

RECEIVED

AUG 14 2015

The Island Regulatory
and Appeals Commission

August 14, 2015

Mr. Mark Lanigan
Regulatory Services
Island Regulatory and Appeals Commission
PO Box 577
501-134 Kent Street
Charlottetown PE C1A 7L1

Dear Mr. Lanigan:

CT4 Filing Docket UE20723
Response to Interrogatories from the Office of the Third Party

Please find attached the Company's response to the Interrogatories filed by Mr. Peter Bevan-Baker, MLA, Office of the Third Party with respect to the CT4 filing. An electronic copy will follow shortly which will include attachments referred to in the responses.

Yours truly,

MARITIME ELECTRIC



Jason C. Roberts
Director, Regulatory & Financial Planning

JCR36
Enclosure

August 14, 2015

Mr. Peter Bevan-Baker, MLA
Office of the Third Party
PO Box 2000
Charlottetown PE C1A 7N8


Dear Mr. Bevan-Baker:

**CT4 Filing Docket UE20723
Response to Interrogatories**

Please find attached the Company's response to your Interrogatories with respect to the CT4 filing. Where the responses refer to an attachment, the file has been provided electronically.

Yours truly,

MARITIME ELECTRIC



Jason C. Roberts
Director, Regulatory & Financial Planning

JCR41
Enclosure

1. Government Third Party

Corporate vision on climate change.

- a) **Does Maritime Electric (MECL) agree with the scientific consensus that climate change is anthropogenic and primarily driven by burning of fossil fuels?**
- b) **Does MECL recognize that PEI is highly vulnerable to many of the effects of climate change?**
- c) **Does MECL believe that, as a major emitter of greenhouse gases, the energy sector should play an integral and leadership role in reducing GHG emissions to mitigate climate change?**

Response: a), b) and c)

To simply respond “yes” to the above questions as posed without being able to clearly articulate why would be meaningless. Maritime Electric’s perception is that there is a range of opinion on the extent to which man-made emissions of greenhouse gases are responsible for climate change, and that a significant amount of research would be necessary in order to develop an informed opinion on the matter. The Company has not done the necessary level of research.

Maritime Electric is a Corporate Utility Member of the Canadian Electricity Association (CEA). The purpose of the CEA is to serve as the collective voice of the electricity industry in Canada. It does this by fostering cooperation among electricity industry participants across Canada and by delivering a coherent industry viewpoint to decision makers on critical policy and regulatory issues.

A condition of Corporate Utility Membership in CEA is participation in the Association’s Sustainable Electricity Program. One of the principles of the Sustainable Electricity Program is “Climate Change Mitigation and Adaptation: Mitigate greenhouse gas emissions from facilities and operations, and adapt to the adverse effects of climate change on electricity infrastructure”.

The CEA 2014 Sustainable Electricity Annual Report shows that the electricity sector is leading the way in reducing greenhouse gas emissions in Canada. The following is taken from page 26 of the Report.

“The electricity sector is responsible for about 12 per cent of all carbon dioxide equivalent (CO₂eq) emissions in Canada [in 2013] ... by 2020, Environment Canada projects that the electricity sector as a whole will reduce CO₂eq emissions by 41 million tonnes (Mt), accounting for approximately one-third of Canada’s total 2020 GHG reduction target of 17 per cent from 2005 levels under the Copenhagen Climate Change Accord ...”

PEI is a contributor to these electricity sector CO₂ reductions, primarily through the large increase in the use of wind power for electricity generation. In 2005, 3.3 % of PEI’s electricity supply was from wind generation – currently it is approximately 25 %.

2. Government Third Party

Sources of information. Please provide a bibliography supplying the following information.

- a) **What research has MECL itself conducted on renewable energy options for PEI?**
- b) **What studies, reports, research, expert opinions, industry opinions, and other sources information were considered by MECL employees in determining that the CT4 option is the best option for PEI?**

Response: a)

Please see the responses to 3. and 4. for some of Maritime Electric's analysis and conclusions regarding renewable energy options for PEI.

Response: b)

Maritime Electric's determination that the proposed CT4 is the best option for PEI is the result of analysis that is based on widely accepted principles of good utility practice. Examples of these principles and how they factored into the Company's analysis and conclusions are described in the following.

15 % Planning Reserve requirement

Under the Interconnection Agreement with NB Power, Maritime Electric is required to have installed or contracted for an amount of generating capacity that is equal to at least 115 % of the Company's firm peak load. The purpose of this requirement is to ensure that Maritime Electric has an adequate amount of extra generating capacity (i.e. a minimum of 15 %) to provide for unplanned outages of generators or loads that are higher than forecast. This criterion determines the total amount of generating capacity that Maritime Electric requires.

N-1 planning criterion

A widely accepted reliability criterion in the electric utility industry is that the system (consisting of the generators and the main transmission lines) should be able to withstand the worst-case single contingency failure without a resulting loss of load. In the past Maritime Electric had based its planning on the worst-case single contingency failure being the loss of one of the submarine cables. This determined the amount of generating capacity that needed to be installed in PEI, in that the amount of generating capacity in PEI plus the 100 MW capacity of the remaining submarine cable needed to be at least equal to the peak load.

However, the worst-case single contingency is now a constraint on the New Brunswick transmission system that results in Maritime Electric's supply from the mainland being limited to 80 MW. The installation of two new submarine cables will not change the situation. What is needed is transmission system additions in New Brunswick or additional generating capacity installed in PEI or in southeastern New Brunswick on the PEI side of Moncton. Since NB Power has no plans to upgrade its transmission system, and there are no opportunities for additional generating capacity to be installed in

southeastern New Brunswick in the needed time frame, additional generating capacity is needed in PEI to accommodate load growth and due to the need to retire the Charlottetown Thermal Generating Station (CTGS), with the accompanying removal from service of its 60 MW of capacity.

It is not cost effective to refurbish the CTGS

The CTGS boilers and turbines were installed in the 1950s and 1960s, with the newest unit being 48 years old. Based on a 2010 consultant's report, Maritime Electric estimated the cost of a 15-year life extension to be approximately \$35 million. At that time MECL determined that replacing the CTGS with a combustion turbine would be more cost effective when operating costs are taken into account. An updated version of that analysis is included in the Company's application to IRAC for approval of CT4. Retirement of the CTGS will result in the loss of 60 MW of on-Island generating capacity.

Capacity value of wind generation based on industry criteria

Maritime Electric's calculations to assign a capacity value to the 92 MW of wind generation that the Company has under contract were based on:

- The electric utility industry Loss Of Load Expectation (LOLE) methodology
- The Northeast Power Coordinating Council (NPCC) one day in ten years reliability criterion. This criterion requires that the probability that firm load will need to be shed due to insufficient generating capacity should be no more than one day in ten years

Under the LOLE methodology, the capacity value (i.e. the Effective Load Carrying Capability) of wind generation is the additional load that the system can supply with the wind generation added to the system, while still maintaining the same level of reliability of supply. The level of reliability of supply that was used in the calculations is the one day in ten years criterion.

With a capacity value assigned to the wind generation, the amount of existing on-Island generating capacity is known, and the additional amount of on-Island generating capacity that is needed can be determined.

Maximum generator size no more than 30 percent of firm peak load

Under the Interconnection Agreement with NB Power, the maximum amount of capacity from any one generator that can be counted on in meeting Maritime Electric's capacity requirement is equal to 30 % of the firm peak load. The purpose of this requirement is to guard against "putting too many eggs in one basket". In 2014 Maritime Electric's firm peak load was 209 MW, and 30 % of this is 63 MW. Thus 63 MW represents an upper limit on the size of generator for Maritime Electric. A larger generator could be considered, but the benefits of any economies of scale would need to outweigh the extent to which not all of the larger unit's capacity could be used in meeting the Company's capacity requirement.

A simple cycle combustion turbine is the lowest cost generator

A simple cycle combustion turbine is one that has no added equipment to recover heat from the exhaust gases in order to produce steam that can be used to generate additional electricity, and thus lower the overall cost of electricity production. A simple cycle combustion turbine typically has the lowest installed cost of any generating option, and thus is the appropriate choice for an application that involves a low number of operating hours. Maritime Electric's on-Island oil-fired generators are used in a standby and peaking role, and normally only operate for 100 – 200 hours per year. Thus, a simple cycle combustion is the appropriate generating technology choice for CT4.

There are significant economies of scale in combustion turbine technology

Schedule 1 in the attached workbook "Government Third Party IRs - Q 2, 3 & 4 – CT4.xlsx" is intended to demonstrate that there are significant economies of scale in combustion turbine technology. For a range of capacities, it shows how the \$/kW cost for equipment supply for simple cycle combustion turbines decreases as the capacity rating (in MW) increases. Thus, everything else being equal, installing one large unit will result in a lower cost than installing two or more units that have a total capacity equal to the larger unit. Given that 63 MW (based on 30 % of firm peak load) represents an upper limit on unit size for Maritime Electric, a 50 MW unit would realize most of the economies of scale potentially available to the Company, and thus Maritime Electric has proposed a nominal size of 50 MW for CT4 (The actual size may be slightly different than 50 MW, depending on the particular model selected as a result of a competitive bidding process).

To summarize:

- The total amount of generating capacity that Maritime Electric requires is determined by the 15 % planning reserve requirement under the Interconnection Agreement with NB Power.
- The portion of this generating capacity that needs to be in PEI is determined by the N-1 criterion, such that the on-Island generating capacity plus the limit of 80 MW of firm capacity from New Brunswick is at least equal to the peak load.
- The need to retire the CTGS, with the resulting loss of the 60 MW of on-Island generating capacity that it provides, was determined with the assistance of ROS Consulting.
- The capacity value of the on-Island wind generation that Maritime Electric has under contract was determined using the industry Loss Of Load Expectation calculation, which has as one of its inputs the NPCC one day in ten years reliability criterion.
- 63 MW (based on the 30 % of firm peak load criterion under the Interconnection Agreement with NB Power) represents an upper limit on generating unit size for Maritime Electric.
- A simple cycle combustion turbine is the lowest cost technology choice for the needed additional on-Island generating capacity, given the low number of operating hours expected for CT4.
- There are significant economies of scale in combustion turbine technology. A 50 MW unit would provide Maritime Electric with most of the available economies of scale, given an upper size limit of 63 MW.

Maritime Electric

UE20723 (CT4) Responses to Interrogatories -

Government Third Party

- Maritime Electric has therefore determined that a simple cycle combustion turbine with a nominal rating of 50 MW (to be designated as CT4) is the best option for PEI.

3. Government Third Party

Specific renewable alternatives. Please provide any relevant documentation showing MECL's work on these or similar options, especially with regards to the costs and implementation barriers of such alternatives.

- a) **Prior to the Energy Accord being finalized, Ecosystec Canada presented a proposal to MECL to build a 25 MW biomass generator on PEI. What is the current status of this project? Was this proposal considered as a potential alternative to CT4? If so, please provide an explanation as to why it was not a feasible alternative to CT4, and why it was not included in the CT4 filing.**
- b) **Has MECL considered the implementation of batteries and other electricity storage technology as a means of either: (i) storing electricity generated from intermittent renewables for use when they are not generating or (ii), offsetting or compensating for peak demand?**
- c) **Has MECL studied the feasibility of total or wave generation on PEI?**
- d) **What capacity and cost savings does MECL anticipate could be achieved from the implementation of "smart grid" technology?**
- e) **MECL plans to invest \$10.9 million over five years through a demand side management plan to reduce peak load by 10 MW. How much would it cost to implement a DSM plan to maintain peak demand at its current level, i.e. to offset all future increases in peak demand? How much capacity reduction could be attained if the \$68 million budgeted for CT4 was invested instead in DSM measures?**
- f) **What are the potential impacts of greater distributed generation (i.e. residential PV and wind systems) on the PEI electrical system? Is there a limit to how much distributed generation capacity the current system can handle? What is the potential of greater distributed generation on PEI in terms of (i) additional generation capacity, (ii) additional energy storage capacity, and (iii) base load and peak demand reductions?**
- g) **What other renewable or low greenhouse gas emitting energy technologies have MECL examined for use in PEI? Please list all technologies considered and a summary of how they were evaluated.**
- h) **If none of the above options are individually appropriate alternatives to the CT4 option, could some combination thereof be a feasible alternative?**

Response: a)

Evaluation of proposed biomass projects in the past has demonstrated that for electricity generation from biomass to be economical (in terms of the cost of electricity supply to Maritime Electric and its customers), some combination of the following is required:

1. The biomass fuel is available at no cost. Examples of this are at a pulp and paper mill or at a sawmill.
2. The project has a cogeneration component; i.e. there is a heating load that can use some of the energy that would otherwise be rejected in the condenser of the steam turbine.
3. There is a revenue stream or other form of financial benefit to the project from Government that is in recognition of job creation or other benefits to the local economy that result from the project.

Government Third Party

In the early 1990s Maritime Electric cooperated with the Province of PEI on the evaluation of a proposed biomass project that would supply electricity to Maritime Electric and heat to the district heating system in Charlottetown. Perceived benefits to the PEI economy included forestry sector jobs and an upgrading of the Province's forestry resource. After extensive analysis, the Province decided not to proceed with the project.

In the mid-2000s Maritime Electric received a proposal from an independent developer for the Company to purchase the electricity from a 25 MW biomass fired generating plant to be located in PEI. A large portion of the biomass supply would have come from off-Island, the project did not have a cogeneration component, and there was no revenue stream from Government. Maritime Electric's evaluation showed that the cost of electricity from the project would have been higher than from the Company's other sources of supply, and the project did not proceed.

The Ecostec Canada's proposed 25 MW biomass fired generator is not considered to be a viable alternative to CT4. Most of the biomass fuel would be procured/purchased from others. The project has a cogeneration component – a vegetable greenhouse – but the opinion of the Province was that the business case for the greenhouse operation was not strong enough to warrant support from Government.

