

July 9, 2015

Maritime Electric Company Limited

DSM Filing Docket UE21406

J.M. Lanigan, CPA, CA

Regulatory Services

Island Regulatory & Appeals Commission

P.O. Box 577

Charlottetown, PE

C1A 7L1

Dear Sir,

In response to the DSM filing I offer the following comments and observations.

**Summary:**

IRAC should defer any ruling on this DSM filing until such time that IRAC has approved a revised rate structure that properly takes into account cost of service for different customers. IRAC should review the role of ECAM. ECAM distorts the true costs of energy required for space heating. Maritime Electric in its evidence establishes an 8 month heating season. ECAM allows Maritime Electric to recover part of the space heating energy cost during the 4 month, when no heat is required, from other customers.

**Discussion:**

Maritime Electric has submitted a DSM Plan to comply with the requirements of section 16.1 of the Electric Power Act.

In table 1, Maritime Electric projects a total reduction in capacity of 9.7 MW for an estimated total cost over the life of the project of \$15.1 million dollars. This is a cost of \$1.6 million dollars per MW.

The cost of CT4 is \$1.4 million dollars per MW.

I have information from a reliable engineering source that informs me that the constructed cost of a 50 MW Combustion Turbine is \$0.9 million dollars per MW before contingency and engineering.

There are utility grade combustion turbine packages available in the 10 to 15 MW output range at a cost of \$1.2 million per MW.

This begs the question what is more cost effective on a per MW basis. Is it the DSM program proposed by Maritime Electric or purchasing 9.7 MW of combustion turbine capacity as part of a bigger unit or purchasing a stand-alone 9.7 MW combustion turbine package?

Maritime Electric is not in a position to make this comparison since this option would not comply with the DSM requirements in section 16.1 of the Electric Power Act.

Maritime Electric also makes it clear that the Act does not define what is meant by “cost effective” DSM. Maritime Electric provides a lengthy description of how it defines “cost effective”.

In my view the LED program should not qualify as an option to provide cost effective demand side management. The intent of demand control is to reduce system peak. The peak load is only required for a few hours per year. Lights are used year round. Lights are part of the base/intermittent load of the utility.

A number of years ago Maritime Electric had a Holiday Lighting Demand Side Management program. This program qualified for DSM because holiday lights were only used for one month when the system was on peak. As the Utility states holiday lighting DSM is no longer effective since system peak has shifted to the January/February period.

The following table based on Maritime Electric data shows why the LED program is less effective in system peak demand control.

	MWh	MW	kW/MWh
LED	12,200	5.9	0.5
Heat pump	300	1.5	5.0
thermostat	1,000	2.3	2.3

The LED program is projected to only save 0.5 kW of demand for every MWh of electricity saved.

For comparison the Maritime Electric system in total has a demand of 0.2 kW per MWh sold. It appears that the heat pump proposal is the most cost effective method to reduce peak without significantly reducing energy sales.

The bigger question that should be answered prior to approving any DSM proposal is the role of electric space heating in driving system demand.

### **Electric space heating and its relationship to Demand and DSM.**

IRAC engaged its own consultant in 2007 to study the effectiveness of the proposed DSM program at that time.

Section 7 on page 8 of the study identifies that an appropriate rate structure is required to encourage efficient DSM.

The section refers to research and legislation in the United States that places great emphasis on ensuring that generally accepted rate making principles are followed to encourage optimum investment in energy efficiency so that rates are fair to ALL customers. The report states that these principles are equally important for Canada. The report refers to BC Hydro's proposed plan to eliminate declining block rates. BC Hydro has now gone further and it now charges a premium above specified bi-monthly energy consumption.

Declining block rates counter market driven DSM measures.

Declining block rates do not exist in most North American jurisdictions.

Maritime Electric in its 2010 rate application had eliminated the second block rate.

The Government intervened successfully to keep the second block rate structure. One result of the intervention was an increase in a growth of the ECAM account from \$6 million to \$12 million in 2011 (Order UE10-03).

Government has an energy policy that goes counter to evidence based research to achieve cost effective DSM.

In section 2.4.2 it states at the end of the first paragraph "increases in electric heat can quickly negate other DSM efforts for system peak reduction.

The report goes on to state that each new electrically heated home will have a 5kW electric heat load that will be on system peak. At a capacity cost of \$56/kW (cost associated with the installation of CT3 at that time) that will add \$280 per year to the utility's cost of service. If that cost is not collected from the electric heat customers thru a compensating rate structure it will be picked up by other Maritime Electric customers. It should be noted that the cost of the proposed CT4 has almost doubled the CT3 costs. Therefore the annual capacity cost will be approx. \$500 per electrically heated home.

