MARITIME ELECTRIC
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The Island Regulatory and Appeals Commission

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October 1, 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:

**DSM Filing Docket UE21406**
**Response to Interrogatories from Commission Staff**

Please find attached the Company's response to the Interrogatories filed by Commission Staff with respect to the DSM 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

JCR65
Enclosure

1. Does Maritime Electric have any comments regarding changing the electricity pricing tariff structure to one which encourages conservation and demand management? Where does the second block reduced tariff, which can be argued as an encouragement to consumption, align with an energy conservation program?

**Response - 1:**

Under the cost of service regulatory model, rates are based on the cost of providing service. Thus Maritime Electric's view is that rates that reflect the cost of providing electricity service will send the correct price signal to consumers.

For the General Service Rates and the Small Industrial Rate, Maritime Electric believes that the existing two block energy rate structure does send the appropriate price signal to customers. The costs incurred in providing electricity service can be separated into three groups – Customer, Demand and Energy. The Customer costs are recovered through a monthly service charge (in the General Service Rates) or through the demand charge (in the Small Industrial Rate). The Demand costs are recovered through a combination of the demand charge and the first block energy charge. The second block energy charge is intended to recover just Energy costs, and thus it is lower than the first block energy charge (which is intended to recover Energy costs plus a portion of Demand costs).

To see the appropriateness of the lower second block energy charge, consider a grocery store that is open 12 hours per day, from 9:00 a.m. to 9:00 p.m. If the store were to go to being open 24 hours per day, there would be an increase in the number of kWh (i.e. energy) used, but no increase in the store's peak load (i.e. demand). Thus the utility would incur additional Energy costs, but no increase in Demand or Customer costs. With a declining two block energy structure, all of the additional kWh would be billed at the second block energy charge, which is intended to recover just Energy costs, and thus the store sees the correct price signal.

However, for the Residential Rate, Maritime Electric believes that the lower energy charge for second block usage does not reflect the cost of service. The reason is that increasing the size of a house or increasing the size of a family is not like extending the hours of operation at a grocery store, where only the energy usage increases. As the number of kWh used by a home increases, so too does the peak load, so the utility incurs additional Energy costs and additional Demand costs. Thus the lower second block energy charge does not send the correct price signal because it does not recover the additional Demand costs incurred by the utility.

The following history is provided to explain why the current Residential Rate has a two block energy structure with a lower charge for the second block.

<u>1984 Rate Case</u>

In 1984 Maritime Electric proposed to eliminate the difference between the first and second energy blocks for the Residential Rate. In its May 27, 1985 Decision and Order, the Commission approved the elimination of the two energy block structure for the Residential Rate, effective July 1, 1985.

The impact on farms of the elimination of the second block in 1985 was limited because the there was a limit on the size of a farm that could be served under Maritime Electric's Residential Rate. The relevant wording in the Rural Residential Rate stated that:

> "A farm may be considered a residential customer if it has an occupied domestic residence and may be served through a single meter at this rate. Service supplied at this rate shall be single phase to a maximum service entrance size of 200 amperes to each individual residence or household. Load requirements in excess of this capacity shall be served under the General Service Rate."

<u>Transition to NB Power rates + 10% in 1998</u>

The implementation of NB Power rates + 10% in 1988 involved a complete adoption of the NB Power rate schedules. Since the NB Power Residential Rate had a two energy block structure, Maritime Electric reverted back to a two energy block structure for its Residential Rate. This became effective on January 1, 1998.

The NB Power Residential Rate does not state a limit for the size of farm that may be served as a residential customer. It simply states, "In addition, the Residential Rate applies to services to farms and churches."

<u>2007 Rate Application</u>

In 2007 Maritime Electric proposed and received Commission approval for a phase out of the second Residential Rate energy block, with the final step to be implemented on April 1, 2010. However, when the time came for the final step in the phase out in 2010, it was politically unacceptable to do so because of the magnitude of the increase in bills that would have resulted for the larger farms. Thus the final step in the phase out was not implemented, and the first block size was left at 2,000 kWh.

Since 2010 rates have been legislated under the five year Energy Accord with Government, and there has not been an opportunity to revisit the Residential Rate second block phase out. Maritime Electric now intends to address this issue as part of the General Rate Application to be filed in Fall 2015.