The installation of CT4 does not preclude the Ecostec project or a similar project. As table 1 in the Application shows, Maritime Electric will need additional generating capacity by 2020, and on-Island generation would be the Company's preferred choice, all other things being equal.

Response: b)

Battery storage is currently not cost effective, either for managing the output of intermittent resources or for offsetting peak demand.

As an example, consider the recently announced "Powerwall" system by Tesla. Its features are:

- A 7 kWh battery that is intended for daily cycling and can be cycled 5,000 times;
- It has a DC to DC converter, so an intended application is to be connected between a home's solar panels and the home's DC to AC inverter;
- Retail price of \$US 3,000; and
- Installation price of \$US 500.

Using an exchange rate of \$Cdn/\$US = 0.80 and HST at 14 %, the installed cost would be \$Cdn 4,988.

Assuming financing at 5 % over 20 years, the annual payment for the battery would be \$400/year. Spreading the cost of the battery over its useful life gives 23 cents per kWh for just the cost of the battery ($(\$400/\text{year} \times 20 \text{ years}) / (7 \text{ kWh} \times 5,000)$). With 15 cents per kWh as the cost of electricity from rooftop solar photovoltaic panels, to use

battery storage to manage the output from the solar PV panels would more than double the cost of electricity so delivered.

The 10 kWh version of the Powerwall has a retail price of \$3,500, but it is intended for weekly or emergency cycling duty, with a cycle life of 1,000 – 1,500 cycles, so its cost per kWh would be even higher.

Tesla has also announced a larger version, called the Powerpack, which is intended for larger applications, such as peak load reduction. Its features are:

- 100 kWh of storage;
- A price point of \$US 250/kWh, or \$US 25,000 for a unit; and
- It would need an inverter to connect with the grid. The price for inverters is \$US 300/kW.

With 100 kWh of storage, a Powerpack could supply 25 kW for 4 hours in a peak shaving role. This would result in a \$US 25,000/25 kW = \$US 1,000/kW price for the unit.

Using an exchange rate of \$Cdn/\$US = 0.80, and without taking into account installation costs, the cost for the Powerpack would be $((\$US 1,000/kW + \$US 300)/kW) / 0.80 = \$Cdn 1,625/kW$. This is higher than the \$Cdn 1,360/kW estimated cost for CT4 (\$Cdn 68 million/50,000 kW).

Response: c)

Other than the barrage type of installation for tidal power, an example of which is the Annapolis Royal plant in Nova Scotia, tidal and wave generation technology is still at the research and development stage. If and when the technology does become commercially viable, Maritime Electric expects that it will first be deployed in areas with better tidal (e.g. the Bay of Fundy) and wave energy resources than are available in PEI.

Response: d)

A conclusion of the PowerShift Atlantic project was that the shifting of load through the use of “smart grid” technology is currently not cost effective due to the high cost of aggregating customer loads and communications infrastructure.

To provide an indication of the potential reduction in peak load due to load shifting, the attached Schedule 2 in the workbook “Government Third Party IRs-Q2,3&4-CT4.xlsx” shows the Maritime Electric load curve for a cold day in January 2015. The peak load was 236 MW for the hour ending at 6:00 p.m. The average load for the day was 198.5 MW, which is shown by the horizontal line. This shows that, with perfect forecasting and load shifting, the peak could have been reduced by as much as $236 \text{ MW} - 198.5 \text{ MW} = 37.5 \text{ MW}$, or 16%.

Response: e)

The question appears to be based on an assumption that there is a large amount of additional cost effective energy efficiency and demand side management (DSM) that could be done if only more money was made available. This is not the case. Maritime Electric’s analysis has identified a limited amount of cost effective energy efficiency and DSM, and the Company’s proposed Plan is intended to implement all of it.

If anything, the 10 MW peak reduction target is aggressive. For example, the measure to incent the installation of heat pumps that will operate down to -25 C for buildings with electric resistance heating assumes a 100 % participation rate; i.e. assumes that all of the estimated 360 buildings per year with electric resistance heat that install a heat pump will install a unit that can operate down to -25 C.

Response: f)

Maritime Electric’s view is that deployment of distributed wind generation in PEI should not be encouraged through Government policy. The reason is the significant economies of scale which are available for wind power.

The table below is intended to demonstrate the economies of scale in wind power. It compares a utility-size wind turbine (i.e. greater than 1,000 kW) and a 50 kW wind turbine, similar in size to those that were installed at four rinks across PEI a few years ago.

ECONOMIES OF SCALE IN WIND POWER			
Size of Wind Turbine	kW	1,000+	50
Installed Cost	\$/kW	2,000	5,000
Annual Capacity Factor	%	36	25 (in a good location)
Cost of Electricity Produced	Cents/kWh	9	30

Because the PEI load can only absorb a certain amount of wind power, it should come from the lowest cost sources. Installing small scale wind turbines on the distribution system will displace the opportunity to install additional large scale wind turbines that are much more cost effective.

The cost for solar photovoltaic (PV) generation is approaching Maritime Electric’s first block energy charge for Residential customers (13.16 cents per kWh plus HST at 14 % is 15.0 cents per kWh). Based on an advertised installed cost of \$2.10/kW for a solar PV system by a local firm, and using an annual capacity factor of 14 % and 5 % financing, the cost of solar PV generated electricity is approximately 15 cents per kWh. This, in combination with the subsidy provided by net metering, could result in a large uptake of solar PV by homeowners in the next few years.

The attached Schedule 3 in the workbook “Government Third Party IRs-Q2,3&4-CT4.xlsx” is intended to show the subsidy benefit provided by net metering for a typical Residential customer using 650 kWh per month on average who installs a solar PV

Government Third Party

system that is sized to generate electricity equal to the homeowner's annual usage. Schedule 3 shows that an estimated 35 % of the solar PV output is used directly by the household's load, while 65% of the output flows into the grid to be credited against the customer's usage at a later time.

The subsidy arises from the homeowner effectively receiving the retail price (i.e. 13 cents per kWh) for all the solar PV generation, while the value to the utility and the rest of the customers is the displacement of purchased electricity at the wholesale price (in the order of 8 cents per kWh). The difference of 5 cents per kWh pays for the grid infrastructure, without which net metering would not be possible. However, the more energy the customer with net metering sends to the grid for credit at the retail price against future use, the smaller the contribution that customer makes toward the cost of the grid.

Four potential impacts of a large scale deployment of distributed solar PV in PEI are:

- There may be a requirement to increase the size of some distribution transformers, depending on the extent to which solar PV installations occur in clusters as compared to being uniformly spread across the Province;
- Solar PV might supply as much as 10 % of the annual energy requirement. In Response: 4. c) it is suggested that there is room under the load curve for 60 - 100 MW of solar PV. 100 MW of solar PV at a 14 % annual capacity factor would generate 122,600 MWh yearly, which would correspond to 10 % of Maritime Electric's electricity supply requirement;
- NB Power's (or others) collaboration would be needed for a large scale deployment of solar PV in PEI, whether it is done through utility scale installations or through a distributed generation approach. Maritime Electric normally does not run its on-Island oil-fired generators, and therefore cannot provide the load following that is needed for intermittent generation to be integrated into the energy supply mix. NB Power currently does the load following for PEI's load and wind generation, and the current level of wind generation in PEI and New Brunswick has largely used up NB Power's generating capacity that is normally available to do load following; and
- The fact that in PEI net metering is a subsidy would become apparent. Under net metering, the customer's generation either directly displaces electricity that the customer would have purchased at the retail price (approximately 13 cents per kWh plus HST at 14 % in the case of a Maritime Electric Residential Rate customer) or in the case of excess generation it flows into the grid to be later credited at the retail price against the customer's usage when his load is greater than his generation. In both cases the customer avoids paying the retail price (13 cents per kWh) while the avoided cost to the utility is the wholesale energy supply price (approximately 8 cents per kWh for Maritime Electric). The difference of 5 cents per kWh would have gone to pay for the grid infrastructure, which is what enables the customer's PV system to supply his load without the need for on-site storage. For 122,600 MWh, this difference of 5 cents per kWh (equal to \$50/MWh) would amount to \$6.1 million annually. If Government policy was to continue to require that net metering be available to customers, then a general rate increase of 3 % would be required (\$6.1 million over Maritime Electric's approximately \$200 annual revenue requirement) to recover the \$6.1 million from the rest of the customers.

Without storage, distributed solar PV will not provide base load capacity or peak demand reductions in PEI. Base load electricity supply is generation that is delivered 24 hours per day, usually at a constant rate. Solar PV is available only during daylight hours, and then only to the extent that it is not limited by the angle of the sun in the sky or overcast conditions. Also, solar PV will not provide peak demand reductions because the PEI system peak load normally occurs for the hour ending 6:00 p.m. in December or January, after sunset.

As discussed in Response 3 b), storage is currently not cost effective.

In reading the literature of the solar energy industry, it is important to remember that much of it is focused on the United States, where circumstances are often different from those in PEI. For example, in much of the U.S. the annual system peak occurs during mid-to-late afternoon in summer, driven by air conditioning loads. In those circumstances, solar PV does provide a reduction in peak load, and there is a debate as to whether net metering results in the customer with solar PV subsidizing the rest of the grid as opposed to the rest of the grid subsidizing the customer with solar PV.

Response: g)

Maritime Electric's focus has been mainly limited to biomass, wind power and solar.

Response: h)

Maritime Electric believes that a combination of renewable energy, energy efficiency and demand side management options do not offer a feasible alternative to CT4.

4. Government Third Party**Long term planning.**

- a) Does MECL have a long term strategic plan? If so, please provide it.
- b) Does MECL have a long term plan to phase out fossil fuel generation? If so, please provide it.
- c) What are the main barriers to increasing the amount of renewable energy produced and consumed on PEI (ex. Cost, intermittency, availability, technical)? What actions are MECL taking to reduce these barriers? Which barriers are out of its control?
- d) What is the projected effect of future carbon pricing initiatives on the cost of operating CT4 and other fossil fuel based generation? How will this affect the Company's revenues and profits? How will it affect electricity rates for consumers?
- e) How will carbon pricing affect the feasibility of using renewable energy alternatives on PEI?
- f) Please provide the estimated decommissioning cost for all existing generation assets, including the anticipated cost for CT4.

Response: a)

Maritime Electric does not prepare a long term strategic plan document on a regular basis. Generation planning is an ongoing activity, and when a decision is made to seek approval for a major contract or addition of generating capacity, the Company's analysis and conclusions that led to the decision are documented as part of the application for approval and accompanying evidence.

Response: b)

Maritime Electric believes that a complete phase out of fossil fuel generation is an unrealistic expectation for PEI. Because of geography, on-Island oil-fired generators are expected to be an ongoing requirement for reliability of supply. However, the amount of operating hours for these generators is expected to be small, such that their output will represent less than one percent of the Company's overall electricity supply (see the table in Response 4 d).

Response: c)

The main barriers to increasing the amount of wind generation for PEI are intermittency and the fact that 25 % of PEI's electricity is already being supplied by wind power.

The attached Schedule 4 in the workbook "Government Third Party IRs-Q2,3&4-CT4.xlsx" shows the output from a wind farm for a month with generation at 38 % capacity factor (which is about average for a year). A capacity factor of 38 % means that the wind farm would provide 38 % of the energy needed to supply a steady load equal in size to the installed nameplate rating of the wind farm. Schedule 4 shows how the output from a wind farm varies intermittently through the month, and it also shows the extent to

Government Third Party

which other generators must vary their output in order to supply the remaining 62 % of the load equal in size to the nameplate rating of the wind farm.

Increasing the amount of wind generation for PEI will need to be done in collaboration with NB Power. Maritime Electric normally does not run its on-Island oil-fired generators, and therefore cannot provide the load following that is needed for intermittent generation to be integrated into the energy supply mix. NB Power does the load following for PEI's load and wind generation, and the current level of wind generation in PEI and New Brunswick has largely used up NB Power's generating capacity that is normally available to do load following.

With 92 MW of wind generation under contract, Maritime Electric has reached the point where contracting for additional wind generation under the same terms as the existing contracts will result in times when there is more wind generation than load. Schedule 5 in the workbook shows that this will first occur in the middle of the night during lower load periods. The Company expects that future power purchase agreements for wind generation will need to have provisions for the utility to be able to not take a portion of the wind farm's output. An offsetting provision will probably be a higher price for the output that the utility does purchase.

For solar PV, the main barriers are cost and intermittency. Because the PEI system peak occurs for the hour ending 6:00 p.m. in December or January, which is after sunset, solar PV will supply energy but not capacity. At 15 cents per kWh, the cost of solar PV is approximately double the cost of the Company's current energy purchases.

Schedule 5 also shows the potential contribution that solar PV could make to Maritime Electric's energy supply. Schedule 5 shows the daily load curve for an average day, i.e. a summer day in which the amount of energy under the load curve is approximately equal to the Company's annual electricity supply divided by 365 days in a year. The bubble shows where solar PV generation would fit under the load curve. The height of the bubble shown is approximately 60 MW. In practice this could be increased to say 90 or 100 MW, assuming that the solar panels would not all be oriented due south, but would have orientations ranging from southeast to southwest. 100 MW at 14 % annual capacity factor would represent 122,600 MWh, which would be approximately 10 % of the Company's annual energy supply requirement.

NB Power's collaboration would also be needed for any large scale deployment of solar PV in PEI because of the associated additional load following requirements.

Response: d)

The following table shows the estimated CO2 emissions associated with Maritime Electric's electricity supply for 2014. System energy is energy supplied from NB Power's system generally – the generation source is not known to the purchaser. The 0.6 kg/kWh emissions rate shown for system energy is an estimate; it is less than for coal fired generation but more than for combined cycle natural gas fired generation. If NB Power is sourcing some of its supply for Maritime Electric from Hydro Quebec, then the

overall value is probably less than 0.6 kg/kWh.

The table also shows an estimated cost associated with the CO2 emissions, using an indicative price of \$40/tonne.

