MARITIME ELECTRIC
A FORTIS COMPANY

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 Mr. Roger King

Please find attached the Company's response to the Interrogatories filed by Mr. Roger King 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

JCR39
Enclosure

MARITIME ELECTRIC
A FORTIS COMPANY

Via email: randjking@pei.sympatico.ca

August 14, 2015

Mr. Roger King
519 Simpson Mill Rd
Hunter River PE C0A 1N0

Dear Mr. King:

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 response refers to an attachment, the file has been provided electronically.

Yours truly,

MARITIME ELECTRIC

Jason C. Roberts
Director, Regulatory & Financial Planning

JCR44
Enclosure

1. **King**
   Please provide the history of events that led to the MECL transmission limit of 80MW and provide a list of the current owners of transmission capacity in New Brunswick.

Response:

The limit of 80 MW of firm transmission capacity to PEI is the result of load growth in the southeastern part of New Brunswick, particularly in the Moncton area. From the perspective of the New Brunswick system, the PEI load is part of the load in southeastern New Brunswick, and thus the growth in PEI load in recent years has aggravated the situation. Further explanation is provided in Response 10.

The transmission limit from NB to PEI/NS is based on the events that have a single entity out of service on a scheduled outage and then taking into account the loss of the next critical element (N-1) scenario. The system stability calculations based on this scenario dictate the firm transmission limits.

Currently there is 80 MW of firm transmission through New Brunswick to Murray Corner. The 80 MW is owned partly by Maritime Electric and by New Brunswick Energy Marketing and is for the exclusive use of Maritime Electric as a result of commitments made in the past by Maritime Electric to take long term firm transmission service.

Maritime Electric does not have a complete listing of all holders of transmission capacity in New Brunswick.

2. King

Can you confirm that the new Power Purchase Agreement (PPA) with New Brunswick Power has been signed by both parties effective for March 2016, expiring in 2019?

Response:

The existing Energy Purchase Agreement (EPA) between New Brunswick Energy Marketing and Maritime Electric was extended with a new expiry date of February 28, 2019. It has been signed by Maritime Electric and New Brunswick Energy Marketing.

3. King

Hydro Quebec (and perhaps other power generators) has procured New Brunswick Power (NBP) transmission capacity in the past; could MECL contract with another supplier for alternative or complementary energy that will solve the current 80MW limit?

Response:

No. The transmission that Hydro Quebec acquired was from the Quebec/New Brunswick border to the New Brunswick/Maine border for sales into New England. There is no additional capacity available beyond the existing 80 MW to Murray Corner, NB.

4. King

Generation adequacy, security of supply and transmission adequacy are believed to be the three system reliability requirements. Please provide the history since 2010 and future forecasts together with rationale that apply to each individual reliability requirement.

Response:

The two main reliability criteria that Maritime Electric follows for system planning are the 15% planning reserve requirement under the Interconnection Agreement with NB Power and the N-1 criterion.

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.

The worksheet "MECL 15 percent" in the accompanying Excel workbook "Interrogatories from Roger King" shows the 15% planning reserve calculation for Maritime Electric from 2010 to 2020.

Maritime Electric includes interruptible customer load in the calculation because the requirement is for generating capacity to be at least equal to 115% of firm peak load. The planning reserve of 15% is intended to provide extra capacity to cover unplanned outages of generators or load being higher than forecast. For these events the frequency or the length of time that interruptible customers would be called on to reduce their load is assumed to be such that the associated costs to the interruptible customers will not exceed the benefit they receive through reduced electricity bills.

N-1 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 a) accommodate load growth, and b) replace the Charlottetown Thermal Generating Station (CTGS) due to the need to retire the CTGS, with the accompanying removal from service of its 60 MW of capacity.

The worksheet "MECL N-1" in the accompanying Excel workbook "King IRs-Q4-CT4.xlsx" shows the N-1 calculation for Maritime Electric from 2010 to 2020.