2. Please provide an analysis of the comparison of space heating costs (present fuel prices) using various heat sources for an average 1,800 square foot P.E.I. home (an estimated 100,000,000 annual BTU's). Please provide this analysis in electronic spreadsheet form as well. For space heating estimate, please use most modern current technology of air sourced heat pumps, triple-pass cold start oil boilers, on demand propane boilers, wood and wood pellets etc. Please provide this analysis based on the current electricity rate tariff structure and indicate the financial implications on the discounted second block tariff for air sourced heat pumps.

**Response – 2:**

The comparison of space heating costs is shown in the table below. This table is also contained in the attached Excel workbook "IRAC Staff IRs-S2-DSM.xlsx".

**COMPARISON OF FUEL COSTS FOR AN ANNUAL SPACE HEATING REQUIREMENT OF 100,000,000 Btu**

| | | Air source heat pump | Furnace oil | Propane | Roundwood (mix of hardwood) | Wood pellets |
|---|---|---|---|---|---|---|
| Annual space heating requirement | Btu x 10^6 | 100 | 100 | 100 | 100 | 100 |
| Conversion efficiency | | 2.50 | 0.90 | 0.90 | 0.65 | 0.75 |
| Required energy content in fuel | Btu x 10^6 | 40 | 111 | 111 | 154 | 133 |
| Fuel heat contents | | 3,412 | 36,200 | 23,503 | 25,000,000 | 17,637 |
| | | Btu / kWh | Btu / litre | Btu / litre | Btu / cord | Btu / kg |
| Required quantities of fuel | | 11,723 | 3,069 | 4,727 | 6.2 | 7,560 |
| | | kWh | litres | litres | cords | kg |
| Current fuel prices (as of Sep 23, 2015) | | 0.1316 | 0.749 | 0.632 | 225.00 | 0.275 |
| | | $ / kWh | $ / litre | $ / litre | $ / cord | $ / kg |
| Annual fuel cost ( before taxes ) | $ | 1,543 | 2,299 | 2,988 | 1,385 | 2,077 |

As a first approximation, all of the electricity usage for the air source heat pump was costed at the Residential Rate first energy block charge of $0.1316/kWh in the above table. To refine the analysis, the next step is to estimate the split of the electricity usage for the air source heat pump into first block and second block amounts. This is shown in the following table.

| SPLIT OF AIR SOURCE HEAT PUMP USAGE BETWEEN FIRST AND SECOND BLOCKS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 10 year | Estimated monthly electricity usage for 1,800 square feet home | | | | | |
| Month | 10 year average Heating Degree Days below 18 C | Air source heat pump ( kWh ) | Lights & appliances ( kWh ) | Water heating ( kWh ) | Total ( kWh ) | Heat pump 1st block ( kWh ) | Heat pump 2nd block ( kWh ) |
| Jan | 772 | 2,072 | 450 | 450 | 2,972 | 1,100 | 972 |
| Feb | 699 | 1,875 | 450 | 450 | 2,775 | 1,100 | 775 |
| Mar | 636 | 1,707 | 450 | 450 | 2,607 | 1,100 | 607 |
| Apr | 424 | 1,137 | 450 | 450 | 2,037 | 1,100 | 37 |
| May | 270 | 726 | 450 | 450 | 1,626 | 726 | - |
| Jun | 112 | 301 | 450 | 450 | 1,201 | 301 | - |
| Jul | 19 | 50 | 450 | 450 | 950 | 50 | - |
| Aug | 25 | 67 | 450 | 450 | 967 | 67 | - |
| Sep | 106 | 285 | 450 | 450 | 1,185 | 285 | - |
| Oct | 272 | 731 | 450 | 450 | 1,631 | 731 | - |
| Nov | 418 | 1,122 | 450 | 450 | 2,022 | 1,100 | 22 |
| Dec | 615 | 1,651 | 450 | 450 | 2,551 | 1,100 | 551 |
| TOTAL | 4,367 | 11,723 | 5,400 | 5,400 | 22,523 | 8,760 | 2,964 |

The above table shows an estimated 8,760 kWh, or 75%, of the 11,723 kWh for heat pump usage as being in the first block. However, this is somewhat high because it is based on an assumed year round Coefficient Of Performance (COP) of 2.5, whereas the COP will actually be lower during the coldest weather, and thus more of the usage will be in December to March than shown in the above table. This in turn will result in more second block usage in December to March than shown in the above table.