ESTIMATED CO2 EMISSIONS FOR MARITIME ELECTRIC 2014 ELECTRICITY SUPPLY				
Source	Energy supply (MWh)	Emissions rate (kg/kWh)	Emissions (tonnes)	Cost at \$40/tonne (\$millions)
On-Island oil-fired generation	8,300	1.0	8,300	0.3
On-Island wind generation	291,400	0.0	0	0.0
Point Lepreau participation (nuclear)	208,000	0.0	0	0.0
System purchases from NB Power	<u>753,000</u>	0.6	<u>451,800</u>	<u>18.1</u>
Total	1,260,700		460,100	18.4

Maritime Electric expects that its on-Island oil-fired generators, including CT4, will continue to be used in a standby and peaking role, with the total annual generation quantity being similar to the 8,300 MWh shown for 2014. Therefore the projected effect of potential future carbon pricing initiatives on the cost of operating CT4 and Maritime Electric's other on-Island oil-fired generators is expected to be small because of their low number of operating hours.

The costs that Maritime Electric incurs for generation fuel and purchased energy are recovered through rates from customers with no added markup. Thus to the extent that future carbon pricing initiatives result in an increase in costs to Maritime Electric for fuel and purchased energy, the Company expects that under the cost of service regulatory model these additional costs would be recovered from customers through rates.

Using an annual revenue requirement of \$200 million for Maritime Electric (i.e. the annual cost of supplying electricity service to its customers, which is the amount that the Company recovers from customers through rates under the cost of service regulatory model), an added cost of \$18 million for CO2 emissions would correspond to a rate increase of 9 percent for customers.

Response: e)

Based on the table in Response 4 d), a CO2 emissions cost of \$18.1 million for the 753,000 MWh of system purchases would correspond to an increase in their cost of \$24/MWh (i.e. 2.4 cents per kWh). This increase would be expected to make it more cost effective to use more renewable energy. For example, Maritime Electric expects that it would then be more cost effective to contract for additional wind generation on terms that provide for a portion of the wind farms' output to be curtailed when there is an overall excess of wind generation relative to load or to assist with load following. However, an

accompanying result would be an increase in customers' bills.

Response: f)

Decommissioning costs for utility assets are generally referred to as future net salvage, expressed as a percentage of plant in service, where net salvage is defined as gross salvage (scrap proceeds) less the estimated cost of removal. In cases where estimated, removal costs are expected to exceed the salvage proceeds, a negative net salvage percentage is calculated.

The recent 2014 Depreciation Study prepared by Gannett Fleming, and filed by the Company as the basis of its Depreciation Study Application (UE21603), discusses the net salvage concept and the estimates included in the study related to the Company's generating assets. The study states (page IV-3):

"...the net salvage estimates were largely based on considerations of several factors including the net salvage characteristics of other electric utilities, a knowledge of management's plans and operating practices, current removal cost estimated by company engineers for certain mass plant accounts expressed in dollars per unit and previous net salvage estimates used by Maritime Electric. The estimates of net salvage are expressed as a per cent of the cost of plant retired."

The net salvage for the Charlottetown Steam Plant is expected to occur mostly in connection with the final retirement of the Plant. In order to estimate terminal net salvage accurately, a site-specific decommissioning study is required. Gannett Fleming recommends that the Company undertake such a study in the future. It is generally recognized that the cost of decommissioning and dismantling a steam plant will significantly exceed the salvage received for any reusable equipment or material at the plant. The proposed net salvage estimate of negative 10 per cent is based on net salvage estimates used by other electric companies for similar plants and is recommended until a site-specific decommissioning study can be performed."

As part of the Company's Depreciation Study Application, it has proposed to undertake, and file by June 30, 2018, a Decommissioning Study with respect to the Charlottetown Thermal Generating Station that will provide an estimate of the cost of decommissioning this facility. No other decommissioning studies are proposed or have been completed to date.

However, the 2014 Depreciation Study (Table 1, Page VI-5) does provide estimated net salvage percentages which can be used to estimate the cost to remove the existing generation and proposed CT4 assets from service upon the end of their useful lives. The table below shows the estimated cost of removal based upon the Depreciation Study's assumptions.

ESTIMATED COST OF REMOVAL			
Generation Asset	Cost at 12/31/14 (\$)	Estimated Negative Net Salvage (%)	Estimated Cost of Removal (\$)
Charlottetown Thermal Plant	61,170,863	10	6,117,086
Borden CTs	12,768,390	3	383,052
CT3	34,716,216	3	1,041,486
CT4	68,000,000*	3	2,040,000

* Based upon proposed expenditures

5. Government Third Party**Other information.**

- a) What are the capacity factors of the existing generation assets for 2005 – 2015? What is the expected capacity factor after completion of the proposed CT4?
- b) In the CT4 Filing, Table 2 provides the number of occurrences for different peaking generation uses of CT1, CT2 and CT3 in 2014. Please provide the same information for the 10 years previous.

Response: a)

CAPACITY FACTORS				
Year	CT1	CT2	CT3	Thermal CTGS
2005	0.04%	0.11%	0.00%	1.21%
2006	0.07%	0.04%	0.79%	0.63%
2007	0.08%	0.08%	0.06%	0.77%
2008	0.08%	0.07%	0.05%	0.65%
2009	0.05%	0.05%	0.06%	1.06%
2010	0.05%	0.02%	0.04%	0.24%
2011	0.08%	0.07%	0.06%	0.59%
2012	0.23%	0.27%	2.30%	2.98%
2013	0.25%	0.20%	0.58%	0.44%
2014	0.21%	0.08%	0.87%	0.97%
2015	0.10%	0.12%	1.75%	1.68%

Once CT4 is in service the expected capacity factors for the combustion turbines (CT1, CT2 and CT3) are expected to remain the same.

The installation of CT4 will allow for the eventual retirement of the Charlottetown Thermal Generating Station (CTGS).

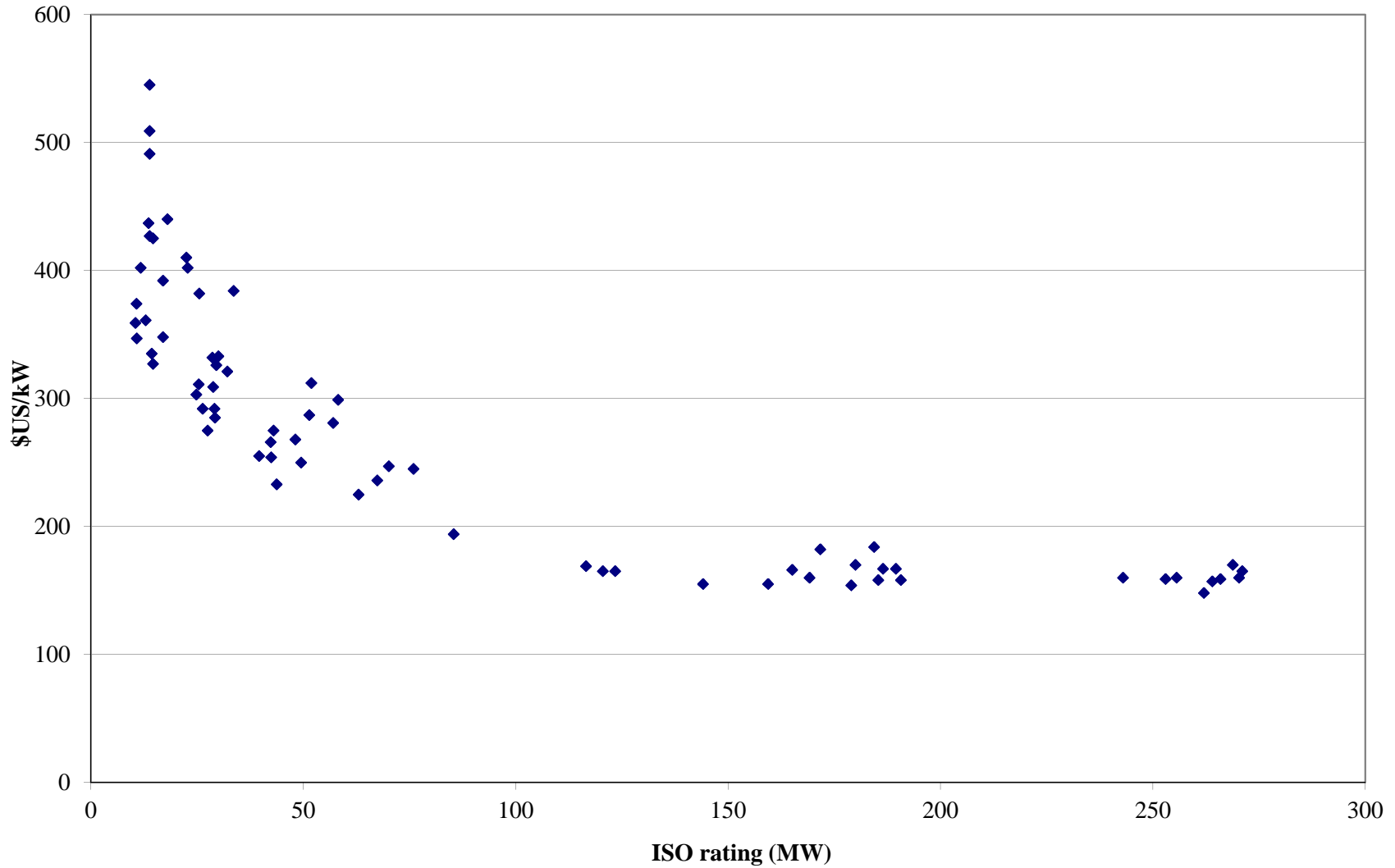
It should be noted that capacity factor is not a performance indicator that is used for peaking and/or standby generating units; capacity factor is used for base load generating stations. Peaking and/or standby generating units are used for reliability purposes and as such a very low capacity factor is expected.

Response: b)

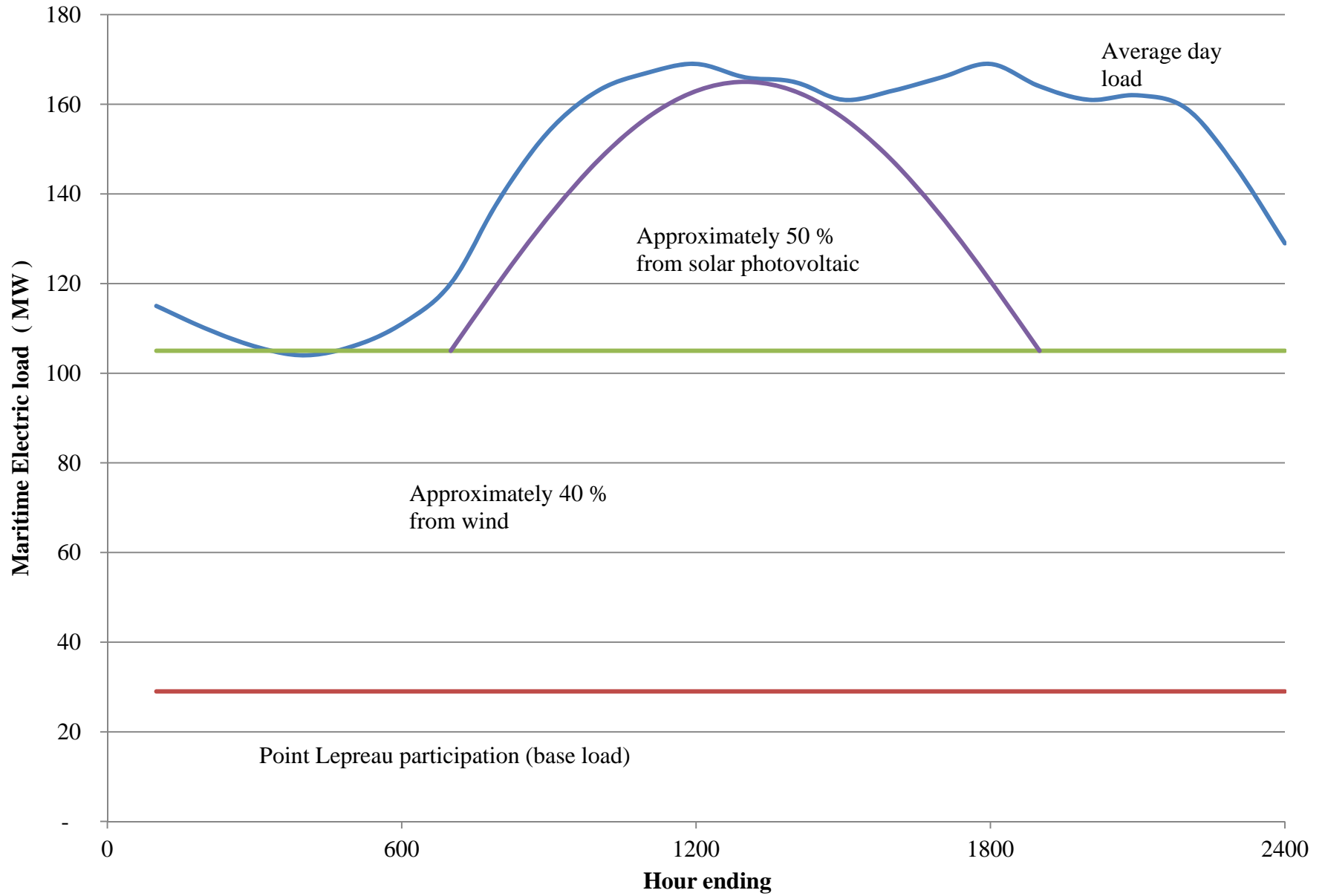
See attached file “Government Third Party IRs-Q5-CT4.xlsx”. Please note that the generation data broken down into the categories indicated is not available for all years requested.

