NPCC
2021 MARITIMES AREA
INTERIM REVIEW OF RESOURCE ADEQUACY

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NORTHERN MAINE ISA, INC.

Approved by the RCC

November 30, 2021

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EXECUTIVE SUMMARY

The 2021 Maritimes Area Interim Review of Resource Adequacy (2021 Interim Review), covering the period of January 2022 through December 2024, has been prepared to satisfy the Reliability Assessment Program as established by the Northeast Power Coordinating Council (NPCC). This 2021 Interim Review follows the resource adequacy review guidelines as specified in the *NPCC Regional Reliability Reference Directory #1 Appendix D (Revised: September 09, 2020)*.

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 2021 Interim Review. Major assumptions are shown in Table 1 below. LOLE values for each year of the 2021 Interim Review and the 2019 Maritimes Area Comprehensive Review of Resource Adequacy (2019 Comprehensive Review) are shown in Table 2 below.

Table 1 - Summary of Major Assumptions

MAJOR ASSUMPTIONS	
Load Forecast	2021 forecast for all jurisdictions
Load Shape	2017 (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 as of January of respective year	2022 - sale of 66 MW 2023 - sale of 149 MW 2024 - sale of 72 MW
Maritime Link Project	2022 - 153 MW firm Nova Scotia (NS) purchase from Newfoundland - 150 MW coal-fired generator retired in NS
Wind (As of Jan. 1st)	2023 - 30 MW added in PEI and 20 MW added in NB 2024 - 100 MW added in NS Total installed wind in the Maritimes to be 1,358 MW by 2024
Unit Removals	2022 & 2023 - Retiring 44 MW of oil-fired generation in PEI

Unit Additions	2020 - 33 MW oil generator returned to service in NS 2023 - 18 MW diesel generator in PEI

Table 2 - Maritimes Area LOLE Values from 2022 to 2024

Year	2021 Interim Review (days/year)	2019 Comprehensive Review (days/year)
2022	0.004	0.009
2023	0.012	0.010
2024	0.010	0.009

The Maritimes Area LOLE results for the 2021 Interim Review in years 2022 – 2024 are close to the corresponding values from the 2019 Comprehensive review and are well below 0.1 days/year for all years.

There are no changes in this 2021 Interim Review with respect to fuel supplies, emergency operating procedures, or market rules.

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1.0 INTRODUCTION

This 2021 Interim Review is the second update of the 2019 Comprehensive Review approved by the Reliability Coordinating Committee (RCC) on December 3, 2019. The Maritimes Area is a winter peaking area with separate jurisdictions in New Brunswick (NB), Nova Scotia (NS), Prince Edward Island (PEI), and Northern Maine (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 2021 Interim Review with respect to fuel supplies, emergency operating procedures, or market rules.

Installed wind capacity is expected to increase by 20 MW in NB and by 30 MW in PEI by Jan 2023 and by 100 MW in NS by Jan 2024. The totaled installed wind capacity in the Maritimes Area projected to be 1,358 MW by 2024.

Coal capacity of 150 MW in NS is scheduled to retire by March 31, 2022 in this Interim Review as compared to Jan 1, 2022 from the 2019 Comprehensive Review.

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 2021 Interim Review versus the previous 2019 Comprehensive Review.

Table 3 - Maritimes Area Peak Demand Forecast from 2022 to 2024

Winter Peak (January)	2021 Interim Review (MW)	2019 Comprehensive Review (MW)	Difference (MW)
2022	5,649	5,623	26
2023	5,674	5,620	54
2024	5,701	5,577	124
2022 to 2024 Average Compound Annual Growth Rate			
Growth Rate	0.46%	-0.41%	

Forecast peak demand in the Maritimes Area in this 2021 Interim Review has increased at an average growth rate of approximately 0.46% from 2022 to 2024 with 2022 considered as a base year. The growth has mainly occurred in NB and PEI. Increased peak demand in NB is due to a reduction in DSM projections

during years 2022 - 2024. There is a decrease in the peak demand forecast for years 2022 – 2024 in NS mainly due to improved DSM projections.

