

2022 NPCC Québec Interim Review of Resource Adequacy

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Approved by the RCC

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1. EXECUTIVE SUMMARY

The Québec Balancing Authority Area submits this assessment of resource adequacy to comply with the Reliability Assessment Program established by the Northeast Power Coordinating Council (NPCC). The guidelines for the review are specified in Appendix D of the NPCC Regional Reliability Reference Directory #1, “*Guidelines for Area Review of Resource Adequacy*”.

This 2022 Interim Review of Resource Adequacy is the second update from the last Comprehensive Review and covers the study period from winter 2022-2023 through winter 2024-2025. Changes in assumptions since the last Comprehensive Review, and the impact of these changes on the overall reliability of the Québec electricity system, are highlighted herein.

The internal demand forecast is very similar to the demand forecast of the last Comprehensive Review. The average growth rate is 1% over the period of this review. Planned resources were revised upward due mostly to new demand response programs targets, an increase in wind resources capacity and capacity purchases from Independent Power Producers.

Results of this Interim Review show that the loss of load expectation (LOLE) for the Québec Area is below the NPCC reliability criterion of not more than 0.1 day per year for all years of the assessment in the base scenario. For the high case scenario, the LOLEs are also less than 0.1 day per year for the three years of the assessment.

Table 1 – Summary of LOLE Results

Winter Peak	Base case scenario (days/year)	High case scenario (days/year)
2022-2023	0.021	0.034
2023-2024	0.022	0.036
2024-2025	0.032	0.070

2. INTRODUCTION

This Interim Review is the second update of the 2020 Québec Balancing Authority Area Comprehensive Review of Resource Adequacy approved by the Reliability Coordinating Committee (RCC) on December 1st, 2020. This review covers the period from November 2022 through October 2025. The Québec Area is a winter peaking system with the peak load generally occurring in January. Major assumptions of this review are consistent with the Hydro-Québec Distribution 2023-2032 Supply Plan, which was filed with the Québec Energy Board on November 1st, 2022. The Québec's level of resource adequacy is calculated using the General Electric Multi-Area Reliability Simulation (GE-MARS) program

3. ASSUMPTION CHANGES

3.1 Base Case Demand Forecast

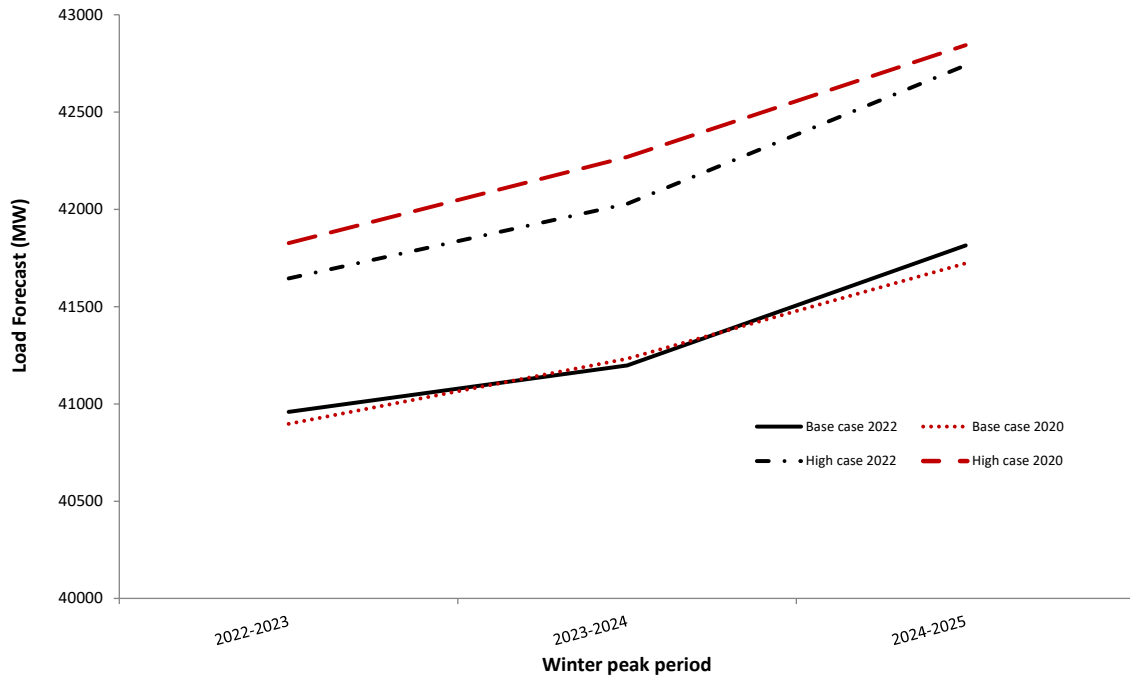
The Québec Area peak load forecast over the period of this review is very similar to the load forecast presented in the 2020 Comprehensive Review. Table 2 below compares the peak load forecast between the two reviews.

Table 2 – Base Case Load Forecast Comparison (MW)

Base case Scenario			
Winter Peak	2022 Interim Review	2020 Comprehensive Review	Difference
2022-2023	40,960	40,898	62
2023-2024	41,198	41,233	-35
2024-2025	41,815	40,788	1,026
Average Growth Rate	1.0%	1.0% ¹	

¹ : After adjustment of the 2025 load forecast with exports to New England (+934 MW).