**UE20723 (CT4) Responses to Interrogatories
Government Third Party IRs Q2, 3 and 4 - CT4**

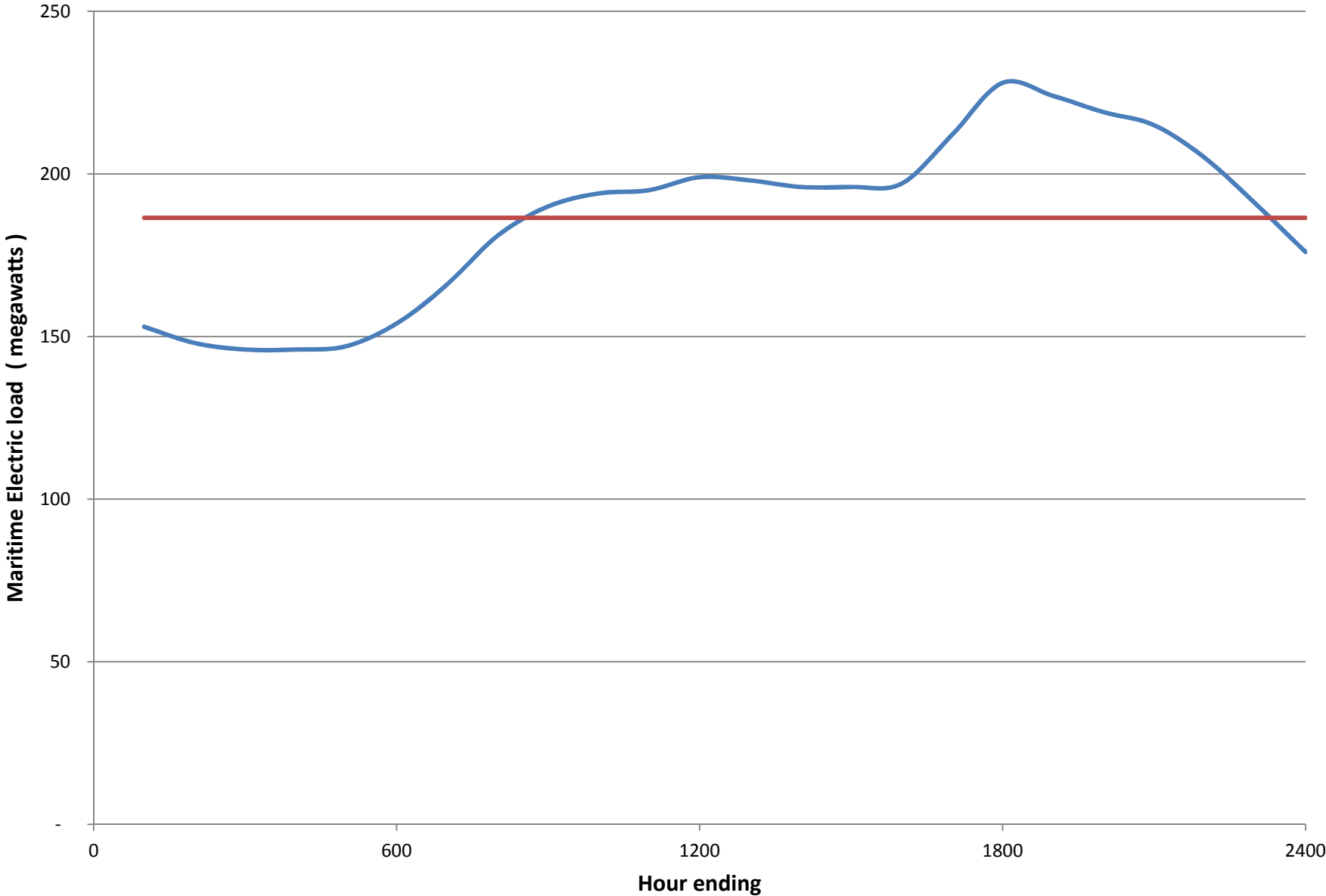
Schedule 1 - Unit Prices for System Cycle Combustion Turbine Equipment Supply - 2003
(Data taken from Gas Turbine World Handbook and used with permission)



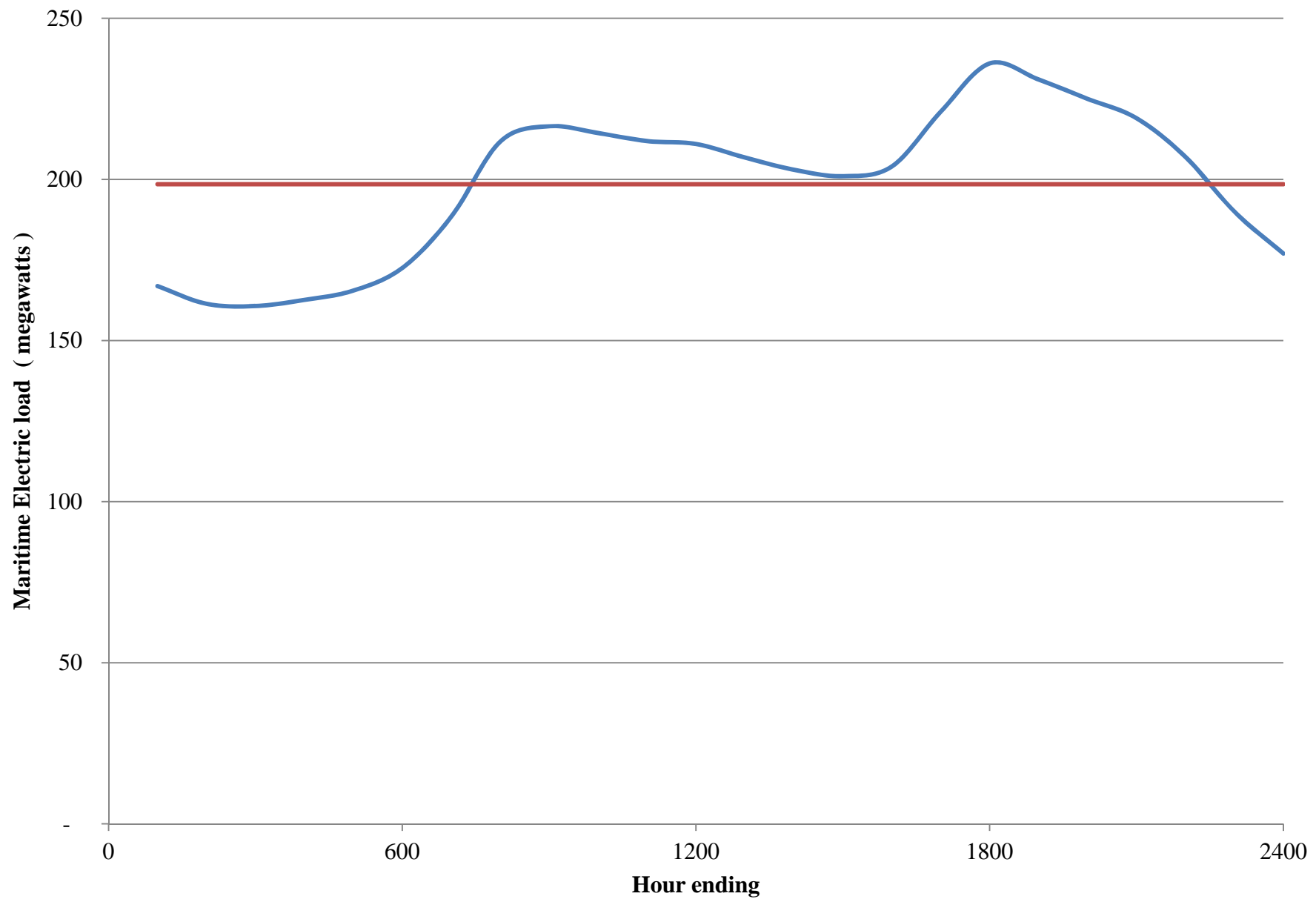
Schedule 5 - Maritime Electric Average Day Load and Potential for Renewables



Maritime Electric load for December 30, 2014



Schedule 2 - Maritime Electric Load for January 6, 2015



Hour ending	December 30, 2014				January 7, 2015				January 6, 2015				January 6, 2015 normalized		
	Maritime Electric load (MWh)	Average load (MWh)	Temperature at start of hour (deg C)	Cavendish Farms (MWh)	Maritime Electric load (MWh)	Average load (MWh)	Temperature at start of hour (deg C)	Cavendish Farms (MWh)	Maritime Electric load (MWh)	Average load (MWh)	Temperature at start of hour (deg C)	Cavendish Farms (MWh)	Cavendish Farms (MWh)	Maritime Electric load (MWh)	Average load (MWh)
100	153	186.5	(9.0)	13.5	166	191.7	(17.6)	13.6	163	195.6	(13.4)	10.0	13.9	167	198.5
200	148	186.5	(10.1)	13.5	162	191.7	(17.5)	13.0	156	195.6	(14.3)	8.5	13.9	161	198.5
300	146	186.5	(10.8)	13.4	162	191.7	(17.4)	13.8	155	195.6	(15.1)	8.2	13.9	161	198.5
400	146	186.5	(11.5)	13.4	158	191.7	(17.5)	13.5	157	195.6	(16.2)	8.3	13.9	163	198.5
500	147	186.5	(12.6)	13.4	161	191.7	(17.5)	13.7	160	195.6	(16.7)	8.4	13.9	166	198.5
600	154	186.5	(13.4)	13.6	170	191.7	(17.6)	14.1	167	195.6	(17.3)	8.4	13.9	173	198.5
700	166	186.5	(13.9)	13.6	187	191.7	(17.5)	14.1	183	195.6	(17.8)	8.5	13.9	188	198.5
800	181	186.5	(14.2)	13.7	207	191.7	(17.1)	14.1	206	195.6	(18.3)	8.2	13.9	212	198.5
900	190	186.5	(14.4)	13.3	210	191.7	(16.9)	14.1	210	195.6	(18.8)	7.4	13.9	217	198.5
1000	194	186.5	(14.2)	13.3	210	191.7	(16.4)	13.9	208	195.6	(19.0)	7.5	13.9	214	198.5
1100	195	186.5	(13.7)	12.6	203	191.7	(15.4)	13.6	206	195.6	(18.9)	8.0	13.9	212	198.5
1200	199	186.5	(12.9)	13.6	200	191.7	(14.4)	13.9	206	195.6	(18.6)	8.9	13.9	211	198.5
1300	198	186.5	(13.6)	13.7	193	191.7	(13.2)	13.7	204	195.6	(18.3)	11.1	13.9	207	198.5
1400	196	186.5	(13.4)	13.8	187	191.7	(12.2)	12.7	202	195.6	(17.7)	12.9	13.9	203	198.5
1500	196	186.5	(12.8)	13.9	186	191.7	(11.7)	13.3	201	195.6	(17.6)	13.7	13.7	201	198.5
1600	197	186.5	(12.8)	13.6	192	191.7	(11.7)	13.8	204	195.6	(16.9)	13.8	13.8	204	198.5
1700	212	186.5	(13.9)	14.0	208	191.7	(11.8)	14.1	221	195.6	(17.4)	14.1	14.1	221	198.5
1800	228	186.5	(14.5)	14.0	224	191.7	(12.6)	14.0	236	195.6	(17.6)	14.0	14.0	236	198.5
1900	224	186.5	(14.4)	13.9	219	191.7	(15.5)	13.7	231	195.6	(17.6)	13.9	13.9	231	198.5
2000	219	186.5	(14.4)	13.9	217	191.7	(16.8)	13.9	225	195.6	(17.4)	13.9	13.9	225	198.5
2100	215	186.5	(14.5)	13.5	213	191.7	(16.6)	13.9	219	195.6	(17.1)	13.9	13.9	219	198.5
2200	205	186.5	(14.7)	13.8	203	191.7	(17.0)	13.9	207	195.6	(17.4)	13.6	13.6	207	198.5
2300	191	186.5	(15.1)	13.8	188	191.7	(15.1)	13.8	190	195.6	(17.7)	13.8	13.8	190	198.5
2400	176	186.5	(15.4)	13.3	174	191.7	(14.2)	13.8	177	195.6	(17.8)	13.7	13.7	177	198.5
	4,476 total				4,600 total				4,694 total				4,764 total		
	186.5 average				191.7 average				195.6 average				198.5 average		

Interrogatories from Green Party
15-08-03

ESTIMATED COST OF SOLAR PV

Price for solar PV panels made by Canadian Solar	\$Cdn / W	1.00	taken from solartrader.ca
Price for a 5 kW pure sine wave inverter	\$Cdn / W	0.50	taken from solartrader.ca
Shipping + Installation	\$Cdn / W	<u>0.60</u>	assumed value to get to \$ 2.10 total
Installed cost based on standard system size of 6.5 kW and larger	\$Cdn / W	2.10	taken from renewablelifestyles.ca
HST at 14 %	\$Cdn / W	<u>0.29</u>	
	\$Cdn / W	<u><u>2.39</u></u>	
Annual cost based on 5 % financing over 20 years	\$ / kW-yr	192.10	
Annual generation for 1 kW at 14 % capacity factor	kWh	1,226	based on DC power rating and average over life of system
Cost of electricity	cts / kWh	15.7	

Interrogatories from Green Party
15-08-03

Announced price for Tesla's 7 kWh Powerwall	\$US	3,000	
Installation cost	\$US	<u>500</u>	Wikipedia, July 27, 2015
Installed cost	\$US	3,500	
\$Cdn / \$US exchange rate		0.80	
Installed cost	\$Cdn	4,375	
HST at 14 %	\$Cdn	<u>613</u>	
	\$Cdn	<u><u>4,988</u></u>	
Annual cost based on 5 % financing over 20 years	\$ / year	400	
Annual electricity delivered from battery	kWh	1,750	7 kWh x 5,000 cycles / 20 years
Cost of battery spread over electricity delivered	cts / kWh	22.9	

