

**NPCC
2018 MARITIMES AREA
INTERIM REVIEW OF RESOURCE ADEQUACY**

Approved by RCC December 4, 2018



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EXECUTIVE SUMMARY

The 2018 Maritimes Area Interim Review of Resource Adequacy (2018 Interim Review), covering the period of January 2019 through December 2021, has been prepared to satisfy the Reliability Assessment Program as established by the Northeast Power Coordinating Council (NPCC). This 2018 Interim Review follows the resource adequacy review guidelines as specified in the *NPCC Regional Reliability Reference Directory #1 Appendix D (Adopted: September 30, 2015)*.

The Maritimes Area will comply with the NPCC resource adequacy criterion that requires a loss of load expectation (LOLE) value of not more than 0.1 days/year for all years of this 2018 Interim Review. Major assumptions are shown in Table 1 below. LOLE values for each year of the 2018 Interim Review and the 2016 Maritimes Area Comprehensive Review of Resource Adequacy (2016 Comprehensive Review) are shown in Table 2 below.

Table 1 - Summary of Major Assumptions

MAJOR ASSUMPTIONS	
Load Forecast	2018 forecast for all jurisdictions
Load Shape	2011/12 (all years)
Resource Adequacy Criterion	Loss of Load Expectation not more than 0.1 days/year
Maritimes Required Reserve	20% of peak firm load
Interconnection Benefits	300 MW
Area Purchases/Sales	2019 - sale of 114 MW 2020 - sale of 110 MW and purchase of 153 MW 2021 - sale of 69 MW
Maritime Link Project	2020 - 153 MW firm Nova Scotia (NS) purchase from Newfoundland - 153 MW coal-fired generator retired in NS
Wind	2019 - 57 MW added in New Brunswick (NB) 2021 - 40 MW added in NB
Unit Removals	2019 - 5 MW diesel fired generation retired in NB - mothballing of 70 MW of biomass fuelled generation in Northern Maine (NM) - 7 MW of oil fired generation retired in Prince Edward Island (PEI) - 38 MW of oil fired generation in PEI laid up during summers from 2019 onward 2020 - 10 MW of oil fired generation retired in PEI

Unit Additions	2021 - 18 MW diesel generator in PEI
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Table 2 - Maritimes Area LOLE Values from 2019 to 2021

Year	2018 Interim Review (days/year)	2016 Comprehensive Review (days/year)
2019	0.002	0.003
2020	0.002	0.003
2021	0.002	0.004

Area load and capacity projections from 2019 to 2021 for this 2018 Interim Review are little changed from those projected for the 2016 Comprehensive Review and still practically flat.

LOLE results for the 2018 Interim Review were slightly lower from 2019 to 2021 than the 2016 Comprehensive Review results due to a slight increase in forecast reserve margins in NS.

There are no changes in this 2018 Interim Review with respect to fuel supplies, emergency operating procedures, or market rules.

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1.0 INTRODUCTION.....	4
2.0 ASSUMPTION CHANGES	4
2.1 DEMAND FORECAST	4
2.2 RESOURCES AND SALES.....	5
2.3 COMPARISON OF FORECAST AND REQUIRED RESERVE	6
2.4 INTERCONNECTION TIE BENEFITS.....	6
2.5 SUPPORT FROM EXTERNAL INTERCONNECTIONS	7
3.0 FUEL SUPPLIES.....	7
4.0 LOLE RESULTS	7
5.0 CONCLUSION	9

LIST OF TABLES

TABLE 1 - SUMMARY OF MAJOR ASSUMPTIONS	1
TABLE 2 - MARITIMES AREA LOLE VALUES FROM 2019 TO 2021	2
TABLE 3 - MARITIMES AREA PEAK DEMAND FORECAST FROM 2019 TO 2021	5
TABLE 4 - MARITIMES AREA RESOURCES FORECAST FOR 2019 TO 2021	5
TABLE 5 - FORECAST, MINIMUM, AND REQUIRED RESERVE - JANUARY 2019 TO 2021	6
TABLE 6 - MARITIMES AREA LOLE VALUES FROM 2019 TO 2021	9
TABLE 7 - MARITIMES AREA LOLE FOR HIGH LOAD GROWTH SCENARIO	9

1.0 INTRODUCTION

This 2018 Interim Review is the second update of the 2016 Comprehensive Review approved by the Reliability Coordinating Committee (RCC) on December 6, 2016. The Maritimes Area is a winter peaking area with separate jurisdictions in NB, NS, PEI, and NM. New Brunswick Power Corporation (NB Power) is the Reliability Coordinator for the Maritimes Area, with its system operator functions performed by its Transmission and System Operator division under a regulator approved Standards of Conduct.