For discussion purposes assume a 70% / 30% split of the heat pump usage between the first and second blocks, respectively. The before taxes cost of the electricity usage for the heat pump can then be more accurately estimated as:

$ 1,080 for first block usage (11,723 kWh x 0.70 x $ 0.1316 / kWh)
$ 365 for second block usage (11,723 kWh x 0.30 x $ 0.1038 / kWh)
$ 1,445 in total

The above analysis is for a heat pump supplying all of the home's space heating requirement. However, most of the heat pumps being installed are mini-split units that are intended to provide supplementary heating. If a mini-split provides half of the home's space heating requirement, then almost all of the usage will be billed at the first block energy charge.

3. Does Maritime Electric have any retail marketing information to indicate what level of rebate is sufficient to influence consumer purchasing decisions? How was the $5 rebate amount determined? Is there a cap on the annual budget amount assigned under this program for LED conversion? Is the $6.0 million estimated cost over 5 years fixed at this amount? Can it be increased or decreased?

**Response – 3:**

The $5.00 rebate amount was determined based on three considerations:

- The price difference observed in hardware stores between LED light bulbs and incandescent halogen light bulbs;
- The level of rebates offered in other jurisdictions to incent the purchase of LED light bulbs; and
- One rebate amount for all LED light bulbs would simplify consumer understanding and program administration.

The $5.00 rebate represents approximately half of the difference in price between LED light bulbs and incandescent light bulbs, which Maritime Electric believes will provide a significant incentive for consumers to purchase LED light bulbs. In the benefit cost analysis shown in Appendix 3 of the Application, a retail price of $10.50 was used for an 11 Watt general service LED light bulb and a retail price of $2.50 was used for a 43 Watt general service incandescent halogen light bulb, for a price difference of $8.00. In the benefit cost analysis shown in Appendix 7 of the Application, a retail price of $17.00 was used for a 13 Watt BR30 LED reflector bulb and a retail price of $3.50 was used for a 65 Watt BR30 incandescent reflector bulb, for a price difference of $13.50.

Maritime Electric proposes to provide annual reports to the Commission on actual Plan expenditures and results. The Company expects that these reports will also be used to propose changes to the Plan as circumstances dictate. These proposed changes could include suggestions to increase or decrease the annual and total program amounts for LED rebate coupons. To the extent there is a need to decrease the annual amount spent on LED rebate coupons, Maritime Electric expects that this could be done by limiting the number of rebate coupons made available in stores.