Schedule 3 - Disposition of Solar PV Output Under Net Metering

15-08-03

NRCan PV potential for Chtown			For a 6.30 kW residential system (DC rating)						
20 year average (kWh / kW)	Month as % of year	For 14 % capacity factor (kWh / kW)	Annual AC power output (kWh)	Average AC power when gen. (kW)	Hours when generating (hours)	Average household load (kW)	PV output used directly (kWh)	PV output to grid for credit (kWh)	
Jan	61	5.5	68	428	2.84	151	1.0	151	277
Feb	78	7.1	87	548	2.84	193	1.0	193	355
Mar	108	9.8	120	759	2.84	268	1.0	268	491
Apr	103	9.4	115	723	2.84	255	1.0	255	468
May	118	10.7	132	829	2.84	292	1.0	292	536
Jun	123	11.2	137	864	2.84	305	1.0	305	559
Jul	126	11.5	140	885	2.84	312	1.0	312	573
Aug	119	10.8	133	836	2.84	295	1.0	295	541
Sep	98	8.9	109	688	2.84	243	1.0	243	446
Oct	74	6.7	83	520	2.84	183	1.0	183	336
Nov	48	4.4	54	337	2.84	119	1.0	119	218
Dec	44	4.0	49	309	2.84	109	1.0	109	200
	1,100		1,226			7,726		2,725	5,001
								35%	65%

South facing; tilt = latitude - 15 deg

System sized for a household using 650 kWh per month on average

AC kWh output for 1 kW DC power rating, on average over life of system

Inverter efficiency at 90 %

14 % annual capacity factor used to allow for improvements in technology since NRCan analysis was done

Interrogatories from Green Party
15-08-03

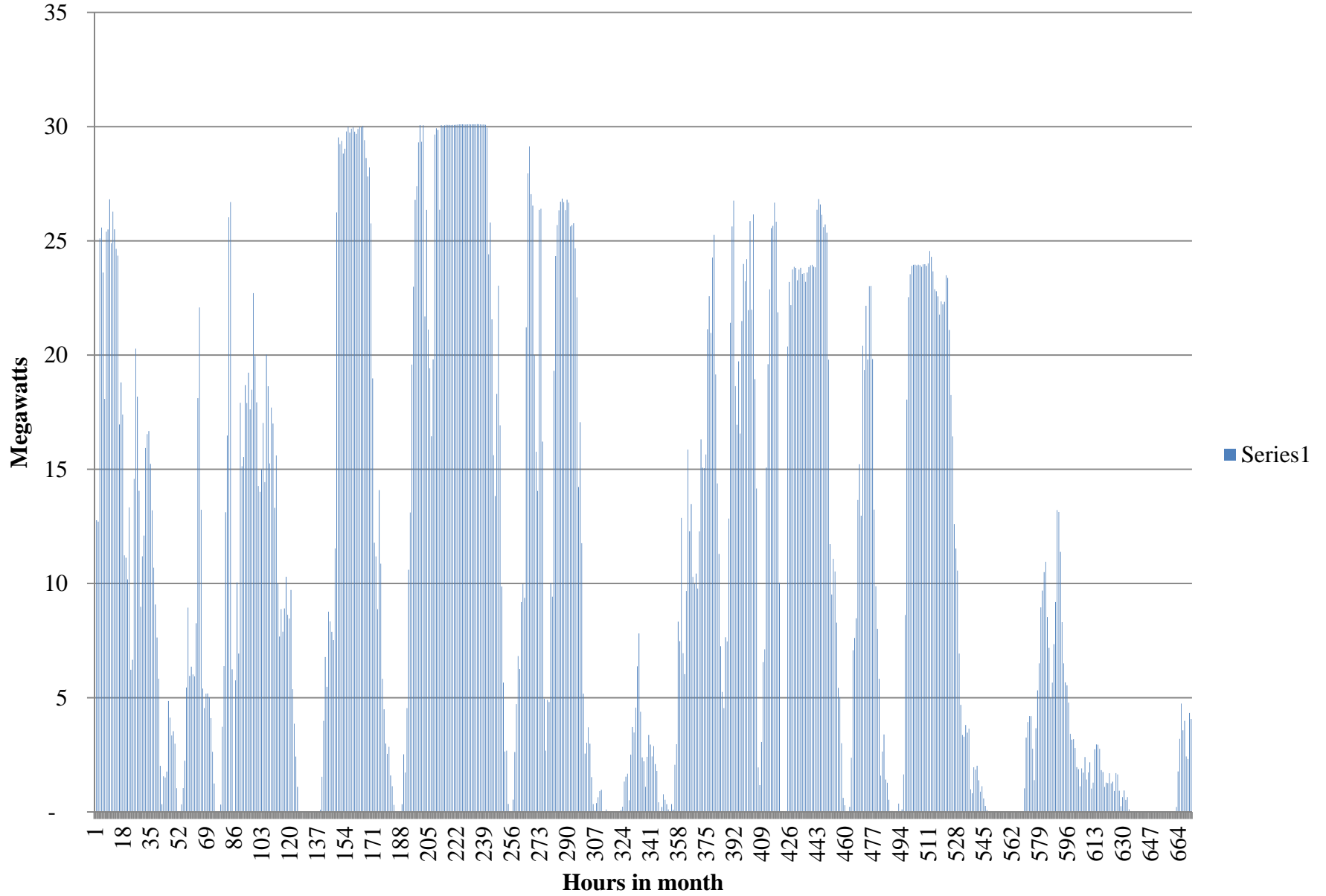
	<u>NRCan PV potential for Chtown</u>			<u>Utility scale wind farm</u>	
	20 year average (kWh / kW)	Month as % of year	For 14 % capacity factor (kWh / kW)	Monthly capacity factor (%)	Average monthly output (kWh / kW)
Jan	61	5.5	68	51.3	382
Feb	78	7.1	87	41.4	278
Mar	108	9.8	120	39.5	294
Apr	103	9.4	115	36.1	260
May	118	10.7	132	28.0	208
Jun	123	11.2	137	27.7	199
Jul	126	11.5	140	21.8	162
Aug	119	10.8	133	26.0	193
Sep	98	8.9	109	37.7	271
Oct	74	6.7	83	45.8	341
Nov	48	4.4	54	48.1	346
Dec	44	4.0	49	54.0	402
	<u>1,100</u>		<u>1,226</u>	38.1	3,337

South facing, tilt = latitude - 15 deg

AC kWh output for 1 kW DC power
rating, on average over life of system

North Cape Phase 1
5 year average (2003-2007)

Schedule 4 - Eastern Kings Wind Farm Output for a Typical Month



Hour ending	Eastern Kings output		PEI load (MWh)
	(kWh)	(MWh)	
2013-Feb-01 01:00:00.000	9,985	10	138
2013-Feb-01 02:00:00.000	12,771	13	131
2013-Feb-01 03:00:00.000	12,707	13	130
2013-Feb-01 04:00:00.000	25,111	25	132
2013-Feb-01 05:00:00.000	25,585	26	135
2013-Feb-01 06:00:00.000	23,613	24	143
2013-Feb-01 07:00:00.000	18,084	18	162
2013-Feb-01 08:00:00.000	25,401	25	181
2013-Feb-01 09:00:00.000	25,498	25	189
2013-Feb-01 10:00:00.000	26,817	27	192
2013-Feb-01 11:00:00.000	24,896	25	191
2013-Feb-01 12:00:00.000	26,275	26	190
2013-Feb-01 13:00:00.000	25,505	26	185
2013-Feb-01 14:00:00.000	24,652	25	183
2013-Feb-01 15:00:00.000	24,352	24	178
2013-Feb-01 16:00:00.000	16,961	17	178
2013-Feb-01 17:00:00.000	18,800	19	186
2013-Feb-01 18:00:00.000	17,394	17	200
2013-Feb-01 19:00:00.000	11,232	11	204
2013-Feb-01 20:00:00.000	11,127	11	200
2013-Feb-01 21:00:00.000	10,182	10	195
2013-Feb-01 22:00:00.000	13,332	13	183
2013-Feb-01 23:00:00.000	6,221	6	173
2013-Feb-02 00:00:00.000	6,659	7	163
2013-Feb-02 01:00:00.000	14,577	15	155
2013-Feb-02 02:00:00.000	20,284	20	148
2013-Feb-02 03:00:00.000	18,183	18	146
2013-Feb-02 04:00:00.000	14,059	14	145
2013-Feb-02 05:00:00.000	8,980	9	146
2013-Feb-02 06:00:00.000	11,188	11	148
2013-Feb-02 07:00:00.000	12,100	12	159
2013-Feb-02 08:00:00.000	15,933	16	171
2013-Feb-02 09:00:00.000	16,540	17	182
2013-Feb-02 10:00:00.000	16,675	17	191
2013-Feb-02 11:00:00.000	15,237	15	190
2013-Feb-02 12:00:00.000	13,201	13	190
2013-Feb-02 13:00:00.000	10,696	11	187
2013-Feb-02 14:00:00.000	9,081	9	182
2013-Feb-02 15:00:00.000	7,636	8	179
2013-Feb-02 16:00:00.000	5,830	6	178
2013-Feb-02 17:00:00.000	2,015	2	185
2013-Feb-02 18:00:00.000	340	0	202
2013-Feb-02 19:00:00.000	1,556	2	208
2013-Feb-02 20:00:00.000	1,505	2	204

2013-Feb-02 21:00:00.000	1,765	2	196
2013-Feb-02 22:00:00.000	4,858	5	189
2013-Feb-02 23:00:00.000	4,127	4	177
2013-Feb-03 00:00:00.000	3,345	3	166
2013-Feb-03 01:00:00.000	3,532	4	156
2013-Feb-03 02:00:00.000	2,986	3	150
2013-Feb-03 03:00:00.000	1,039	1	147
2013-Feb-03 04:00:00.000	-	-	146
2013-Feb-03 05:00:00.000	16	0	146
2013-Feb-03 06:00:00.000	334	0	147
2013-Feb-03 07:00:00.000	1,044	1	152
2013-Feb-03 08:00:00.000	2,240	2	160
2013-Feb-03 09:00:00.000	5,448	5	171
2013-Feb-03 10:00:00.000	8,945	9	182
2013-Feb-03 11:00:00.000	5,952	6	185
2013-Feb-03 12:00:00.000	6,358	6	188
2013-Feb-03 13:00:00.000	6,021	6	189
2013-Feb-03 14:00:00.000	5,937	6	188
2013-Feb-03 15:00:00.000	8,263	8	186
2013-Feb-03 16:00:00.000	18,111	18	190
2013-Feb-03 17:00:00.000	22,083	22	201
2013-Feb-03 18:00:00.000	13,229	13	209
2013-Feb-03 19:00:00.000	5,402	5	208
2013-Feb-03 20:00:00.000	4,544	5	198
2013-Feb-03 21:00:00.000	5,175	5	188
2013-Feb-03 22:00:00.000	5,186	5	176
2013-Feb-03 23:00:00.000	5,015	5	163
2013-Feb-04 00:00:00.000	4,107	4	150
2013-Feb-04 01:00:00.000	2,634	3	140
2013-Feb-04 02:00:00.000	1,247	1	135
2013-Feb-04 03:00:00.000	-	-	134
2013-Feb-04 04:00:00.000	-	-	133
2013-Feb-04 05:00:00.000	-	-	134
2013-Feb-04 06:00:00.000	323	0	142
2013-Feb-04 07:00:00.000	3,729	4	156
2013-Feb-04 08:00:00.000	6,386	6	170
2013-Feb-04 09:00:00.000	13,119	13	181
2013-Feb-04 10:00:00.000	16,475	16	187
2013-Feb-04 11:00:00.000	26,032	26	192
2013-Feb-04 12:00:00.000	26,700	27	197
2013-Feb-04 13:00:00.000	6,246	6	195
2013-Feb-04 14:00:00.000	-	-	192
2013-Feb-04 15:00:00.000	5,759	6	191
2013-Feb-04 16:00:00.000	10,050	10	194
2013-Feb-04 17:00:00.000	6,934	7	204
2013-Feb-04 18:00:00.000	17,908	18	214
2013-Feb-04 19:00:00.000	15,134	15	213

2013-Feb-04 20:00:00.000	15,540	16	208
2013-Feb-04 21:00:00.000	18,686	19	203
2013-Feb-04 22:00:00.000	17,900	18	193
2013-Feb-04 23:00:00.000	19,229	19	180
2013-Feb-05 00:00:00.000	17,622	18	166
2013-Feb-05 01:00:00.000	18,484	18	158
2013-Feb-05 02:00:00.000	22,711	23	156
2013-Feb-05 03:00:00.000	19,959	20	154
2013-Feb-05 04:00:00.000	17,933	18	153
2013-Feb-05 05:00:00.000	14,268	14	154
2013-Feb-05 06:00:00.000	14,014	14	162
2013-Feb-05 07:00:00.000	14,995	15	181
2013-Feb-05 08:00:00.000	17,028	17	200
2013-Feb-05 09:00:00.000	14,438	14	208
2013-Feb-05 10:00:00.000	20,020	20	208
2013-Feb-05 11:00:00.000	18,636	19	204
2013-Feb-05 12:00:00.000	15,256	15	203
2013-Feb-05 13:00:00.000	17,701	18	200
2013-Feb-05 14:00:00.000	17,001	17	196
2013-Feb-05 15:00:00.000	13,313	13	191
2013-Feb-05 16:00:00.000	15,604	16	195
2013-Feb-05 17:00:00.000	10,001	10	205
2013-Feb-05 18:00:00.000	7,675	8	218
2013-Feb-05 19:00:00.000	8,882	9	224
2013-Feb-05 20:00:00.000	7,889	8	220
2013-Feb-05 21:00:00.000	8,907	9	212
2013-Feb-05 22:00:00.000	10,292	10	199
2013-Feb-05 23:00:00.000	8,630	9	187
2013-Feb-06 00:00:00.000	8,467	8	172
2013-Feb-06 01:00:00.000	9,713	10	162
2013-Feb-06 02:00:00.000	5,375	5	158
2013-Feb-06 03:00:00.000	3,863	4	156
2013-Feb-06 04:00:00.000	2,424	2	156
2013-Feb-06 05:00:00.000	1,097	1	157
2013-Feb-06 06:00:00.000	16	0	164
2013-Feb-06 07:00:00.000	-	-	182
2013-Feb-06 08:00:00.000	-	-	183
2013-Feb-06 09:00:00.000	-	-	181
2013-Feb-06 10:00:00.000	-	-	188
2013-Feb-06 11:00:00.000	-	-	185
2013-Feb-06 12:00:00.000	-	-	185
2013-Feb-06 13:00:00.000	-	-	186
2013-Feb-06 14:00:00.000	-	-	181
2013-Feb-06 15:00:00.000	-	-	179
2013-Feb-06 16:00:00.000	-	-	182
2013-Feb-06 17:00:00.000	-	-	195
2013-Feb-06 18:00:00.000	-	-	206