Figure 1 – Comparison of Demand Forecasts



3.1.1 Load Forecast Uncertainty

The load forecast uncertainty is derived from the load sensitivity to weather conditions and the variation of economic and demographic variables affecting the load. In this review, the load forecast uncertainty, in comparison to load forecast in the last comprehensive review, is slightly higher for the first two winter peak periods and similar for the last winter peak period of this review.

Table 3 – Load Forecast Uncertainty Comparison

Load Forecast Uncertainty	Current year	+1 year	+2 years
2022 Interim Review	4.52%	4.61%	4.68%
2020 Comprehensive Review	4.37%	4.43%	4.7%
Difference	0.15%	0.18%	-0.02%

3.2 High Case Demand Forecast

The High case load forecast levels presented in Table 4 have a 10% probability of being exceeded. When simulating LOLE for the High case scenario, the load forecast uncertainty is limited to weather conditions.

Table 4 – High Case Load Forecast Comparison (MW)

Winter Peak	High case Scenario		
	2022 Interim Review	2020 Comprehensive Review	Difference
2022-2023	41,645	41,826	-181
2023-2024	42,029	42,270	-242
2024-2025	42,740	41,910	830
Average Growth Rate	1.1%	1.1% ¹	

¹ : After adjustment of the 2025 load forecast with exports to New England (+934 MW).

3.3 PLANNED RESOURCES

In this review, planned resources are consistent with the most recent available capacity data updates for the Area. Planned resources at the end of the study period have been revised upward by 300 MW since the last Comprehensive Review. The differences in planned resources are explained by:

- an increase of available hydro capacity (+180 MW) due to power plant uprate and new capacity purchases from IPPs.
- additional capacity from demand response programs targets over the period of this assessment (+78 MW in 2025).
- additional wind capacity in 2025 (+204 MW) with a 36% of contribution at peak time-period.

Table 5 – Planned Resources Comparison (MW)

Winter Peak	2022 Interim Review	2020 Comprehensive Review	Difference
2022-2023	46,643	46,704	-61
2023-2024	46,764	46,588	177
2024-2025	47,103	46,804	299

4. LOLE RESULTS

4.1 Base Case Demand Scenario

Results shown in Table 6 below indicate that the Québec Area will meet the NPCC resource adequacy criterion that requires a loss of load expectation (LOLE) value not more than 0.1 day per year (or one day per ten years) for all the years covered by this review. These values are, in general, lower than the ones presented in the last Comprehensive Review, due to an increase in resources.

Table 6 – Planned Reserve, Required Reserve margins and LOLE Results

Winter Peak	Planned Reserve (MW)		LOLE (days/year)	
	2022 Interim Review	2020 Comprehensive Review	2022 Interim Review	2020 Comprehensive Review
2022-2023	5,684	5,806	0.021	0.025
2023-2024	5,566	5,355	0.022	0.046
2024-2025	5,286	6,015	0.032	0.024

4.2 Reference Reserve Margins Levels

The Québec Balancing Authority Reference Reserve Margin is determined by using the NPCC reliability criterion. For this review, results in Table 7 below show that Required Reserve Margins for the Québec Area range from 10.9 percent for the 2022-2023 winter period to 10.7 percent for the 2024-2025 winter period. The reference reserve margins of this review are lower than the reserve margins presented in the 2020 Comprehensive Review. The difference in reserve margins is mainly explained by additional more efficient

resources, the new version of EOPs functionalities introduced in the GE MARS model and the following calibration.

Table 7 – Reference Reserve Margins at NPCC Criterion (LOLE = 0.1 day/year)

Winter Peak	Reference Reserve Margin (MW)		Reference Reserve Margin (%)		LOLE (days/year)
	2022 Interim Review	2020 Comprehensive Review	2022 Interim Review	2020 Comprehensive Review	
2022-2023	4,479	4,674	10.9%	11.4%	0.100
2023-2024	4,316	4,666	10.5%	11.3%	0.100
2024-2025	4,486	4,868	10.7%	11.9%	0.100

4.3 High Case Demand Scenario

Results shown in Table 8 indicate that, in the High case demand scenario, the Loss of Load Expectations are less than 0.1 day/year for all the years of the assessment. Even if compliance with the reliability criterion in the high case scenario is not required by the NPCC, it emerges that in the event of a high scenario, the area will have sufficient capacity to respond to that demand for the three next winter periods. The results are presented in Table 8 below.

Table 8 – Planned reserve and LOLE - High Case Demand Forecast

Winter Peak	Planned Reserve (MW)		LOLE (days/year)	
	2022 Interim Review	2020 Comprehensive Review	2022 Interim Review	2020 Comprehensive Review
2022-2023	4,998	4,878	0.034	0.069
2023-2024	4,735	4,317	0.036	0.116
2024-2025	4,361	4,894	0.070	0.063

6. Conclusion

The results of this review show that the Québec Balancing Authority Area will meet the NPCC resource reliability criterion (LOLE=0.1 days/year) for all the years of the assessment.