

2021 NPCC Québec Interim Review of Resource Adequacy

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Approved by the RCC

November 30, 2021

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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 2021 Interim Review of Resource Adequacy is the first update from the last Comprehensive Review and covers the study period from winter 2021-2022 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 has been revised upward since the last Comprehensive Review due mainly to an increase in sales in the residential, commercial and industrial sectors. Planned resources were also revised upward due mostly to new demand response programs targets and to an increase in wind resources capacity.

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 case scenario. For the high case scenario, the area would need additional capacity for the last two winter periods.

Table 1 – Summary of LOLE Results

Winter Peak	Base case scenario (day / year)	High case scenario (day/ year)
2021-2022	0.036	0.072
2022-2023	0.033	0.075
2023-2024	0.047	0.110
2024-2025	0.067	0.161

2. INTRODUCTION

This Interim Review is the first update of the 2020 Québec Balancing Authority Area Comprehensive Review of Resource Adequacy approved by the Reliability Coordinating Committee (RCC) in December 2020. This review covers the period from November 2021 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 second update of the Hydro-Québec Distribution 2020-2029 Supply Plan, which was filed with the Québec Energy Board on November 1st, 2021.

3. ASSUMPTION CHANGES

3.1 Base Case Demand Forecast

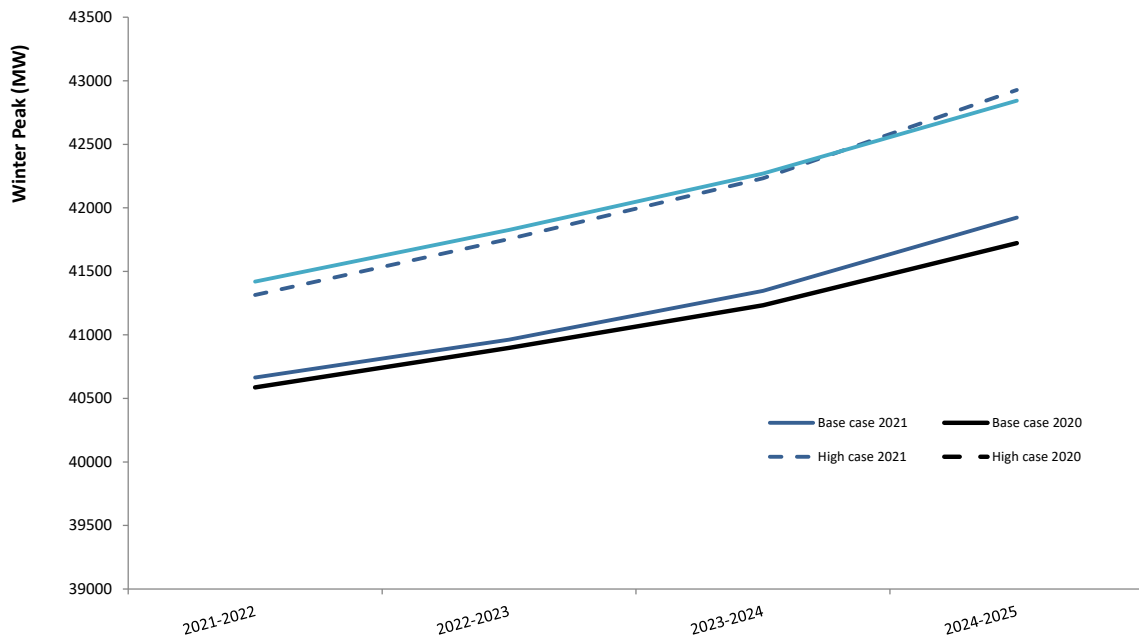
The Québec Area peak load forecast over the period of this review has increased in comparison to the load forecast presented in the 2020 Comprehensive Review. This growth in the load forecast is mainly attributed to an increase in sales in the residential, commercial and industrial sectors. Table 2 below compares the peak load forecast between the two reviews.

Table 2 – Base Case Load Forecast Comparison (MW)

Base Case Scenario			
Winter Peak	2021 Interim Review	2020 Comprehensive Review	Difference
2021-2022	40,664	40,587	78
2022-2023	40,962	40,898	64
2023-2024	41,347	41,233	114
2024-2025	41,924	40,788	1,135
Average Growth Rate	1.0%	0.9%¹	

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

Figure 1 – Comparison of Demand Forecasts



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 is quite similar to what was used in the last Comprehensive Review.