2013-Feb-06 19:00:00.000	92	0	210
2013-Feb-06 20:00:00.000	1,535	2	206
2013-Feb-06 21:00:00.000	3,986	4	201
2013-Feb-06 22:00:00.000	6,781	7	192
2013-Feb-06 23:00:00.000	5,476	5	175
2013-Feb-07 00:00:00.000	8,768	9	162
2013-Feb-07 01:00:00.000	8,339	8	151
2013-Feb-07 02:00:00.000	7,884	8	150
2013-Feb-07 03:00:00.000	7,527	8	148
2013-Feb-07 04:00:00.000	11,533	12	150
2013-Feb-07 05:00:00.000	26,247	26	154
2013-Feb-07 06:00:00.000	29,530	30	156
2013-Feb-07 07:00:00.000	29,230	29	184
2013-Feb-07 08:00:00.000	29,376	29	206
2013-Feb-07 09:00:00.000	28,818	29	213
2013-Feb-07 10:00:00.000	29,034	29	214
2013-Feb-07 11:00:00.000	29,788	30	216
2013-Feb-07 12:00:00.000	29,998	30	217
2013-Feb-07 13:00:00.000	29,738	30	214
2013-Feb-07 14:00:00.000	29,909	30	211
2013-Feb-07 15:00:00.000	29,972	30	207
2013-Feb-07 16:00:00.000	29,780	30	211
2013-Feb-07 17:00:00.000	29,686	30	219
2013-Feb-07 18:00:00.000	29,901	30	232
2013-Feb-07 19:00:00.000	29,999	30	240
2013-Feb-07 20:00:00.000	29,972	30	235
2013-Feb-07 21:00:00.000	30,030	30	229
2013-Feb-07 22:00:00.000	29,407	29	218
2013-Feb-07 23:00:00.000	28,626	29	201
2013-Feb-08 00:00:00.000	27,822	28	187
2013-Feb-08 01:00:00.000	28,214	28	174
2013-Feb-08 02:00:00.000	25,760	26	168
2013-Feb-08 03:00:00.000	18,978	19	167
2013-Feb-08 04:00:00.000	11,784	12	165
2013-Feb-08 05:00:00.000	11,186	11	168
2013-Feb-08 06:00:00.000	8,879	9	175
2013-Feb-08 07:00:00.000	14,090	14	192
2013-Feb-08 08:00:00.000	10,865	11	198
2013-Feb-08 09:00:00.000	5,829	6	190
2013-Feb-08 10:00:00.000	4,494	4	184
2013-Feb-08 11:00:00.000	2,989	3	195
2013-Feb-08 12:00:00.000	2,542	3	195
2013-Feb-08 13:00:00.000	2,853	3	195
2013-Feb-08 14:00:00.000	1,600	2	194
2013-Feb-08 15:00:00.000	1,127	1	191
2013-Feb-08 16:00:00.000	306	0	196
2013-Feb-08 17:00:00.000	-	-	204

2013-Feb-08 18:00:00.000	-	-	214
2013-Feb-08 19:00:00.000	-	-	218
2013-Feb-08 20:00:00.000	-	-	212
2013-Feb-08 21:00:00.000	336	0	206
2013-Feb-08 22:00:00.000	2,524	3	196
2013-Feb-08 23:00:00.000	1,726	2	186
2013-Feb-09 00:00:00.000	4,546	5	174
2013-Feb-09 01:00:00.000	10,600	11	163
2013-Feb-09 02:00:00.000	13,107	13	153
2013-Feb-09 03:00:00.000	19,583	20	149
2013-Feb-09 04:00:00.000	22,993	23	148
2013-Feb-09 05:00:00.000	26,794	27	149
2013-Feb-09 06:00:00.000	27,393	27	151
2013-Feb-09 07:00:00.000	29,309	29	158
2013-Feb-09 08:00:00.000	30,073	30	166
2013-Feb-09 09:00:00.000	29,336	29	176
2013-Feb-09 10:00:00.000	30,064	30	186
2013-Feb-09 11:00:00.000	21,691	22	191
2013-Feb-09 12:00:00.000	26,360	26	195
2013-Feb-09 13:00:00.000	21,115	21	194
2013-Feb-09 14:00:00.000	19,420	19	190
2013-Feb-09 15:00:00.000	16,446	16	187
2013-Feb-09 16:00:00.000	19,805	20	188
2013-Feb-09 17:00:00.000	29,655	30	195
2013-Feb-09 18:00:00.000	29,930	30	206
2013-Feb-09 19:00:00.000	29,852	30	204
2013-Feb-09 20:00:00.000	26,364	26	196
2013-Feb-09 21:00:00.000	30,070	30	187
2013-Feb-09 22:00:00.000	30,019	30	178
2013-Feb-09 23:00:00.000	30,060	30	168
2013-Feb-10 00:00:00.000	30,083	30	155
2013-Feb-10 01:00:00.000	30,074	30	147
2013-Feb-10 02:00:00.000	30,077	30	143
2013-Feb-10 03:00:00.000	30,072	30	140
2013-Feb-10 04:00:00.000	30,077	30	139
2013-Feb-10 05:00:00.000	30,078	30	140
2013-Feb-10 06:00:00.000	30,079	30	143
2013-Feb-10 07:00:00.000	30,092	30	147
2013-Feb-10 08:00:00.000	30,104	30	154
2013-Feb-10 09:00:00.000	30,101	30	163
2013-Feb-10 10:00:00.000	30,101	30	172
2013-Feb-10 11:00:00.000	30,099	30	178
2013-Feb-10 12:00:00.000	30,093	30	185
2013-Feb-10 13:00:00.000	30,105	30	186
2013-Feb-10 14:00:00.000	30,105	30	183
2013-Feb-10 15:00:00.000	30,098	30	181
2013-Feb-10 16:00:00.000	30,103	30	183

2013-Feb-10 17:00:00.000	30,101	30	192
2013-Feb-10 18:00:00.000	30,104	30	198
2013-Feb-10 19:00:00.000	30,110	30	207
2013-Feb-10 20:00:00.000	30,109	30	202
2013-Feb-10 21:00:00.000	30,102	30	195
2013-Feb-10 22:00:00.000	30,092	30	186
2013-Feb-10 23:00:00.000	30,095	30	171
2013-Feb-11 00:00:00.000	30,081	30	158
2013-Feb-11 01:00:00.000	29,952	30	149
2013-Feb-11 02:00:00.000	24,408	24	145
2013-Feb-11 03:00:00.000	25,802	26	144
2013-Feb-11 04:00:00.000	21,563	22	143
2013-Feb-11 05:00:00.000	15,614	16	146
2013-Feb-11 06:00:00.000	13,830	14	154
2013-Feb-11 07:00:00.000	18,299	18	171
2013-Feb-11 08:00:00.000	23,037	23	193
2013-Feb-11 09:00:00.000	16,926	17	192
2013-Feb-11 10:00:00.000	9,868	10	191
2013-Feb-11 11:00:00.000	5,662	6	187
2013-Feb-11 12:00:00.000	2,643	3	185
2013-Feb-11 13:00:00.000	2,686	3	179
2013-Feb-11 14:00:00.000	348	0	175
2013-Feb-11 15:00:00.000	0	0	173
2013-Feb-11 16:00:00.000	5	0	177
2013-Feb-11 17:00:00.000	539	1	188
2013-Feb-11 18:00:00.000	2,620	3	197
2013-Feb-11 19:00:00.000	4,721	5	201
2013-Feb-11 20:00:00.000	6,821	7	199
2013-Feb-11 21:00:00.000	6,253	6	191
2013-Feb-11 22:00:00.000	9,191	9	182
2013-Feb-11 23:00:00.000	9,976	10	168
2013-Feb-12 00:00:00.000	9,373	9	154
2013-Feb-12 01:00:00.000	21,216	21	147
2013-Feb-12 02:00:00.000	27,955	28	142
2013-Feb-12 03:00:00.000	29,137	29	140
2013-Feb-12 04:00:00.000	27,041	27	138
2013-Feb-12 05:00:00.000	26,541	27	136
2013-Feb-12 06:00:00.000	20,002	20	142
2013-Feb-12 07:00:00.000	15,769	16	158
2013-Feb-12 08:00:00.000	14,053	14	176
2013-Feb-12 09:00:00.000	26,359	26	177
2013-Feb-12 10:00:00.000	26,408	26	180
2013-Feb-12 11:00:00.000	16,211	16	177
2013-Feb-12 12:00:00.000	4,955	5	179
2013-Feb-12 13:00:00.000	2,683	3	179
2013-Feb-12 14:00:00.000	4,904	5	178
2013-Feb-12 15:00:00.000	4,812	5	179

2013-Feb-12 16:00:00.000	10,024	10	183
2013-Feb-12 17:00:00.000	9,422	9	191
2013-Feb-12 18:00:00.000	19,314	19	198
2013-Feb-12 19:00:00.000	24,335	24	201
2013-Feb-12 20:00:00.000	25,694	26	198
2013-Feb-12 21:00:00.000	26,337	26	192
2013-Feb-12 22:00:00.000	26,713	27	182
2013-Feb-12 23:00:00.000	26,851	27	166
2013-Feb-13 00:00:00.000	26,694	27	152
2013-Feb-13 01:00:00.000	26,350	26	139
2013-Feb-13 02:00:00.000	26,796	27	136
2013-Feb-13 03:00:00.000	26,670	27	135
2013-Feb-13 04:00:00.000	25,629	26	132
2013-Feb-13 05:00:00.000	25,689	26	135
2013-Feb-13 06:00:00.000	25,772	26	140
2013-Feb-13 07:00:00.000	24,674	25	158
2013-Feb-13 08:00:00.000	22,528	23	176
2013-Feb-13 09:00:00.000	14,227	14	181
2013-Feb-13 10:00:00.000	17,062	17	181
2013-Feb-13 11:00:00.000	11,763	12	178
2013-Feb-13 12:00:00.000	5,175	5	178
2013-Feb-13 13:00:00.000	2,554	3	176
2013-Feb-13 14:00:00.000	3,025	3	175
2013-Feb-13 15:00:00.000	3,707	4	174
2013-Feb-13 16:00:00.000	2,986	3	177
2013-Feb-13 17:00:00.000	1,523	2	185
2013-Feb-13 18:00:00.000	346	0	193
2013-Feb-13 19:00:00.000	50	0	197
2013-Feb-13 20:00:00.000	383	0	194
2013-Feb-13 21:00:00.000	641	1	188
2013-Feb-13 22:00:00.000	909	1	178
2013-Feb-13 23:00:00.000	971	1	163
2013-Feb-14 00:00:00.000	-	-	147
2013-Feb-14 01:00:00.000	29	0	137
2013-Feb-14 02:00:00.000	110	0	131
2013-Feb-14 03:00:00.000	-	-	130
2013-Feb-14 04:00:00.000	-	-	129
2013-Feb-14 05:00:00.000	-	-	130
2013-Feb-14 06:00:00.000	0	0	137
2013-Feb-14 07:00:00.000	-	-	156
2013-Feb-14 08:00:00.000	-	-	178
2013-Feb-14 09:00:00.000	-	-	182
2013-Feb-14 10:00:00.000	-	-	183
2013-Feb-14 11:00:00.000	80	0	181
2013-Feb-14 12:00:00.000	229	0	181
2013-Feb-14 13:00:00.000	1,328	1	177
2013-Feb-14 14:00:00.000	1,544	2	177

2013-Feb-14 15:00:00.000	1,674	2	177
2013-Feb-14 16:00:00.000	511	1	179
2013-Feb-14 17:00:00.000	2,506	3	186
2013-Feb-14 18:00:00.000	3,714	4	192
2013-Feb-14 19:00:00.000	3,477	3	197
2013-Feb-14 20:00:00.000	4,566	5	190
2013-Feb-14 21:00:00.000	6,377	6	184
2013-Feb-14 22:00:00.000	7,811	8	173
2013-Feb-14 23:00:00.000	4,385	4	157
2013-Feb-15 00:00:00.000	2,389	2	143
2013-Feb-15 01:00:00.000	2,214	2	135
2013-Feb-15 02:00:00.000	1,098	1	132
2013-Feb-15 03:00:00.000	2,413	2	129
2013-Feb-15 04:00:00.000	3,366	3	131
2013-Feb-15 05:00:00.000	2,948	3	131
2013-Feb-15 06:00:00.000	2,428	2	138
2013-Feb-15 07:00:00.000	2,881	3	155
2013-Feb-15 08:00:00.000	2,095	2	178
2013-Feb-15 09:00:00.000	1,791	2	182
2013-Feb-15 10:00:00.000	424	0	180
2013-Feb-15 11:00:00.000	13	0	173
2013-Feb-15 12:00:00.000	219	0	171
2013-Feb-15 13:00:00.000	770	1	165
2013-Feb-15 14:00:00.000	531	1	162
2013-Feb-15 15:00:00.000	340	0	158
2013-Feb-15 16:00:00.000	107	0	158
2013-Feb-15 17:00:00.000	-	-	164
2013-Feb-15 18:00:00.000	343	0	173
2013-Feb-15 19:00:00.000	100	0	181
2013-Feb-15 20:00:00.000	2,066	2	178
2013-Feb-15 21:00:00.000	2,965	3	173
2013-Feb-15 22:00:00.000	8,331	8	165
2013-Feb-15 23:00:00.000	7,476	7	154
2013-Feb-16 00:00:00.000	12,877	13	143
2013-Feb-16 01:00:00.000	6,948	7	133
2013-Feb-16 02:00:00.000	6,032	6	129
2013-Feb-16 03:00:00.000	9,674	10	128
2013-Feb-16 04:00:00.000	15,860	16	126
2013-Feb-16 05:00:00.000	12,286	12	125
2013-Feb-16 06:00:00.000	13,480	13	127
2013-Feb-16 07:00:00.000	10,288	10	136
2013-Feb-16 08:00:00.000	9,973	10	147
2013-Feb-16 09:00:00.000	10,434	10	156
2013-Feb-16 10:00:00.000	9,780	10	162
2013-Feb-16 11:00:00.000	12,281	12	162
2013-Feb-16 12:00:00.000	16,312	16	161
2013-Feb-16 13:00:00.000	15,069	15	157