Interruptible load is not used in the N-1 calculation. There is a limit to both the duration and frequency that interruptible customers can be called on to reduce load. The reason is that reducing load on short notice usually results in interruptible customers incurring costs that they would not have otherwise incurred, and they must balance these costs against the benefit provided through a reduction in their electricity bills. The outage of a submarine cable could last for up to six months, and in the past the Company did not include interruptible customers in the N-1 calculation because six months was judged to be too long a time period to be relying on interruptible load. Transmission constraints in New Brunswick that would result in a limitation of supply from the mainland to 80 MW are expected to be of relatively short duration, but their frequency may be such that the associated cost to interruptible customers would be too high. Thus Maritime Electric continues to not use interruptible load in the N-1 calculation.

5. King

The historical daily times for peak load for PEI and NBP have been different; please provide the historical and forecast data here.

Response:

The historic daily times for the PEI peak load are as follows:

Year	Date	Hour ending	Peak (MW)
2005	13-Dec-05	18:00	208.3
2006	19-Dec-06	18:00	216.2
2007	17-Dec-07	18:00	218.2
2008	19-Dec-08	18:00	222.5
2009	17-Dec-09	18:00	219.4
2010	02-Feb-10	19:00	207.1
2011	24-Jan-11	18:00	223.2
2012	10-Dec-12	18:00	228.4
2013	12-Dec-13	18:00	251.8
2014	30-Dec-14	18:00	254.5
2015 (YTD)	06-Jan-15	18:00	263.9

Maritime Electric's peak load is driven by lighting, and as shown almost always occurs for the hour ending 6:00 p.m. in December or January. The one exception is February 2010, when the peak occurred an hour later (for the hour ending 7:00 p.m.), due to the later sunset time in February.

Maritime Electric does not have a record of New Brunswick Power peak data. However, based on interactions with NB Power personnel over the years, the Company's understanding is that NB Power's annual system peak consistently occurs for the hour ending 8:00 a.m. or 9:00 a.m. on a cold winter day, driven by the large amount of electric space heating load in New Brunswick. For example, NB Power's 2014 Integrated Resource Plan states that on January 24, 2013 NB Power required 3,117 MW of electricity between 7:00 a.m. and 8:00 a.m., when it was -32 deg C with the wind chill.

Maritime Electric expects that the past patterns will continue into the future, with the NB Power peak continuing to occur for the hour ending 9:00 a.m. and the Maritime Electric peak continuing to occur for the hour ending 6:00 p.m.

6. King

In the event of a mainland transmission overload please describe the curtailment allocations prescribed by NBP. Are these curtailment factors dependent upon where the excessive load is occurring?

Response:

NB Power curtails load based on scheduled energy and on the type of transmission held by a party.

The curtailment order is as follows, based on pro-rata scheduled share by all those who hold that form of transmission:

- Short-term non-firm transmission;
- Long-term non-firm transmission;
- Short-term firm transmission; and
- Long-term firm and Network Service transmission.

The 80 MW of long-term firm transmission for Maritime Electric has equal weighting as NB Power's Network Transmission Service for NB Power's in-province load. If curtailment of the 80 MW is required, curtailment would also apply to the firm load within New Brunswick, on a pro rata basis.

7. King

For any such curtailment conditions please quantify the probability of events and the potential impacts to PEI customers.

Response:

The loads in PEI and in the southeastern part of New Brunswick are growing, and the frequency of curtailments is increasing. Also, NB Power has no plans for transmission system additions to address the constraints.

Maritime Electric's plan to mitigate the potential impact on customers is to have adequate generating capacity installed (including CT4) or under contract so as to meet both the 15% planning reserve criterion and the N-1 criterion. The calculations for both of these criteria include as an input the limitation of firm capacity supply from the mainland to 80 MW.

8. King

Why was the temporary, 27MW transmission capacity sought and provided by NBP; why is it limited and why is it temporary?

Response:

The 27 MW of capacity was NB Power's response to Maritime Electric's request for relief from the 80 MW transmission limitation.

The capacity purchase is not a traditional supply and thus is deemed as a short term measure until Maritime Electric can arrange for its own supply through traditional means. New Brunswick Energy Marketing may not have access to this capacity in the future.