Table 3 – Load Forecast Uncertainty Comparison

Review of Resource Adequacy	Current year	+1 year	+2 years	+3 years
2021 Interim Review	4.3%	4.4%	4.5%	4.6%
2020 Comprehensive Review	4.3%	4.4%	4.4%	4.7%
Difference	0.0%	0.0%	0.1%	-0.1%

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)

High Case Scenario			
Winter Peak	2021 Interim Review	2020 Comprehensive Review	Difference
2021-2022	41,313	41,419	-106
2022-2023	41,755	41,826	-71
2023-2024	42,233	42,270	-37
2024-2025	42,928	41,910	1,018
Average Growth Rate	1.3%	1.1%¹	

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

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 343 MW since the last Comprehensive Review. The differences in planned resources are explained by:

- a decrease of available hydro capacity for the next winter period (-400 MW) due to higher restrictions that are explained by unavailability of several groups for sustainability works, unavailability of a transformer at a switchyard, ... etc.
- additional capacity from demand response programs targets during the next winter periods.
- additional wind capacity in 2025 (+204 MW) with a 36% of contribution at peak time-period.

Table 5 – Planned Resources Comparison (MW)

Winter Peak	2021 Interim Review	2020 Comprehensive Review	Difference
2021-2022	45,748	46,270	-522
2022-2023	46,577	46,704	-127
2023-2024	46,732	46,588	144
2024-2025	47,147	46,804	343

4.1 Base Case Demand Scenario

Results shown in Table 6 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 higher than the ones presented in the last Comprehensive Review, due to an increase in load forecasts.

Table 6 – Planned Reserve and LOLE Results

Winter Peak	Planned Reserve (MW)		LOLE (Day / year)	
	2021 Interim Review	2020 Comprehensive Review	2021 Interim Review	2020 Comprehensive Review
2021-2022	5,084	5,684	0.036	0.020
2022-2023	5,615	5,806	0.033	0.025
2023-2024	5,385	5,355	0.047	0.046
2024-2025	5,224	6,015	0.067	0.024

11.7 percent for the 2024-2025 winter period. The reference reserve margins of this review are quite similar to the reserve margins presented in the 2020 Comprehensive Review.

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

Winter Peak	Required Reserve (MW)		Reference Reserve (%)		LOLE (Day/year)
	2021 Interim Review	2020 Comprehensive Review	2021 Interim Review	2020 Comprehensive Review	
2021-2022	4,171	4,386	10.3%	10.8%	0.100
2022-2023	4,627	4,674	11.3%	11.4%	0.100
2023-2024	4,710	4,666	11.4%	11.3%	0.100
2024-2025	4,871	4,868	11.6%	11.9%	0.100

4.2 High Case Demand Scenario

Results shown in Table 8 indicate that, in the High case demand scenario, the Québec Area would need additional capacity for the last two winter periods.

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

Winter Peak	Planned Reserve (MW)		LOLE (day / year)	
	2021 Interim Review	2020 Comprehensive Review	2021 Interim Review	2020 Comprehensive Review
2020-2021	5,434	4,954	0.024	0.109
2021-2022	4,434	4,851	0.072	0.054
2022-2023	4,822	4,878	0.075	0.069
2023-2024	4,499	4,317	0.110	0.116
2024-2025	4,219	4,894	0.161	0.063

5. Internal transfer limits and interconnections

No changes have been made to the internal transfer limits since the last comprehensive review. For the interconnections, the project of Hertel-New York Interconnection (CHPE) is under study. This project is supposed to increase transfer capability between Québec and New York by 1,250 MW. It involves the construction of a ± 400 -kV DC underground transmission line about 60 km (37 miles) long from Hertel 735/315-kV substation just south of Montréal to the Canada – U.S.A. border. The project will connect to the Champlain Hudson Power Express project (CHPE) in New York State. From the international border crossing, the DC transmission line will be extended 339 miles to a substation in Astoria, NY, where the power will be converted from DC to AC. The project in Québec also includes the construction of an AC to DC converter at Hertel substation. The project is expected to be in service in 2025. In this review, no assumption of capacity imports from this tie has been used. The area will need further information on this tie and a complete market analysis to conclude whether to use it or not for its capacity imports at peak time. All other ties with the Québec area remain unchanged.

6. Conclusion

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