In section 2.4.3 it states that electric heat is "unnatural" from an economic efficiency perspective. An electric heating load sitting on the system peak requires generation to serve the peak load for only one or a few hours per year. The capacity will not be used during the remainder of the year. The capacity will still need an on-going revenue stream for the recovery of the fixed costs. This cost is approx. \$40 per month.

The report clearly indicates that Maritime Electric's current rate structure is unfair.

### **Rate hearings related to the impact of electric space heating.**

Concerns about the growing peak demand due to electric space heating and its impact on rates and system efficiency have been raised back in 2009. I refer the Commission to Docket UE20938 Order UE09-02 section 65.

Based on evidence presented the Commission concluded the following.

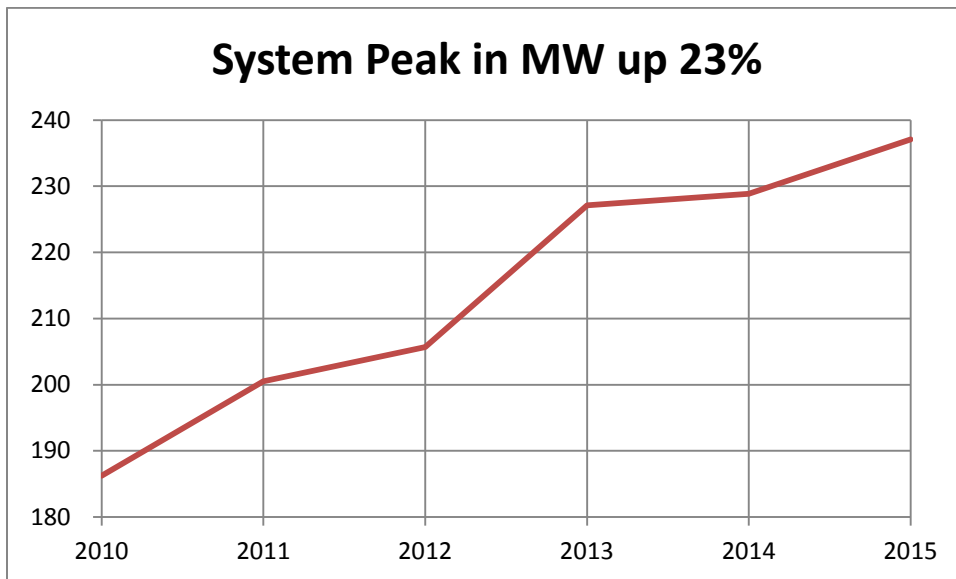
It states “The Commission will be reviewing rates to assess equity within rate classes taking into consideration the results of the Cost of Service study to be filed”.

It is my understanding that the Cost of Service Study and the rate review have not been done because the Government introduced legislation in 2011 to freeze the existing rate structure including the second block energy rate. The legislation is commonly known as the “Energy Accord”.

### **Responses to questions posed to Maritime Electric.**

Based on Maritime Electric’s response to my questions 1 and 2, It appears that concerns raised by IRAC’s consultant and my evidence at rate hearings have come true.

Peak demand has increased 23% since 2010 as per data provided by Maritime Electric. This is shown in the below graph. Peak demand has increased 51 MW. This equals the capacity of the proposed CT4.