2.0 ASSUMPTION CHANGES

No changes were made in this 2018 Interim Review with respect to fuel supplies, emergency operating procedures, or market rules.

Upgrades to the transmission interface between PEI and NB have increased the transfer capability from 222 MW (2016 value) to the current value of 240 MW in 2018. Completion of the re-termination of a circuit on PEI (scheduled for Q4 2018) will further increase the capacity of the interface to 300 MW in both directions by 2019. After completion of these upgrades, transfer capability to PEI will exceed their peak load.

With the completion of the installation of a larger transformer at the Tinker substation feeding NM and the 2019 transfer of 20 MW of load from that system to a direct NB feed, the transfer capability into NM will exceed its peak load beginning in 2019.

NB installed wind capacity is expected to increase by 57 MW by 2019 and a further 40 MW by 2021.

2.1 Demand Forecast

The Maritimes Area coincident peak demand is forecast to occur during the month of January each year. Table 3 shows a comparison of the annual peak demands used in this 2018 Interim Review versus the 2016 Comprehensive Review.

Table 3 - Maritimes Area Peak Demand Forecast from 2019 to 2021

Winter Peak (January)	2018 Interim Review (MW)	2016 Comprehensive Review (MW)	Difference (MW)
2019	5,391	5,416	-25
2020	5,407	5,432	-25
2021	5,400	5,426	-26
2019 to 2021 Average Compound Annual Growth Rate			
Growth Rate	0.08%	0.09%	

Forecast peak demand in the Maritimes Area is effectively flat over the period of this 2018 Interim Review and practically unchanged from the 2016 Comprehensive Review.

2.2 Resources and Sales

Resource and external sales changes for this 2018 Interim Review versus the 2016 Comprehensive Review include the following:

- Retirement of 17 MW of oil fired PEI capacity before 2021 with a further 38 MW of oil fuelled capacity on PEI will be laid up for summer periods starting in 2019 related to the increase in transfer capability from NB to PEI,
- Installation of an 18 MW diesel generator on PEI in January 2021,
- Mothballing of two biomass fuelled units totaling 70 MW of capacity in Maine by 2019 related to the transfer of about 20 MW of Houlton Water load from Northern Maine to the New Brunswick sub-area and the installation of a higher capacity transformer feeding northern Maine,
- Additional new NB installed wind capacity, 57 MW by 2019 and 40 MW by 2021,
- Removal of a 5 MW diesel generator in NB,
- Short term firm external sales to New England of 114 MW, 110 MW and 69 MW during 2019, 2020, 2021 respectively (sales are netted against resources).

Table 4 shows the year by year January resources forecast for this 2018 Interim Review compared to the 2016 Comprehensive Review.

Table 4 - Maritimes Area Resources Forecast for 2019 to 2021

Year	2018 Interim Review (MW, with on-peak wind)			2016 Comprehensive Review (MW, with on-peak wind)			Difference (MW)
	Conventional	Wind	Total	Conventional	Wind	Total	
2019	6,716	521	7,237	6,803	496	7,299	-62
2020	6,743	521	7,264	6,958	496	7,454	-190
2021	6,774	537	7,311	6,958	496	7,454	-143

Conventional resources in Table 4 are from the peak load month of January of each year and include installed generation, contracted external purchases (added) and contracted sales (subtracted), and tie benefits of 300 MW (see Section 3.5 below). Wind capacity used in Table 4 is the total amount of wind generation modeled during the hour of the Maritimes Area coincident peak load based on the load shape used for the LOLE calculations. Because of the variability of wind from hour to hour, this does not represent the effective load carrying capability or capacity value of the wind resources. Forecast hourly wind generation capacity is subtracted from hourly loads for LOLE analysis.

2.3 Comparison of Forecast and Required Reserve

The Maritimes Area uses a 20% reserve criterion for planning purposes. This criterion is not mandated but has historically resulted in levels of reserve that are closely correlated to the reserve levels necessary to meet the NPCC resource adequacy criterion. A close correlation between this 20% reserve criterion and NPCC’s LOLE criterion of not more than 0.1 days per year of load losses due to resource deficiencies was established in the 2016 Comprehensive Review. Table 5 shows annual values for the forecast, minimum and required reserves at 20%. In each year of this 2018 Interim Review, the forecast reserve exceeds the 20% required reserve criterion.