2013-Feb-16 14:00:00.000	15,047	15	152
2013-Feb-16 15:00:00.000	15,650	16	148
2013-Feb-16 16:00:00.000	21,129	21	148
2013-Feb-16 17:00:00.000	22,575	23	154
2013-Feb-16 18:00:00.000	20,969	21	166
2013-Feb-16 19:00:00.000	24,270	24	174
2013-Feb-16 20:00:00.000	25,261	25	169
2013-Feb-16 21:00:00.000	19,149	19	165
2013-Feb-16 22:00:00.000	14,382	14	157
2013-Feb-16 23:00:00.000	11,293	11	148
2013-Feb-17 00:00:00.000	7,257	7	138
2013-Feb-17 01:00:00.000	5,253	5	129
2013-Feb-17 02:00:00.000	4,543	5	123
2013-Feb-17 03:00:00.000	7,646	8	123
2013-Feb-17 04:00:00.000	7,462	7	122
2013-Feb-17 05:00:00.000	12,844	13	123
2013-Feb-17 06:00:00.000	21,414	21	127
2013-Feb-17 07:00:00.000	25,629	26	135
2013-Feb-17 08:00:00.000	26,760	27	145
2013-Feb-17 09:00:00.000	18,638	19	156
2013-Feb-17 10:00:00.000	16,950	17	163
2013-Feb-17 11:00:00.000	19,723	20	167
2013-Feb-17 12:00:00.000	16,565	17	172
2013-Feb-17 13:00:00.000	21,494	21	176
2013-Feb-17 14:00:00.000	23,987	24	174
2013-Feb-17 15:00:00.000	23,233	23	174
2013-Feb-17 16:00:00.000	24,204	24	178
2013-Feb-17 17:00:00.000	21,966	22	186
2013-Feb-17 18:00:00.000	25,863	26	190
2013-Feb-17 19:00:00.000	21,989	22	187
2013-Feb-17 20:00:00.000	26,154	26	180
2013-Feb-17 21:00:00.000	18,946	19	174
2013-Feb-17 22:00:00.000	14,159	14	164
2013-Feb-17 23:00:00.000	1,951	2	153
2013-Feb-18 00:00:00.000	1,173	1	142
2013-Feb-18 01:00:00.000	3,065	3	133
2013-Feb-18 02:00:00.000	6,555	7	129
2013-Feb-18 03:00:00.000	7,118	7	131
2013-Feb-18 04:00:00.000	15,076	15	131
2013-Feb-18 05:00:00.000	19,601	20	132
2013-Feb-18 06:00:00.000	22,877	23	136
2013-Feb-18 07:00:00.000	25,556	26	143
2013-Feb-18 08:00:00.000	25,655	26	150
2013-Feb-18 09:00:00.000	26,672	27	160
2013-Feb-18 10:00:00.000	25,839	26	171
2013-Feb-18 11:00:00.000	21,872	22	177
2013-Feb-18 12:00:00.000	10,040	10	184

2013-Feb-18 13:00:00.000	-	-	187
2013-Feb-18 14:00:00.000	-	-	183
2013-Feb-18 15:00:00.000	-	-	184
2013-Feb-18 16:00:00.000	-	-	187
2013-Feb-18 17:00:00.000	20,374	20	176
2013-Feb-18 18:00:00.000	23,202	23	201
2013-Feb-18 19:00:00.000	22,183	22	208
2013-Feb-18 20:00:00.000	23,748	24	204
2013-Feb-18 21:00:00.000	23,862	24	196
2013-Feb-18 22:00:00.000	23,814	24	187
2013-Feb-18 23:00:00.000	23,271	23	171
2013-Feb-19 00:00:00.000	23,741	24	159
2013-Feb-19 01:00:00.000	23,820	24	149
2013-Feb-19 02:00:00.000	23,556	24	144
2013-Feb-19 03:00:00.000	23,587	24	141
2013-Feb-19 04:00:00.000	23,204	23	141
2013-Feb-19 05:00:00.000	23,615	24	144
2013-Feb-19 06:00:00.000	23,854	24	151
2013-Feb-19 07:00:00.000	23,931	24	169
2013-Feb-19 08:00:00.000	23,950	24	186
2013-Feb-19 09:00:00.000	23,872	24	193
2013-Feb-19 10:00:00.000	23,839	24	187
2013-Feb-19 11:00:00.000	26,367	26	183
2013-Feb-19 12:00:00.000	26,831	27	181
2013-Feb-19 13:00:00.000	26,592	27	177
2013-Feb-19 14:00:00.000	26,141	26	173
2013-Feb-19 15:00:00.000	25,598	26	168
2013-Feb-19 16:00:00.000	25,717	26	171
2013-Feb-19 17:00:00.000	25,358	25	175
2013-Feb-19 18:00:00.000	19,798	20	186
2013-Feb-19 19:00:00.000	11,729	12	193
2013-Feb-19 20:00:00.000	9,518	10	190
2013-Feb-19 21:00:00.000	11,083	11	176
2013-Feb-19 22:00:00.000	10,525	11	172
2013-Feb-19 23:00:00.000	8,289	8	162
2013-Feb-20 00:00:00.000	5,432	5	148
2013-Feb-20 01:00:00.000	5,023	5	140
2013-Feb-20 02:00:00.000	3,005	3	136
2013-Feb-20 03:00:00.000	614	1	135
2013-Feb-20 04:00:00.000	292	0	134
2013-Feb-20 05:00:00.000	2	0	136
2013-Feb-20 06:00:00.000	-	-	144
2013-Feb-20 07:00:00.000	222	0	161
2013-Feb-20 08:00:00.000	2,369	2	171
2013-Feb-20 09:00:00.000	7,074	7	184
2013-Feb-20 10:00:00.000	7,616	8	187
2013-Feb-20 11:00:00.000	8,475	8	184

2013-Feb-20 12:00:00.000	13,655	14	189
2013-Feb-20 13:00:00.000	15,222	15	188
2013-Feb-20 14:00:00.000	12,968	13	188
2013-Feb-20 15:00:00.000	20,409	20	179
2013-Feb-20 16:00:00.000	19,346	19	179
2013-Feb-20 17:00:00.000	22,161	22	193
2013-Feb-20 18:00:00.000	19,803	20	198
2013-Feb-20 19:00:00.000	23,018	23	202
2013-Feb-20 20:00:00.000	23,027	23	195
2013-Feb-20 21:00:00.000	19,821	20	187
2013-Feb-20 22:00:00.000	13,234	13	175
2013-Feb-20 23:00:00.000	9,875	10	159
2013-Feb-21 00:00:00.000	8,015	8	144
2013-Feb-21 01:00:00.000	5,827	6	134
2013-Feb-21 02:00:00.000	1,589	2	129
2013-Feb-21 03:00:00.000	2,640	3	127
2013-Feb-21 04:00:00.000	3,388	3	126
2013-Feb-21 05:00:00.000	1,415	1	127
2013-Feb-21 06:00:00.000	1,277	1	132
2013-Feb-21 07:00:00.000	529	1	149
2013-Feb-21 08:00:00.000	2	0	169
2013-Feb-21 09:00:00.000	43	0	176
2013-Feb-21 10:00:00.000	-	-	178
2013-Feb-21 11:00:00.000	-	-	174
2013-Feb-21 12:00:00.000	28	0	175
2013-Feb-21 13:00:00.000	364	0	172
2013-Feb-21 14:00:00.000	-	-	174
2013-Feb-21 15:00:00.000	108	0	172
2013-Feb-21 16:00:00.000	1,641	2	176
2013-Feb-21 17:00:00.000	8,623	9	179
2013-Feb-21 18:00:00.000	18,052	18	170
2013-Feb-21 19:00:00.000	22,536	23	177
2013-Feb-21 20:00:00.000	23,539	24	175
2013-Feb-21 21:00:00.000	23,902	24	171
2013-Feb-21 22:00:00.000	23,954	24	180
2013-Feb-21 23:00:00.000	23,957	24	168
2013-Feb-22 00:00:00.000	23,926	24	154
2013-Feb-22 01:00:00.000	23,955	24	144
2013-Feb-22 02:00:00.000	23,929	24	140
2013-Feb-22 03:00:00.000	23,862	24	139
2013-Feb-22 04:00:00.000	23,974	24	139
2013-Feb-22 05:00:00.000	23,978	24	140
2013-Feb-22 06:00:00.000	23,903	24	145
2013-Feb-22 07:00:00.000	24,014	24	164
2013-Feb-22 08:00:00.000	24,554	25	179
2013-Feb-22 09:00:00.000	24,299	24	189
2013-Feb-22 10:00:00.000	23,664	24	191

2013-Feb-22 11:00:00.000	22,883	23	187
2013-Feb-22 12:00:00.000	22,793	23	188
2013-Feb-22 13:00:00.000	22,570	23	184
2013-Feb-22 14:00:00.000	21,773	22	181
2013-Feb-22 15:00:00.000	22,351	22	177
2013-Feb-22 16:00:00.000	22,219	22	177
2013-Feb-22 17:00:00.000	22,329	22	188
2013-Feb-22 18:00:00.000	23,493	23	191
2013-Feb-22 19:00:00.000	23,379	23	198
2013-Feb-22 20:00:00.000	21,100	21	193
2013-Feb-22 21:00:00.000	18,250	18	185
2013-Feb-22 22:00:00.000	16,440	16	177
2013-Feb-22 23:00:00.000	12,605	13	167
2013-Feb-23 00:00:00.000	11,530	12	154
2013-Feb-23 01:00:00.000	10,566	11	141
2013-Feb-23 02:00:00.000	6,934	7	137
2013-Feb-23 03:00:00.000	4,686	5	135
2013-Feb-23 04:00:00.000	3,366	3	134
2013-Feb-23 05:00:00.000	3,291	3	134
2013-Feb-23 06:00:00.000	3,807	4	139
2013-Feb-23 07:00:00.000	3,469	3	146
2013-Feb-23 08:00:00.000	3,642	4	157
2013-Feb-23 09:00:00.000	987	1	169
2013-Feb-23 10:00:00.000	819	1	170
2013-Feb-23 11:00:00.000	1,956	2	170
2013-Feb-23 12:00:00.000	1,850	2	170
2013-Feb-23 13:00:00.000	2,022	2	165
2013-Feb-23 14:00:00.000	1,383	1	160
2013-Feb-23 15:00:00.000	886	1	156
2013-Feb-23 16:00:00.000	1,124	1	156
2013-Feb-23 17:00:00.000	591	1	163
2013-Feb-23 18:00:00.000	258	0	173
2013-Feb-23 19:00:00.000	84	0	186
2013-Feb-23 20:00:00.000	-	-	185
2013-Feb-23 21:00:00.000	-	-	182
2013-Feb-23 22:00:00.000	-	-	175
2013-Feb-23 23:00:00.000	-	-	168
2013-Feb-24 00:00:00.000	-	-	158
2013-Feb-24 01:00:00.000	-	-	148
2013-Feb-24 02:00:00.000	-	-	145
2013-Feb-24 03:00:00.000	-	-	143
2013-Feb-24 04:00:00.000	-	-	142
2013-Feb-24 05:00:00.000	-	-	143
2013-Feb-24 06:00:00.000	-	-	145
2013-Feb-24 07:00:00.000	-	-	150
2013-Feb-24 08:00:00.000	-	-	156
2013-Feb-24 09:00:00.000	-	-	164

2013-Feb-24 10:00:00.000	-	-	169
2013-Feb-24 11:00:00.000	-	-	170
2013-Feb-24 12:00:00.000	0	0	169
2013-Feb-24 13:00:00.000	14	0	170
2013-Feb-24 14:00:00.000	20	0	165
2013-Feb-24 15:00:00.000	1	0	159
2013-Feb-24 16:00:00.000	-	-	158
2013-Feb-24 17:00:00.000	12	0	169
2013-Feb-24 18:00:00.000	1,032	1	179
2013-Feb-24 19:00:00.000	3,251	3	190
2013-Feb-24 20:00:00.000	3,937	4	190
2013-Feb-24 21:00:00.000	4,199	4	185
2013-Feb-24 22:00:00.000	4,194	4	177
2013-Feb-24 23:00:00.000	2,769	3	164
2013-Feb-25 00:00:00.000	1,389	1	149
2013-Feb-25 01:00:00.000	3,664	4	142
2013-Feb-25 02:00:00.000	5,323	5	136
2013-Feb-25 03:00:00.000	6,505	7	134
2013-Feb-25 04:00:00.000	8,953	9	136
2013-Feb-25 05:00:00.000	9,690	10	139
2013-Feb-25 06:00:00.000	10,498	10	143
2013-Feb-25 07:00:00.000	10,953	11	162
2013-Feb-25 08:00:00.000	8,532	9	181
2013-Feb-25 09:00:00.000	7,184	7	182
2013-Feb-25 10:00:00.000	5,005	5	179
2013-Feb-25 11:00:00.000	5,659	6	178
2013-Feb-25 12:00:00.000	7,342	7	178
2013-Feb-25 13:00:00.000	9,187	9	172
2013-Feb-25 14:00:00.000	13,213	13	169
2013-Feb-25 15:00:00.000	13,129	13	169
2013-Feb-25 16:00:00.000	11,386	11	173
2013-Feb-25 17:00:00.000	8,310	8	183
2013-Feb-25 18:00:00.000	6,504	7	190
2013-Feb-25 19:00:00.000	5,669	6	197
2013-Feb-25 20:00:00.000	5,541	6	192
2013-Feb-25 21:00:00.000	4,782	5	189
2013-Feb-25 22:00:00.000	3,418	3	179
2013-Feb-25 23:00:00.000	3,166	3	165
2013-Feb-26 00:00:00.000	3,188	3	150
2013-Feb-26 01:00:00.000	2,801	3	141
2013-Feb-26 02:00:00.000	1,960	2	138
2013-Feb-26 03:00:00.000	1,871	2	137
2013-Feb-26 04:00:00.000	1,119	1	137
2013-Feb-26 05:00:00.000	1,907	2	139
2013-Feb-26 06:00:00.000	1,721	2	147
2013-Feb-26 07:00:00.000	2,403	2	164
2013-Feb-26 08:00:00.000	1,416	1	165