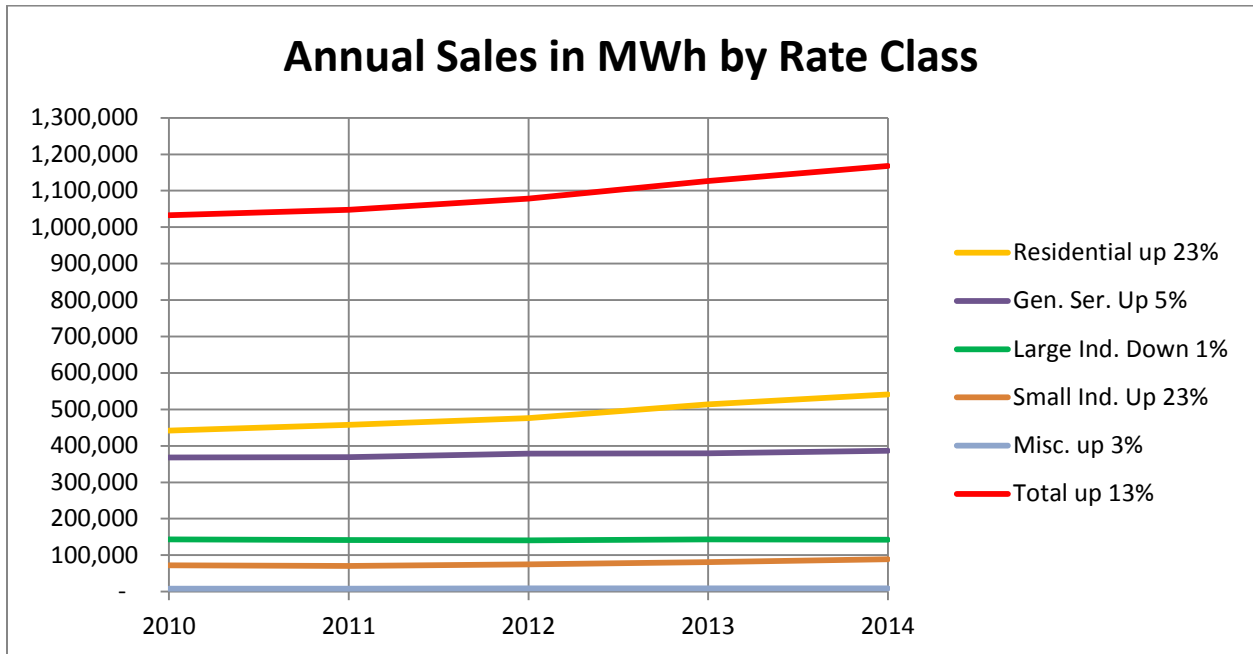


The system peak load increase is outpacing the increased energy sales.

This is shown in the following graph.

Total sales in MWh have only increased 13% while peak load has increased 23%. This will increase the unit cost of electricity because system load factor is deteriorating.

Maritime Electric's load factor in 2014 was 58%.



The largest percent increases are in the residential sector and the small industrial sector. The residential sector in 2014 makes up 43% of MWh of energy sold. The next biggest sector is General Service at 33%. This is followed by the large industrial sector at 12%. The small industrial sector uses only 8%.

The general service sector is up by a modest 5%. Clearly peak demand must be driven by demand in the residential sector.

In answer to question 6 Maritime Electric states that 121 million kWh are consumed by electric resistance heating. This represents 22% of the total residential load. This does not include heating by heat pumps. This is a substantial component of the residential sector energy requirements. Its impact needs to be reflected in the rate structure.

As per question 6, Maritime Electric estimates that over the next few years 3,600 heat pumps will be installed annually. Over a 5 year period that is 18,000 units. At one per household that means that 32% of islanders will have heat pumps installed during that time period.

Question 8 was meant to get an estimate of heat load at -15 deg. C and at -22 deg. C.

Maritime Electric chooses to keep to its average load of 3 MW in the -18 to -20 C range. Maritime Electric estimates that 56% of heating units will be on at system peak. It is my view that more than 56% will be on at peak at those temperatures.

At a building design temperature of -27 C, 100% of the heat pumps would be on at system peak. This is similar to oil fired heat. When it is mild out the furnace will run infrequently. As it gets colder the furnace comes on more often. In extreme cold at -27C the furnace will run continuously.

Therefore a 3MW load at -18C will become a 5.6 MW load at -27C. A 5 year forecasted load growth of 15MW would become a 28MW load growth should PEI experience a serious cold snap.

**Government policy promotes electric heating for environmental reasons.**

Just how friendly is electric space heating to the environment?

Question #4 of my interrogatories is meant to sample this matter.

Government has a policy to encourage conversion of space heating from oil to electric for environmental reasons. The validity of this reasoning was also questioned at the 2009 rate hearings. See Section 13 of Order UE09-02.

January and February are the peak month for space heating requirements.

In fact for 2015 Maritime Electric’s average load for February was greater than the load in January.

The following table shows the breakdown of sources of energy.

Note that in February only 19.5% of energy came from wind. The wind farms seem to have performed very well since the average output was 35 MW.