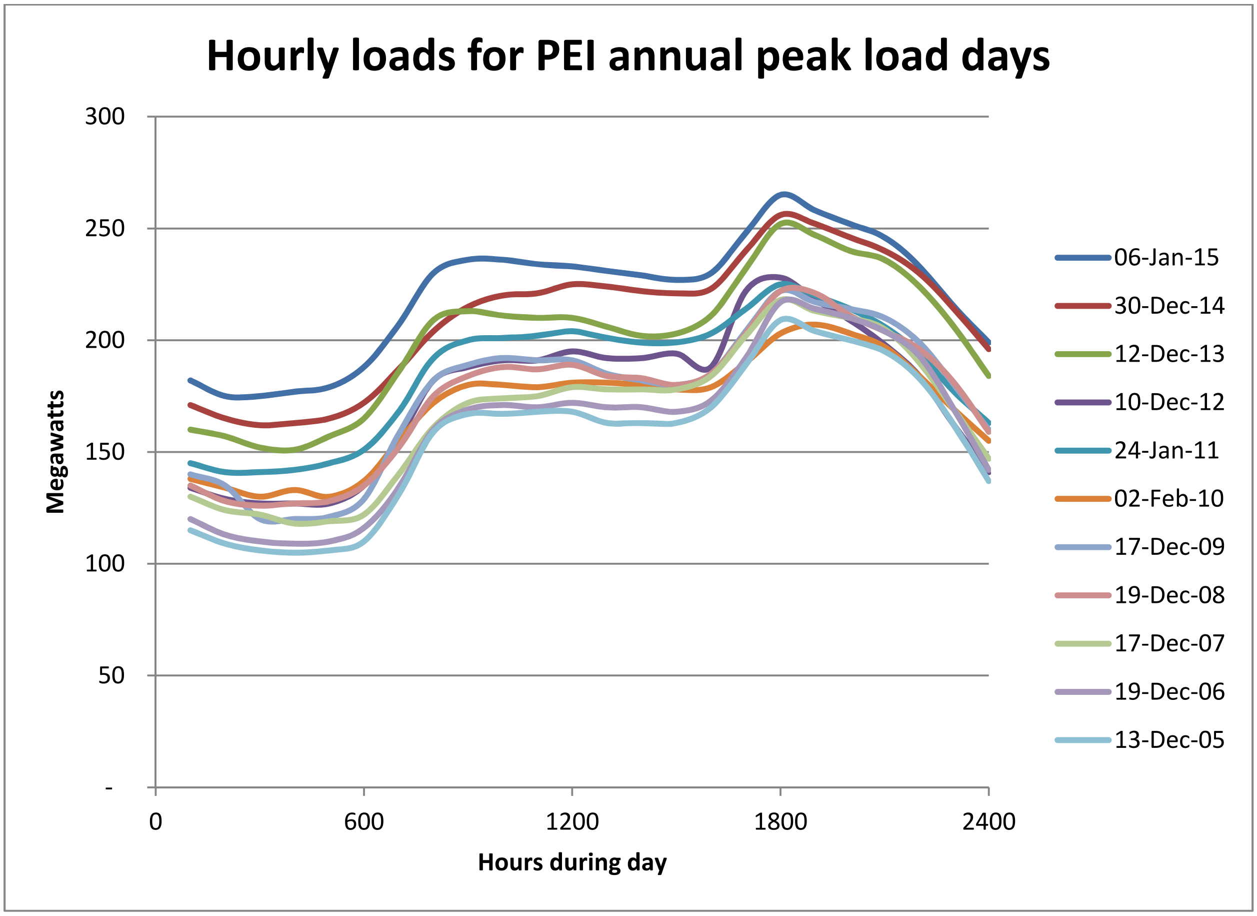
4. Air sourced heat pumps have been identified as a driver for the conversion of overall peak demand load switching from December to January. Please provide a graph of the change in peak load over past 10 years. At peak please provide environmental factors like temperature, daylight hours, etc.

**Response - 4:**

The table below shows the time and date for the PEI annual system peak load for the past 10 years plus 2015 to date, as well as the weather conditions at the Charlottetown Airport at the time of peak.

| PEI Annual System Peak Loads | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Year** | **Date** | **Hour Ending** | **PEI Annual System Net Peak Load (MWh/h)** | **Weather conditions at Charlottetown Airport** | | | |
| | | | | **Temperature (deg C)** | | **Wind chill (deg C)** | **Approx. time of sunset** |
| 2005 | Dec 13 | 18:00 | 208.3 | (3.8) | Cloudy | (9) | 16:27 |
| 2006 | Dec 19 | 18:00 | 216.2 | (5.0) | Snow showers | (12) | 16:29 |
| 2007 | Dec 17 | 18:00 | 218.2 | (6.6) | Snow, blowing Snow | (15) | 16:28 |
| 2008 | Dec 19 | 18:00 | 222.5 | (14.8) | Mainly clear | (25) | 16:29 |
| 2009 | Dec 17 | 18:00 | 219.4 | (13.0) | Mainly clear | (21) | 16:28 |
| 2010 | Feb 2 | 19:00 | 207.1 | (19.1) | Mainly clear | (26) | 17:19 |
| 2011 | Jan 24 | 18:00 | 223.2 | (17.8) | Snow showers | (27) | 17:06 |
| 2012 | Dec 10 | 18:00 | 228.4 | 0.3 | Rain | | 16:27 |
| 2013 | Dec 12 | 18:00 | 251.8 | (15.5) | Mainly clear | (24) | 16:27 |
| 2014 | Dec 30 | 18:00 | 254.5 | (14.5) | Mainly clear | (21) | 16:36 |
| 2015 YTD | Jan 6 | 18:00 | 263.9 | (17.6) | Mainly clear | (25) | 16:43 |

The graph below shows the hourly loads for the PEI annual system peak load day for the past 10 years, plus 2015 to date.