9. King

Please explain the criteria and method used in deciding the probabilistic LOLE that defined the ELCC for PEI wind over the range of wind capacity shown and how the full PEI wind capacity of 204MW has been considered. Please provide the data and explanation of how the probabilities change as a result of the significant geographic dispersion of the different wind regimes we have across our PEI wind sites.

Response:

The Capacity Value of Wind Generation in PEI chart on page 16 is the result of a simplified Loss Of Load Expectation (LOLE) calculation. The main steps in the calculation are as follows:

1. PEI hourly loads for the five months of November through March were used. The load is significantly less in the April through October months, and thus the contribution to the expected loss of load hours from April through October is assumed to be small.

2. Hourly wind generation for the 203 MW of on-Island wind generation was used. For winters prior to 2014 / 2015, the actual wind generation was scaled up to correspond to the expected output from 203 MW. For example, the output from the 30 MW Hermanville wind farm (in eastern PEI beginning in early 2014) was incorporated by doubling the output from the 30 MW Eastern Kings wind farm. The Eastern Kings wind farm output was used so as to capture the diversity between Hermanville and the wind farms in the western part of PEI.

3. No planned outages were assumed for the on-Island oil-fired generators for November through March.

4. Due to their limited number of operating hours, a forced outage rate of 10% was assumed for all on-Island oil-fired generators except for CT3, which was assigned a forced outage rate of 5% based on actual experience.

5. Capacity supply from the mainland was assumed to have 100% reliability.

6. To simplify the calculations for the capacity outage probability table, the Borden CT1 and the Summerside Diesel Plant were combined into one unit, and the three smallest units at the Charlottetown Thermal Generating Station were combined into one unit.

7. With no wind generation, the amount of capacity supply from the mainland was adjusted so as to achieve an LOLE of 2.4 hours for the November through March hourly loads (The NPCC one day in ten years criterion was applied as a LOLE of 24 hours in ten years, or 2.4 hours per year on average).

8. The hourly loads were then reduced by the respective amounts of hourly wind generation due to all 203 MW of on-Island wind power (effectively treating the wind generation as a negative load), causing the LOLE to be lower than 2.4 hours.

9. The hourly loads were then all increased by the same MW amount so as to return the LOLE to 2.4 hours. This increase in load is the Effective Load Carrying Capability of the 203 MW

of on-Island wind generation, as estimated based on the actual loads and wind generation for that particular year.

10. Steps 8 and 9 were repeated for smaller amounts of installed wind power by scaling the hourly wind generation amounts down by the ratio of the smaller installed capacity to 203 MW.

11. Steps 7 through 10 were done for a total of five years of data – the winters of 2010 / 2011 through 2014 / 2015. The results were averaged to produce the Capacity Value of Wind Generation in PEI chart on page 16.

The calculations took into account the generation by all of the 203 MW of wind power in PEI, and thus the geographic diversity between the wind farms is included the results.

10. King

Some application statements suggest that NBP corrective measures could be in place by 2019. What are NBP plans to correct the transmission limits?

Response:

The 2019 date is in regard to the possibility of installing natural gas fired generation in the Moncton area or between Moncton and PEI. 2019 is the earliest that natural gas supply is expected to be available in the Maritimes for such a new generating facility.

Maritime Electric's understanding of NB Power's position regarding transmission system upgrades in southeastern New Brunswick is that the New Brunswick transmission system is currently adequate to reliably supply New Brunswick load, and thus NB Power currently has no plans for upgrades. The Company believes that the following excerpts from NB Power's 2014 Integrated Resource Plan support this understanding.

"The net effect to the transmission system, and to the power system as a whole, is that it is more stressed today than was the case almost a decade ago. This is particularly prevalent in the southeast corner of the province as reflected through the lowering of our transfer capabilities to PEI and Nova Scotia. Additional transmission reinforcements, or additional generation, are required in this area to return our transfer capabilities to historic values.