	Jan 2015	Feb 2015	Jan 2015	Feb 2015	Jan 2015	Feb 2015
	MWh	MWh	MW(avg)	MW(avg)	% load	% load
cables	96,665	91,149	130	136	74.6%	75.8%
Wind PEIEC	31,114	23,440	42	35	24.0%	19.5%
Wind other	65	83	0	0	0.1%	0.1%
ct1&2	27	137	0	0	0.0%	0.1%
ct3	1,731	1,359	2	2	1.3%	1.1%
steam	-	4,005	0	6	0.0%	3.3%
Total	129,602	120,173	174	179	100.0%	100.0%

If we assume that nuclear energy is green we get the following breakdown between fossil fuel and green energy.

energy output by source			
	Jan 2015	Feb 2015	avrg.
nuclear(est)	14.9%	14.5%	14.7%
fossil	61.0%	65.9%	63.5%
wind	24.1%	19.5%	21.8%
green(includes nuclear)	39.0%	34.1%	36.5%
fossil	61.0%	65.9%	63.5%

In order to compare oil sourced space heating vs electric heating we have to work the electric energy back to the input fuel used to generate that electricity. This is done in the following table.

	Output	output		Input	Input
	Jan 2015	Feb 2015	assumed	Jan 2015	Feb 2015
	MWh	MWh	efficiency	MWh	MWh
cable fossil	77,332	73,723	35%	220,947	210,637
cable nuclear	19,333	17,426	100%	19,333	17,426
wind PEIEC	31,114	23,440	100%	31,114	23,440
wind other	65	83	100%	65	83
ct1&2	27	137	25%	108	548
ct3	1,731	1,359	25%	6,924	5,435
steam	-	4,005	5%	-	80,106
Total	129,601	120,173		278,491	337,676
efficiency				47%	36%
		249,775	616,167	41%	

Note that the Maritime Electric system energy efficiency including wind energy is only 36% for the month of February. As per DSM filing the COP of heat pumps is 2. Therefore in February for space heating supplied by heat pumps we have an efficiency of 72 % ( 2 X 36%). This is lower than the nominal

80% efficiency of oil fired space heating. Note that electric resistance space heating is only 36% energy efficient. Therefore in February it would have been more environmentally friendly to heat with oil on Prince Edward Island.

The Maritime Electric System suffered a huge efficiency penalty in February because it had to have the old steam plant on hot standby and actually spin the generators for an average 6 MW output in February. If I recall correctly from the 1980<sup>th</sup> discussions, the plant upgrade at full load would result in 19% efficiency. My assumed 5% efficiency may be generous at part load operation experienced in February.

The CT1 &2 outputs are negligible. The generators were basically spinning from time to time. CT3 produced on average 2 MW of a 50MW rated CT. This is a load factor of 4%. The 25% efficiency allowance may be generous.

There is a significant dollar cost associated with having to run the Charlottetown steam plant. I intend to come back to this as part of the CT4 filing.

## The role of IRAC

As per IRAC's website:



The Commission's regulatory powers are derived from the [Electric Power Act](#). On December 7, 2012 the Legislative Assembly of PEI passed the [Electric Power \(Energy Accord Continuation\) Amendment Act](#) which establishes electric pricing from April 1, 2013 to March 1, 2016.

The Energy Accord effectively removed IRAC from overseeing electricity pricing until March 1, 2016. This is only 8 month from now.

IRAC is asked to rule on this DSM filing of June 5 and the Combustion Turbine filing submitted June 25.

IRAC should assume that it will regain oversight of electricity pricing and therefore should take into account the effect of implementing both filings on rates.

IRAC should test Maritime Electric's statement on page 2 section 3 of the DSM filing.

Quote: The proposals contained in this application represents a just and reasonable balance of the interests of Maritime Electric and those of its customers and will, if approved, allow the Company to deliver an effective plan at a cost that is, in all circumstances, reasonable.



Especially the clause “in all circumstances” needs to be tested.

It is my contention that the proposals are NOT reasonable in ALL circumstances.

Maritime Electric does not take into account the unfair rate structure and ECAM based billing.

Allow me to remind IRAC of previous hearings on the subject of rate structure and ECAM.

## **ECAM**

Docket UE20938 Order09-02

Discussion Sections 10, 11, 12 and 13 are background to the findings in Section 37 and 38.

Section 37 - In an effort to enhance public understanding, the Commission believes it would be ignoring its responsibility if it did not highlight the fact that, while electricity costs have increased, substantial costs are also being deferred through the Energy Cost Adjustment Mechanism. If nothing else, the consuming public should take from this Order the warning that the deferred costs represent expenditures already made to purchase energy already consumed. Those costs must be paid and that objective can only be achieved by charging those costs to the consumers.

Section 38 – For a jurisdiction our size, the figures are substantial. For example, in the month of January 2009, Maritime Electric paid \$11.8 million for purchased energy; however, \$4.5 million of those costs (38%) were deferred through ECAM. That means it cost the company \$4.5 million more to purchase the energy Islanders consumed in that one month than was recovered through bills to customers for that month. Through the operation of the ECAM, that \$4.5 million will be recovered over the net 12 month period thereby impacting every bill for the next year. Already more than \$33 million in deferred costs are booked to be recovered through the ECAM.