2013-Feb-26 09:00:00.000	1,732	2	191
2013-Feb-26 10:00:00.000	2,173	2	186
2013-Feb-26 11:00:00.000	1,020	1	181
2013-Feb-26 12:00:00.000	1,279	1	179
2013-Feb-26 13:00:00.000	2,739	3	173
2013-Feb-26 14:00:00.000	2,953	3	169
2013-Feb-26 15:00:00.000	2,943	3	166
2013-Feb-26 16:00:00.000	2,760	3	168
2013-Feb-26 17:00:00.000	1,829	2	175
2013-Feb-26 18:00:00.000	1,743	2	180
2013-Feb-26 19:00:00.000	1,096	1	191
2013-Feb-26 20:00:00.000	1,281	1	191
2013-Feb-26 21:00:00.000	1,263	1	188
2013-Feb-26 22:00:00.000	1,695	2	180
2013-Feb-26 23:00:00.000	1,248	1	167
2013-Feb-27 00:00:00.000	1,322	1	152
2013-Feb-27 01:00:00.000	915	1	144
2013-Feb-27 02:00:00.000	1,697	2	142
2013-Feb-27 03:00:00.000	1,642	2	141
2013-Feb-27 04:00:00.000	930	1	142
2013-Feb-27 05:00:00.000	247	0	144
2013-Feb-27 06:00:00.000	645	1	153
2013-Feb-27 07:00:00.000	938	1	172
2013-Feb-27 08:00:00.000	524	1	167
2013-Feb-27 09:00:00.000	645	1	191
2013-Feb-27 10:00:00.000	112	0	186
2013-Feb-27 11:00:00.000	0	0	181
2013-Feb-27 12:00:00.000	-	-	179
2013-Feb-27 13:00:00.000	-	-	172
2013-Feb-27 14:00:00.000	-	-	168
2013-Feb-27 15:00:00.000	-	-	164
2013-Feb-27 16:00:00.000	9	0	165
2013-Feb-27 17:00:00.000	-	-	173
2013-Feb-27 18:00:00.000	-	-	177
2013-Feb-27 19:00:00.000	-	-	188
2013-Feb-27 20:00:00.000	9	0	188
2013-Feb-27 21:00:00.000	-	-	185
2013-Feb-27 22:00:00.000	-	-	177
2013-Feb-27 23:00:00.000	-	-	163
2013-Feb-28 00:00:00.000	-	-	148
2013-Feb-28 01:00:00.000	-	-	140
2013-Feb-28 02:00:00.000	-	-	136
2013-Feb-28 03:00:00.000	-	-	135
2013-Feb-28 04:00:00.000	-	-	134
2013-Feb-28 05:00:00.000	-	-	137
2013-Feb-28 06:00:00.000	-	-	146
2013-Feb-28 07:00:00.000	-	-	163

2013-Feb-28 08:00:00.000	-	-	181
2013-Feb-28 09:00:00.000	-	-	187
2013-Feb-28 10:00:00.000	-	-	185
2013-Feb-28 11:00:00.000	-	-	181
2013-Feb-28 12:00:00.000	1	0	182
2013-Feb-28 13:00:00.000	-	-	177
2013-Feb-28 14:00:00.000	27	0	173
2013-Feb-28 15:00:00.000	216	0	168
2013-Feb-28 16:00:00.000	1,774	2	170
2013-Feb-28 17:00:00.000	3,199	3	175
2013-Feb-28 18:00:00.000	4,743	5	181
2013-Feb-28 19:00:00.000	3,574	4	188
2013-Feb-28 20:00:00.000	3,988	4	188
2013-Feb-28 21:00:00.000	2,430	2	184
2013-Feb-28 22:00:00.000	2,320	2	173
2013-Feb-28 23:00:00.000	4,336	4	160
2013-Mar-01 00:00:00.000	4,071	4	144

**UE20723 (CT4) Responses to Interrogatories
Government Third Party IRs Q5 - CT4**

Peter Baker Bevan

5) Other Information

- a) **What are the capacity factors of the existing generation assets for 2005-2015?**
What is the expected capacity factor after completion of the proposed CT4?

Capacity Factors				
Year	CT1	CT2	CT3	Thermal CTGS
2005	0.04%	0.11%	0.00%	1.21%
2006	0.07%	0.04%	0.79%	0.63%
2007	0.08%	0.08%	0.06%	0.77%
2008	0.08%	0.07%	0.05%	0.65%
2009	0.05%	0.05%	0.06%	1.06%
2010	0.05%	0.02%	0.04%	0.24%
2011	0.08%	0.07%	0.06%	0.59%
2012	0.23%	0.27%	2.30%	2.98%
2013	0.25%	0.20%	0.58%	0.44%
2014	0.21%	0.08%	0.87%	0.97%
2015	0.10%	0.12%	1.75%	1.68%

After the completion of CT4, the expected capacity factors should remain the same for the existing combustion turbines.

b) In the CT4 filing, Table 2 provides the number of occurrences for different peaking generation uses of CT1, CT2 and CT3 in 2014
Please provide the duration (length of time) of each of these occurrences. Please provide the same information for 10 years previous

Off load Submarine Cables		
Occurrence	Date	Duration
1	06-Jan	1:51
2	17-Jan	2:22
3	19-Jan	0:08
4	02-Feb	3:36
5	16-Mar	0:25
6	17-Mar	4:20
7	29-May	1:49
8	10-Jun	4:25
9	16-Jun	17:00
10	17-Jun	11:00
11	18-Jun	9:00
12	27-Jun	2:00
13	28-Jun	7:00
14	30-Jun	17:00
15	01-Jul	3:00
16	01-Jul	16:00
17	02-Jul	10:00
18	08-Jul	1:00
19	08-Jul	12:00
20	09-Jul	15:00
21	10-Jul	16:00
22	11-Jul	15:31
23	13-Jul	17:00
24	14-Jul	16:00
25	15-Jul	13:00
26	16-Jul	13:00
27	17-Jul	18:00
28	18-Jul	13:00
29	19-Jul	13:00
30	20-Jul	14:00
31	21-Jul	16:00
32	22-Jul	10:00
33	23-Jul	14:00
34	24-Jul	7:00
35	25-Jul	12:00
36	26-Jul	15:00
37	27-Jul	17:00
38	28-Jul	16:00
39	29-Jul	4:00
40	14-Aug	3:00
41	20-Aug	1:00
42	05-Nov	2:52
43	27-Nov	1:59
44	28-Nov	2:04
45	13-Dec	1:57
46	17-Dec	0:40
47	20-Dec	4:50
48	29-Dec	3:09

Curtailment by NB Power		
Occurrence	Date	Duration
1	27-Jun	0:59
2	29-Jun	2:14
3	11-Jul	3:00
4	09-Oct	0:55

NB Power Hold-To-Schedule	
Occurrence	Duration

Reserve Call		
Occurrence	Date	Duration
1	01-Dec	6:18
2	02-Dec	2:14

On Island Transmission Outage/maintenance	
Occurrence	Duration

Unit Testing		
Occurrence	Date	Duration
1	22-Feb	1:00
2	23-Feb	0:54
3	15-Mar	1:00
4	29-Mar	0:46
5	24-Apr	1:00
6	25-Apr	0:57
7	27-Apr	0:57
8	23-May	0:59
9	24-May	0:59
10	28-Sep	2:23
11	23-Nov	1:39
12	04-Dec	1:06

Off load Submarine Cables		
Occurrence		Duration
1	08-Feb	5:53
2	13-Feb	1:22
3	14-Feb	1:21
4	10-Jul	0:41
5	11-Jul	0:09
6	01-Dec	2:45
7	02-Dec	1:28
8	03-Dec	1:21
9	05-Dec	3:01
10	09-Dec	4:05
11	20-Dec	10:39
12	21-Dec	4:30
13	29-Dec	2:58
14	31-Dec	2:20
15	31-Dec	4:29

Curtailment by NB Power		
Occurrence		Duration
1	02-Jan	1:19
2	02-Jan	2:04
3	03-Jan	2:03
4	06-Jan	3:18
5	16-Jan	5:36
6	18-Jan	3:21
7	22-Jan	1:16
8	28-Jan	1:44
9	29-Jan	1:35
10	06-Feb	4:59
11	08-Feb	5:40
12	19-Feb	1:45
13	20-Feb	1:01
14	26-Feb	2:12
15	27-Feb	2:04
16	08-May	1:27
17	01-Jun	1:20
18	02-Jun	12:12
19	09-Oct	1:36
20	17-Dec	6:45

NB Power Hold-To- Schedule		
Occurrence		Duration
1	04-Jan	1:22
2	04-Jan	4:00
3	27-May	1:29
4	06-Jun	1:06
5	11-Jun	1:05
6	13-Jun	1:04
7	04-Jul	1:02
8	05-Jul	1:00
9	18-Jul	1:40
10	13-Dec	5:58
11	17-Dec	2:28

Reserve Call		
Occurrence		Duration
1	24-Jan	2:30

On Island Transmission Outage/maint enance	
Occurrence	Duration

Unit Testing		
Occurrence		Duration
1	02-Jan	0:28
2	16-Jan	0:50
3	16-Jan	0:27
4	24-May	0:53
5	26-Jul	3:48
6	27-Nov	0:40
7	27-Nov	0:30
8	27-Nov	0:38

Off load Submarine Cables		
Occurrence	Duration	
1	02-Jan	8:42
2	05-Jan	5:35
3	13-Jan	1:18
4	16-Jan	1:25
5	18-Jan	1:05
6	23-Jan	3:00
7	24-Jan	3:30
8	03-Feb	5:14
9	04-Feb	4:21
10	05-Feb	6:27
11	06-Feb	2:22
12	09-Feb	4:16
13	10-Feb	11:29
14	12-Feb	5:11
15	19-Feb	2:27
16	26-Feb	4:53
17	05-Mar	4:53
18	10-Mar	1:27
19	02-Dec	5:42
20	05-Dec	12:09
21	08-Dec	14:22
22	09-Dec	0:57
23	13-Dec	2:25
24	16-Dec	4:05
25	17-Dec	5:13
26	18-Dec	4:58
27	20-Dec	3:12
28	21-Dec	5:49
29	22-Dec	14:42
30	23-Dec	4:45

Curtailment by NB Power		
Occurrence	Duration	
1	18-Feb	4:51
2	18-Apr	4:34
3	27-Jun	5:47
4	06-Oct	9:07
5	25-Oct	1:38
6	26-Oct	2:25
7	28-Oct	2:22
8	31-Oct	5:07
9	26-Nov	3:52
10	09-Dec	4:41
11	13-Dec	4:06

NB Power Hold-To-Schedule		
Occurrence	Duration	
1	12-Apr	1:42
2	25-Apr	1:20
3	01-May	1:31
4	04-Jul	2:22
5	12-Jul	0:43
6	06-Aug	1:38
7	07-Aug	1:55
8	30-Sep	2:09
9	01-Nov	0:52
10	17-Dec	3:39

Lepreau Tripped Off	
Occurrence	Duration
1	05-Apr 1:14

On Island Transmission Outage/maintenance		
Occurrence	Duration	
1	08-May	3:59
2	04-Aug	3:35
3	01-Nov	1:34

Unit Testing		
Occurrence	Duration	
1	02-Jan	0:34
2	03-Jan	0:30
3	10-Mar	0:44
4	23-Apr	4:20
5	09-Jun	1:06
6	10-Jun	0:59
7	24-Jun	2:47
8	30-Oct	1:46
9	14-Nov	2:05
10	29-Nov	1:42

Off load Submarine Cables		
Occurrence		Duration
1	03-Jan	3:33
2	07-Jan	17:16
3	12-Jan	11:23
4	15-Jan	14:52
5	21-Jan	5:56
6	22-Jan	11:37
7	26-Jan	6:44
8	29-Jan	4:41
9	30-Jan	7:16
10	30-Jan	5:26
11	02-Feb	11:00
12	09-Feb	1:43
13	10-Feb	1:11
14	12-Feb	5:01
15	14-Feb	13:58
16	15-Feb	3:09
17	18-Feb	14:33
18	22-Feb	4:40
19	24-Feb	4:49
20	26-Feb	3:13
21	09-Mar	5:17
22	09-Mar	3:14

Curtailment by NB Power		
Occurrence		Duration
1	14-Jan	3:19
2	04-Feb	6:32
3	10-Jul	0:54

NB Power Hold-To- Schedule		
Occurrence		Duration
1	11-Jan	1:44
2	18-Jun	1:01
3	04-Jul	1:15
4	04-Jul	1:04
5	09-Jul	1:25

Reserve Call		
Occurrence		Duration
1	31-Mar	0:21
2	28-May	1:25
3	28-May	1:10

On Island Transmission Outage/maint enance		
Occurrence		Duration

Unit Testing		
Occurrence		Duration
1	14-May	1:04
2	08-Jul	1:16