Sufficient transmission capacity is available for in-province load levels and for exports, assuming necessary generation is available in critical areas and during certain times of the year, and that special protection systems are in place in the event of loss of transmission and/or generation equipment." **[page 18]**

"The New Brunswick to Nova Scotia and PEI transfer capabilities are a function of the transmission system's transfer capability into the southeastern region of New Brunswick, minus the southeastern region load (mainly Moncton, Dieppe, Riverview and surrounding areas). As the New Brunswick southeastern region load increases, the net electricity transfer capability available to PEI and Nova Scotia is reduced. NB Power's in-province load growth in the Moncton area in the past 10 years has reduced the combined transfer limits to PEI and Nova Scotia." **[page 21]**

"Although the current transmission system in New Brunswick is sufficient to reliably transfer electricity of the existing generation, potential upgrades may be necessary in the future, especially in the southeast of the province as load in the Moncton area grows." **[page 22]**

"NB Power continues to investigate solutions to future transmission constraints. … The final solution to transmission constraints will be evaluated in a separate study." **[page 23]**

11. King

Given the conclusion that purchasing CT4 is a more cost effective investment than refurbishing CTGS why is the plan to retain the CTGS site and equipment in a "long term layup" condition? Debt provision has been in place for some time to provide funding for site tear-down so presumably cost is not the reason.

Response:

Following installation of CT4 a portion of the CTGS capacity will still be needed until 2020, which is when Maritime Electric expects that the next significant capacity addition will be made. By placing the equipment into long term layup in a staged manner, the Company expects to achieve some savings in operating and maintenance costs, while keeping the equipment in place during the early years of operation of CT4 and the new submarine cables to prove their reliability. Eventual retirement of the CTGS would follow, beginning in 2021.

In regard to the cost of decommissioning the CTGS, Maritime Electric filed an Application with the Commission on July 23, 2015 that proposes changes to the annual rates of depreciation currently used for Company assets. As part of that Application, the Company addresses its plans with respect to the staged long term layup, and eventual retirement, of the CTGS. The Company recommends, in that Application, that a decommissioning study with respect to the CTGS be prepared and submitted to the Commission no later than June 30, 2018.

12. King

Please provide the budget breakdown of the $68M generator installed costs and include the competitive alternative contractors supplied with RFPs and their proposed costs of the generator.

Response:

The CT4 Project budget is below:

	Cost - rounded (2017 $ x 1,000)	
Turbine-Generator	33,230	Based on proposal received July 2014, costs similar to other manufacturer budgetary figures received Q3 2014.
Large Equipment		
- Transformer	1,460	Budgetary estimate from manufacturer, Q4 2014.
- Electrical & Fuel Handling Buildings	470	Based on MECL experience building Charlottetown substation control building, 2013.
- Cables, substation equipment	400	Budgetary estimates from manufacturers, Q4 2014.
- Switchgear & motor control centre	1,050	Budgetary estimate from manufacturer, Q4 2014.
- Fuel Day Tank	150	Budgetary estimate from manufacturer, Q4 2014.
- Additional fuel storage	1,530	Budgetary estimate from manufacturer, Q4 2014.
- Water treatment	510	Budgetary estimate from manufacturer, Q4 2014.
Transportation	600	Based on Stantec estimate, September 2014.
Engineer/Procure/Construct (EPC)		
- Engineering & contractor costs	7,830	Based on Stantec estimate, September 2014.
- Civil works/structural	3,550	Based on Stantec estimate, September 2014.
- Electrical & instrumentation	2,140	Based on Stantec estimate, September 2014.
- Mechanical	1,970	Based on Stantec estimate, September 2014.
Transmission System	100	Internal estimate to move transmission line for new fuel storage tank, Q2 2015.
Permitting/Legal/Regulatory/Salaries	2,420	Based on Stantec estimate, September 2014.
Spare Parts	640	Based on suggested spare parts at outset of CT3 project.
Subtotal	**58,050**	
Project Contingency	5,680	10% exchange rate risk on T-G purchase. 8% on remainder of project as per Stantec estimate, September 2014
Capital Cost	**63,730**	
Interest During Construction	4,230	Based on 6.54% weighted cost of capital, similar project cash flow to CT3 project.
Total Project Cost	**67,960**	

The $33.2 million cost for the combustion turbine generator equipment supply is based on a budgetary price proposal from a leading supplier. The actual selection of a suppler will be based on a competitive bidding process in 2016.