5. Please provide the same graphical analysis for peak summer consumption including date and environmental factors such as daylight and temperature.

**Response - 5:**

The table below shows the time and date for the PEI summer peak load for the past 10 years plus 2015 to date, as well as the weather conditions at the Charlottetown Airport at the time of peak.

| PEI SUMMER PEAK LOADS | | | | | | |
|---|---|---|---|---|---|---|
| Year | Date | Hour Ending | PEI summer net peak load (MWh/h) | Weather conditions at Charlottetown Airport | | |
| | | | | Temperature (deg C) | | Relative humidity (%) |
| 2005 | Aug 11 | 12:00 | 182.7 | 23.8 | Mostly cloudy | 76 |
| 2006 | Jul 18 | 12:00 | 182.7 | 26.1 | Mainly clear | 63 |
| 2007 | Aug 3 | 12:00 | 189.2 | 24.7 | Mainly clear | 76 |
| 2008 | Jul 21 | 12:00 | 187.2 | 18.5 | Showers, Fog | 95 |
| 2009 | Aug 17 | 12:00 | 191.7 | 25.5 | Partly cloudy | 78 |
| 2010 | Aug 6 | 12:00 | 189.7 | 25.1 | Mainly clear | 75 |
| 2011 | Aug 8 | 18:00 | 183.0 | 17.2 | Rain, Fog | 93 |
| 2012 | Aug 13 | 17:00 | 193.5 | 27.5 | Mostly cloudy | 69 |
| 2013 | Jul 15 | 18:00 | 195.6 | 31.1 | Mainly clear | 44 |
| 2014 | Aug 5 | 18:00 | 195.0 | 23.8 | Mostly cloudy | 76 |
| 2015 YTD | Aug 19 | 17:00 | 204.9 | 29.6 | Mainly clear | 56 |

| | | | PEI SUMMER PEAK LOADS | | | |
|---|---|---|---|---|---|---|
| | | | PEI summer net peak load | Weather conditions at Charlottetown Airport | | |
| Year | Date | Hour ending | (MWh/h) | Tempertr ( deg C ) | | Relative humidity ( % ) |
| 2005 | Aug 11 | 12:00 | 182.7 | 23.8 | Mostly cloudy | 76 |
| 2006 | Jul 18 | 12:00 | 182.7 | 26.1 | Mainly clear | 63 |
| 2007 | Aug 3 | 12:00 | 189.2 | 24.7 | Mainly clear | 76 |
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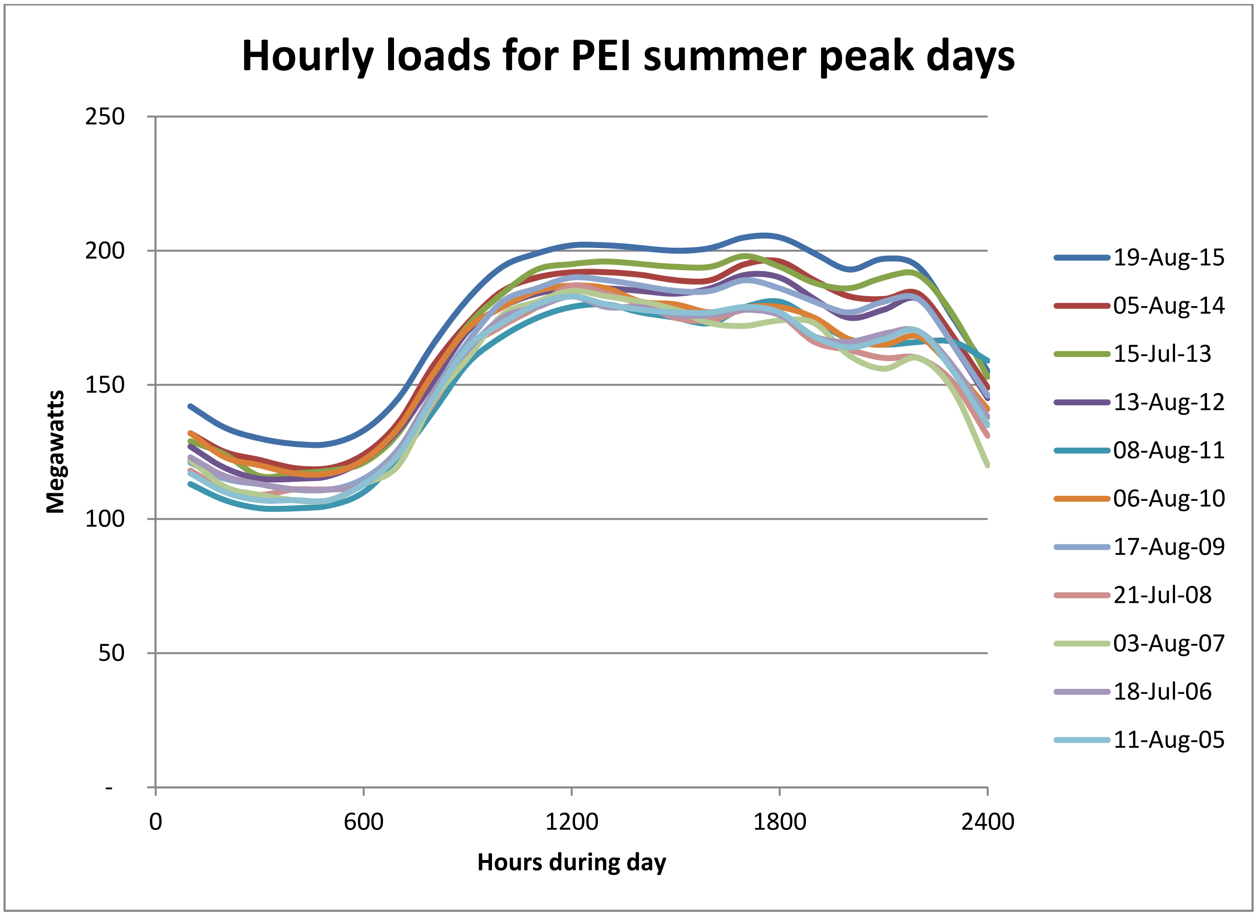
The graph below shows the hourly loads for the PEI summer peak load day for the past 10 years, plus 2015 to date.