These sections clearly acknowledge that the cost of electric heat in January is not fully recovered. In fact for January 2009, 38% of the electricity cost was in part collected in the Spring, Summer and Fall of 2009 from customers that do not use electricity for space heating.

The frustrating part is that IRAC will point out the unfairness but will not or does not have the authority to act to correct the unfairness.

## **Rate Structure**

Docket UE20938 Order09-02

Section 64 and 65 of the Order address issues related to rate structure.

Section 64 reviews the historical context of the current rate structure.

Section 65 addresses concerns raised about the impact of increased heating from electricity and its effect on system load factor and ultimately rates we all pay. IRAC makes the following closing statement. "The Commission will be reviewing rates to assess equity within rate classes taking into consideration the result of the Cost of Service Study to be filed."

Maritime Electric had proposed elimination of the discounted second block energy rate in 2010.

The Government intervened successfully in 2010 to keep the second block lower priced energy structure.

Subsequent to the hearings the rate structure was frozen by Government thru the Energy Accord in 2011.

## **Conclusions**

The impact of electric space heating on system demand is substantial and forecast to grow significantly over the next few years.

Given the significant evidence available on the contributing factors to the grows of peak demand by electric space heating and its effect on ECAM and rate structure, its seems prudent that the Commission should address these matters before approving any DSM or for that matter increased capacity purchases such as CT4.

Properly addressing these issues will lead to a market driven reduction in system load growth.

Customers will take energy cost savings measures such as installing LED lights without any expensive rebate programs. Customers will need to be informed on the long term costs savings from such energy saving matters.

Addressing ECAM and Rate Structure will impact the load forecast used by Maritime Electric.

IRAC should defer any ruling on DSM until all factors driving demand and energy costs are fully evaluated and addressed.

## **Comments on other submissions as provided up until July 6.**

IRAC makes it clear in the Notice of Application that Maritime Electric has filed this plan in consultation with the Commission without the requirement for a Commission Order directing this filing.

The Government is asking Maritime Electric to produce a copy of the Order of the Commission to Maritime Electric as per Electric Power Act.

Mr. Roger King in his comments raises concerns about promoting electric space heating and the effectiveness of the program. Mr. King concludes that the DSM Plan should be rejected.

Maritime Electric responded to Mr. King's question 1.(d) as follows

### **Response – 1.(d):**

The growth in electric resistance heating and the installation of mini-split heat pumps in recent years has been driven by market forces. Consumers have been responding to higher furnace oil prices and a growing awareness of the potential environmental liability associated with furnace oil tanks.

“Growth has been driven by market forces” – This is not correct. Growth is driven by ECAM, cross subsidization, and as IRAC's own consultant put it “electric heat has ‘unnatural’ economics”. If Maritime Electric wants market forces to operate, it should get rid of ECAM and recover the fixed costs for supplying electric heat from electric heat customers.

As Mr. King suggests the billing structure should change.

Maritime Electric always counters the time of use billing with the following response;

Maritime Electric's position on Time-of-Use rates is that the difference between the Company's on-peak and off-peak energy supply costs is not large enough to incent customers to shift a significant portion of their on-peak usage to off-peak hours.

There has been a major change in the electricity market. One only has to follow the New England market pricing of electricity.

<http://www.iso-ne.com/isoexpress/>

On peak and off peak pricing varies significantly. The introduction of wind energy creates times where negative energy pricing occurs.

I find it puzzling that in this new energy market Maritime Electric has little difference between on-peak and off-peak energy supply costs.

Mr. King also raises concerns in question 2. (a) about load capacity of 50%. Maritime Electric responds by providing the PEI load factor of 63%.

Based on the PEI load data provided and the Maritime Electric load data provided to my questions the following breakdown results.

	MWh	MW	Load Factor
PEI Load	1,395,000	254	63%
ME Load	1,167,691	229	58%
Other	227,309	25	103%

Maritime Electric's load factor is 58% based on energy sales.

The "Other" load is mainly Summerside Electric. Although Summerside is doing some DSM measures such as thermal storage when surplus wind energy is available. It is not likely that it has a load factor approaching 100%. Other factors must be at play here such as the inclusion of system losses in the PEI load number.

In general, one conclusion than can possibly be drawn is that only Maritime Electric wants this plan.