Table 5 - Forecast, Minimum, and Required Reserve - January 2019 to 2021

Year	Forecast Capacity (MW)	Peak Load (MW)	Inter. Load (MW)	Forecast Reserve		Minimum Reserve		Required Reserve	
				MW	%	MW	%	MW	%
2019	7,237	5,391	267	2,113	41	1,974	41	1,025	20
2020	7,264	5,407	265	2,121	41	1,917	40	1,029	20
2021	7,311	5,400	264	2,175	42	2,043	41	1,027	20

$$\text{Forecast Reserve (\%)} = \frac{[\text{Forecast Capacity} - (\text{Peak Load} - \text{Inter. Load})] * 100\%}{(\text{Peak Load} - \text{Inter. Load})}$$

$$\text{Minimum Reserve (\%)} = \frac{\text{Min. of Hourly } [\text{Capacity} - (\text{Load} - \text{Inter. Load})] * 100\%}{(\text{Load} - \text{Inter. Load})}$$

Forecast wind generation outputs during the Maritimes Area peak load hour are used for the forecast capacity totals in Table 5. Hour by hour reserve values are used for the minimum reserve calculations.

2.4 Interconnection Tie Benefits

In this 2018 Interim Review, 300 MW of interconnection tie benefits from New England are assumed. These tie benefits are based on a 2011 decision by the New Brunswick Market Advisory Committee to recognize the lowest historical Firm Transmission Capacity posted from summer peaking New England to winter peaking New Brunswick since the commissioning of the second 345 kV tie between these systems in December 2007. This is unchanged from the 2016 Comprehensive Review. In the CP-8 report *Review of Interconnection Assistance Reliability Benefits (December 31, 2015, Approved by RCC March 2, 2016)* the “As Is” estimated tie benefit potential for the Maritimes Area is 702 MW and 1012 MW for the years 2016 and 2020 with an export of 200 MW modeled in both test years. Based on this study, the 300 MW of tie benefits assumed for this 2018 Interim Review is conservative.

2.5 Support from External Interconnections

For the purposes of this 2018 Interim Review, interconnection support from neighbouring NPCC Areas was limited to 300 MW of tie benefits for all years. In addition, beginning in mid-2020, 153 MW of firm contracted capacity is expected to be available from a new 500 MW Maritimes Area HVDC link between NS and Newfoundland and Labrador completed in late 2017. This added external support will offset the simultaneous retirement of the same amount of coal fueled capacity in Nova Scotia. Non-firm capacity from Newfoundland and Labrador was not modeled.

3.0 FUEL SUPPLIES

The 2016 Comprehensive Review showed that the Maritimes Area has a diversified mix of resources such that there is not a high degree of reliance upon any one type or source of fuel. This diversified resource mix is unchanged for this 2018 Interim Review.

Generation fueled solely by natural gas accounts for just 7% of Maritimes Area capacity resources with supply options that include local shale gas fields, eastern off-shore production, western pipelines, and a liquefied natural gas receiving and re-gasification terminal. These supply options help to significantly reduce the exposure of the Maritimes Area to natural gas fuel disruptions.

4.0 LOLE RESULTS

Area load and capacity projections from 2019 to 2021 for this 2018 Interim Review are little changed from those predicted for the 2016 Comprehensive Review resulting in LOLE values that are practically the same.

A summary of the Maritimes Area LOLE values from 2019 to 2021 is shown in Table 6 below. All LOLE values for this 2018 Interim Review meet the NPCC resource adequacy criterion.

Table 6 - Maritimes Area LOLE Values from 2019 to 2021

Year	2018 Interim Review (days/year)	2016 Comprehensive Review (days/year)
2019	0.002	0.003
2020	0.002	0.003
2021	0.002	0.004

In the 2016 Comprehensive Review, the Maritimes Area examined a high growth scenario based on adding a fixed value of 1% compounding growth to the average annual growth rate examined during the period.

As a check on this scenario for this 2018 Interim Review, a compounding load growth rate of 1.085% per year was added uniformly across all sub-areas during the two future years of the forecast period from 2020 thru 2021 using 2019 as the base year. The LOLE values obtained for the future years of 2020 thru 2021 are shown in Table 7 and still meet the NPCC resource adequacy criterion.

Table 7 - Maritimes Area LOLE for High Load Growth Scenario

Year	2018 Interim Review (days/year)	2016 Comprehensive Review (days/year)
2019	0.002	0.006
2020	0.003	0.010
2021	0.005	0.019

5.0 CONCLUSION

Results of this 2018 Interim Review show the Maritimes Area will comply with the NPCC resource adequacy criterion requiring a LOLE value of not more than 0.1 days/year for all years from 2019 to 2021.