6. Has Maritime Electric done any investigation into whether customers shifting from oil boilers to electric air sourced heat pumps have maintained their home oil heat infrastructure? What data sources did Maritime Electric use to determine the 810 units estimate of homes with remaining oil heat infrastructure after installation of air sourced heat pumps?

**Response – 6:**

In mid-2014 Maritime Electric met with seven of the largest installers of heat pumps in PEI. The purpose of the meetings was to gain an understanding of the types, makes and models of heat pumps that were being installed.

In 2013 the PEI Office of Energy Efficiency (OEE) provided grants for approximately 900 heat pump installations. OEE provided Maritime Electric with a summary of their grant program data for 2013, which also provided information on the types, makes and models of heat pumps that were being installed.

The following conclusions were drawn from these investigations:

- Almost all the heat pumps being installed in PEI are mini-split heat pumps.
- Approximately 3,600 heat pumps are being installed annually in PEI, with 25% of these, or 900, receiving grants from OEE.
- The installed cost (taxes included) for a good quality mini-split heat pump installed by a reputable contractor is around $4,500. The OEE grant is $425, which represents approximately 10% of the cost. Many people do not apply for the OEE grant because they can achieve a saving of $1,000 or more by ordering the equipment over the Internet and installing it on a Do-It-Yourself type basis. However, drawbacks to this approach are lack of warranty and potential problems due to improper installation.
- Most of these mini-split heat pumps are being installed as supplementary sources of heat – they normally do not have backup electric resistance heaters. Thus homes with existing oil-fired (or other fuel source) central heating systems are maintaining these systems.

Approximately 10% of PEI homes have electric space heat. Thus the other 90% use oil or another fuel as the main source of space heating, and 90% of the 900 grants provided annually by OEE for heat pump installations is an estimated 810 homes that install a mini-split heat pump and maintain their oil-fired or other fuel source central space heating system.

Maritime Electric's proposed measure of providing incentives for thermostat control of air source heat pumps is intended to operate in conjunction with the OEE grant program. Thus the Company's target for the measure is 810 units annually, which is the estimated number of units per year that receive the OEE grant and are installed in homes with an oil-fired or other fuel source central space heating system.