2.2 Resources and Sales

Resource and external sales changes for this 2021 Interim Review versus the 2019 Comprehensive Review include the following:

- Retirement of 4 MW hydro generation in NB starting January 1, 2022 subject to regulatory approvals,
- NS to retire 150 MW (nameplate) coal fired generation by March 31, 2022 provided an equivalent import capacity from hydro generation is available from the province of Newfoundland and Labrador,
- Retirement of 40 MW of oil-fired capacity by January 2022 and 4.2 MW of diesel fired capacity by October 2023 in PEI,
- Additional installed wind capacity of 20 MW in NB and 30 MW in PEI by Jan 2023 and 100 MW in NS by Jan 2024. The total wind capacity in the Maritimes Area is projected to be 1,358 MW by 2024,
- Addition of a firm external sales to New England of 72 MW from January - May 2024 and 90 MW from June – December 2024 (sales are netted against resources),
- 33 MW of oil-fired thermal generation returned to service in NS starting October 2020,
- Addition of 18 MW diesel generator in PEI in October 2023.

Table 4 shows the year-by-year January resources forecast for this 2021 Interim Review compared to the 2019 Comprehensive Review.

Table 4 - Maritimes Area Resources Forecast for 2022 to 2024

Year	2021 Interim Review (MW, with on-peak wind)			2019 Comprehensive Review (MW, with on-peak wind)			Diff. (MW)
	Conventional	Wind	Total	Conventional	Wind	Total	Total
2022	6,857	335	7,192	6,712	343	7,055	137
2023	6,626	353	6,979	6,647	343	6,990	-11
2024	6,709	376	7,085	6,796	343	7,139	-54

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 2.4 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 2017 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. Forecasted hourly wind generation capacity is subtracted from hourly loads for LOLE analysis.

The forecasted resource capacity in this 2021 Interim Review is lower in year 2024, primarily due to a contracted external sale that is subtracted from the generation capacity.

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 2019 Comprehensive Review. Table 5 shows annual values for the forecast, minimum and required reserves at 20%. In each year of this 2021 Interim Review, the forecast reserve exceeds the 20% required reserve criterion.

Table 5 - Forecast, Minimum, and Required Reserve - January 2022 to 2024

Year	Forecast Capacity (MW)	Peak Load (MW)	Inter. Load (MW)	Forecast Reserve		Minimum Reserve		Required Reserve	
				MW	%	MW	%	MW	%
2022	7,192	5,649	297	1,840	34	1,675	32	1,070	20
2023	6,979	5,674	309	1,615	30	1,590	30	1,073	20
2024	7,085	5,701	321	1,706	32	1,666	32	1,076	20

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

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

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 2021 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 2019 Comprehensive Review. In the CP-8 report *Review of Interconnection Assistance Reliability Benefits (December 16, 2019, Approved by RCC February 27, 2020)* the "As Is" estimated tie benefit potential for the Maritimes Area is 1,623 MW and 1,504 MW for the years 2020 and 2024 respectively. Based on this study, the 300 MW of tie benefits assumed for this 2021 Interim Review is conservative.

2.5 Support from External Interconnections

For the purposes of this 2021 Interim Review, interconnection support from neighboring NPCC Areas was limited to 300 MW of tie benefits for all years. In addition, by end of 2021, 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 retirement of a similar amount of coal fueled capacity in Nova Scotia by the end of Q1 2022. Non-firm capacity from Newfoundland and Labrador was not modeled.

3.0 FUEL SUPPLIES

The 2019 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 2021 Interim Review.

Generation fueled solely by natural gas accounts for approximately 7% of Maritimes Area capacity resources with supply options that include local shale gas fields, 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

The LOLE results in this 2021 Interim Review are very close to the LOLE results from 2019 Comprehensive Review. A summary of the Maritimes Area LOLE values from

2022 to 2024 is shown in Table 6 below. All LOLE values for this 2021 Interim Review meet the NPCC resource adequacy criterion.

Table 6 - Maritimes Area LOLE Values from 2022 to 2024

Year	2021 Interim Review (days/year)	2019 Comprehensive Review (days/year)
2022	0.004	0.009
2023	0.012	0.010
2024	0.010	0.009

In the 2019 Comprehensive Review, the Maritimes Area examined a high growth scenario based on adding an additional 1% compounding growth to the average annual growth rate examined during the period.

As a check on this scenario for this 2021 Interim Review, an additional 1% compounding load growth per year was added uniformly across all sub-areas during the forecast period from 2022 thru 2024 using 2022 as the base year. The LOLE values obtained for the future years of 2022 thru 2024 are shown in Table 7 and still meet the NPCC resource adequacy criterion.

Table 7 - Maritimes Area LOLE for High Load Growth Scenario

Year	2021 Interim Review (days/year)	2019 Comprehensive Review (days/year)
2022	0.004	0.016
2023	0.017	0.023
2024	0.020	0.037

5.0 CONCLUSION

Results of this 2021 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 2022 to 2024.