UE20723 (CT4) Responses to Interrogatories
King IRs Q4 - CT4

Interrogatory 4 from Roger King
15-08-07

MARITIME ELECTRIC CAPACITY REQUIREMENT FOR 15 % PLANNING RESERVE

		Actual 2010	Actual 2011	Actual 2012	Actual 2013	Actual 2014	Forecast 2015	Forecast 2016	Forecast 2017	Forecast 2018	Forecast 2019	Forecast 2020
Maritime Electric peak load without DSM (MW)							240	245	251	259	267	275
		Feb 2	Jan 24	Dec 10	Dec 12	Dec 30						
Less reduction due to DSM								2	4	6	8	10
Peak load		186	201	205	227	225	240	243	247	253	259	265
Less Interruptible load		11	10	9	11	16	14	14	14	14	14	14
Firm peak load		175	191	196	216	209	226	229	233	239	245	251
Plus 15 % planning reserve		26	29	29	32	31	34	34	35	36	37	38
Generating capacity requirement		201	220	225	248	240	260	263	268	275	282	289
Maritime Electric generating capacity (MW):												
- Charlottetown Thermal Generating Station		60	60	60	60	60	55	55	55	55	38	19
- Borden Plant		40	40	40	40	40	40	40	40	40	40	40
- Combustion Turbine 3		49	49	49	49	49	49	49	49	49	49	49
- Maximum from off-Island (includes Point Lepreau)		80	80	80	80	80	80	80	80	80	80	80
- Short term capacity agreement						27	27	27				
- Combustion Turbine 4									50	50	50	50
- Additional capacity												50
subtotal		229	229	229	229	256	251	251	274	274	257	288
- wind generation:	MECL purchased capacity	52	52	52	62	92	92	92	92	92	92	92
	ELCC as % of purchased	34	34	34	32	23	23	23	23	23	23	23
	ELCC (MW)	18	18	18	20	21	21	21	21	21	21	21
total		247	247	247	249	277	272	272	295	295	278	309
Capacity surplus (deficit)		45	27	21	0	37	12	9	27	20	(4)	21

21 MW of Effective Load Carrying Capability is 23 % of the 92 MW of wind generation that Maritime Electric has under contract, based on a probabilistic anaysis.

Interrogatory 4 from Roger King
15-08-07

MARITIME ELECTRIC CAPACITY REQUIREMENT FOR N-1

	Actual 2010	Actual 2011	Actual 2012	Actual 2013	Actual 2014	Forecast 2015	Forecast 2016	Forecast 2017	Forecast 2018	Forecast 2019	Forecast 2020
Maritime Electric peak load without DSM (MW)						240	245	251	259	267	275
	Feb 2	Jan 24	Dec 10	Dec 12	Dec 30						
Less reduction due to DSM							2	4	6	8	10
Peak load	186	201	205	227	225	240	243	247	253	259	265
Maritime Electric generating capacity (MW):											
- Charlottetown Thermal Generating Station	60	60	60	60	60	55	55	55	55	38	19
- Borden Plant	40	40	40	40	40	40	40	40	40	40	40
- Combustion Turbine 3	49	49	49	49	49	49	49	49	49	49	49
- Maximum from off-Island (includes Point Lepreau)	100	80	80	80	80	80	80	80	80	80	80
- Short term capacity agreement					27	27	27				
- Combustion Turbine 4								50	50	50	50
- Additional capacity											50
	249	229	229	229	256	251	251	274	274	257	288
- wind generation: MECL purchased capacity	52	52	52	62	92	92	92	92	92	92	92
ELCC as % of purchased	34	34	34	32	23	23	23	23	23	23	23
ELCC (MW)	18	18	18	20	21	21	21	21	21	21	21
total	267	247	247	249	277	272	272	295	295	278	309
Capacity surplus (deficit)	81	46	42	22	52	32	29	48	42	19	44

21 MW of Effective Load Carrying Capability is 23 % of the 92 MW of wind generation that Maritime Electric has under contract, based on a probabilistic anaysis. No benefit from the West Cape wind farm 99 MW has been included because there is no formal arrangement in place with Summerside or Suez for how the benefit of the West Cape generation would be shared during limitations of supply from the mainland.