7. The current CT4 application requests approval of a $68 million expenditure for a 50MW unit. That is a multiplier of $1.36 million per MW. The Energy Efficiency and DSM Plan overall has a cost of $10.9 million and with estimated savings of 9.7 MW at peak load for a multiplier of 1.12 million per MW. This plan is less costly per MW than new generation, if it avoids new generation. This plan does not avoid the need for CT4 in 2017-18. Why does the Company still believe it necessary for this plan considering the fact generation is not avoided?

**Response – 7:**

Even though Maritime Electric's proposed Energy Efficiency and DSM Plan will not result in an avoiding of the need for CT4, the Plan will result in generation being avoided. The generation that will be avoided will be short term firm capacity purchases.

The 50 MW nominal capacity of CT4 and the 50 MW of additional generating capacity expected to be needed by 2020 are in addition to the up to 80 MW of firm generating capacity that can be purchased from NB Power, given the limitation of 80 MW of firm transmission capacity in New Brunswick that is available for deliveries to PEI. 30 MW of this 80 MW of firm transmission capacity is dedicated to delivering Maritime Electric's 30 MW participation in Point Lepreau. The remaining 50 MW of this firm transmission capacity is available for delivery of other purchases of generating capacity to PEI, and Maritime Electric is currently using it to purchase short term firm generating capacity from NB Power. After CT4 is installed, Maritime Electric will still need to purchase some short term firm generating capacity, and following the acquiring of an additional 50 MW of generating capacity by 2020 and the retirement of the Charlottetown Thermal Generating Station the Company will still have a need to purchase some short term firm generating capacity.

Thus the generating capacity that is on the margin, and what will be displaced by the Company's Energy Efficiency and DSM Plan, is short term firm capacity purchases. That is why the avoided cost for generating capacity that is used in the benefit cost analyses for the Plan is an estimated $100/kW-year for short term capacity purchases, not the cost of CT4. The $100/kW-year is a nominal value – it is higher than what Maritime Electric is currently paying for short term firm capacity, but it is lower than the cost of generating capacity in the New England market.

8. Please provide Appendices 1-9 restated with 1). Utility avoided generating capacity cost and 2). Avoided T&D capacity cost removed. Please explain why Maritime Electric included both costs in the application filed considering the application for CT4 and the 2016 capital budget recently filed.

**Response – 8:**
The including of Maritime Electric's avoided generating capacity cost (in the form of short term firm capacity purchases) in the benefit cost analyses for the Company's proposed Energy Efficiency and DSM Plan is not a double counting with the Application for CT4. Rather, together they represent the Company's proposed plan to meet 60 MW of peak load – 50 MW with the nominal 50 MW capacity of CT4 and 10 MW through energy efficiency and DSM. Maritime Electric's alternative to the 10 MW of demand reduction through energy efficiency and DSM would be to purchase 10 MW of short term firm generating capacity so as to be able to actually supply the 10 MW of load. However, the results of the benefit cost analysis show that the lower cost alternative is to reduce the load by 10 MW through the Company's proposed Energy Efficiency and DSM Plan rather than supply the load through a purchase of 10 MW of generating capacity.

Similarly, the including of avoided T&D capacity costs in the benefit cost analyses for the Company's proposed Energy Efficiency and DSM Plan is not a double counting with the 2016 Capital Budget Application and the ongoing annual capital investments in T&D generally. Rather, together they represent the Company's proposed plan to be able to deliver the peak load – most of it through investment in T&D infrastructure and 10 MW through energy efficiency and DSM. Maritime Electric's alternative to the 10 MW of demand reduction through energy efficiency and DSM would be to invest in an additional 10 MW of T&D infrastructure so as to be able to actually deliver an additional 10 MW of load. However, the results of the benefit cost analysis show that the lower cost alternative is to reduce the load by 10 MW through the Company's proposed Energy Efficiency and DSM Plan rather than be able to deliver the 10 MW of load through an investment in 10 MW of T&D infrastructure.

Thus the Company believes that the proposed Energy Efficiency and DSM Plan will result in avoiding 10 MW of short term firm generating capacity purchases and an investment of 10 MW of T&D capacity, and therefore these avoided costs should be included as benefits in the benefit costs analyses for the Plan.