

NPCC
2016 Québec Balancing Authority Area
Interim Review of
Resource Adequacy

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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 2016 Interim Review of Resource Adequacy covers the study period from winter 2016-2017 through winter 2018-2019. 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 therein.

The internal demand forecast has been revised downward since the last Comprehensive Review due mainly to a decrease in the expected load from the industrial and the residential sectors. Planned resources have been revised upward for 2016-2017 due to higher firm capacity import while resources for 2017-2018 and 2018-2019 are similar to those presented in the 2014 Comprehensive Review.

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 this assessment under the base case scenario and the high case scenario.

Table 1 - Summary of LOLE Results

Winter Peak	Base case scenario (days / year)	High case scenario (days / year)
2016-2017	0.017	0.046
2017-2018	0.028	0.065
2018-2019	0.015	0.049

2. INTRODUCTION

This 2016 Interim Review is the second update of the 2014 Québec Balancing Authority Area Comprehensive Review of Resource Adequacy approved by the Reliability Coordinating Committee (RCC) in December 2014. This review covers the period from November 2016 through October 2019. The Québec Area is a winter peaking area with the peak load occurring generally in January. Major assumptions of this review are consistent with the Hydro-Québec Distribution (HQD) 2017-2026 Supply Plan, which was filed with the Québec Energy Board on November 1st, 2016.

3. ASSUMPTION CHANGES

3.1 Base Case Demand Forecast

The Québec area's peak load forecast over the period of this review has decreased in comparison to the load forecast presented in the 2014 Comprehensive Review. This reduction in the load is mainly attributed to a decrease in the expected demand from the industrial and the residential 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	2016 Interim Review	2014 Comprehensive Review	Difference
2016-2017	38,856	39,791	-935
2017-2018	38,880	39,789	-909
2018-2019	38,578	39,489	-911
Average Growth Rate	-0.4%	-0.4%	

3.1.1 Load Forecast Uncertainty

Load forecast uncertainty is derived from the load sensitivity to weather conditions and the variation of economic and demographic variables affecting the load forecast. In this review, load forecast uncertainty has been revised upward in comparison to what was used in the last Comprehensive Review. This change reflects mostly the revision of weather uncertainty, which is based on historical data. Since the 2014 Comprehensive review, two cold winters (2014 and 2015) have been added to the simulated weather conditions.

Table 3 - Load Forecast Uncertainty between the two Reviews

Review of Resource Adequacy	Current year	+1 year	+2 years
2016 Interim Review	4.50%	4.65%	4.78%
2014 Comprehensive Review	4.20%	4.48%	4.65%
Difference	0.30%	0.17%	0.13%

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	2016 Interim Review	2014 Comprehensive Review	Difference
2016-2017	39,788	41,011	-1,223
2017-2018	39,953	41,170	-1,218
2018-2019	39,803	41,118	-1,315
Average Growth Rate	0.0%	0.1%	

3.3 PLANNED RESOURCES

In this review, planned resources are consistent with the most recent updates of available capacity data in the area. Planned resources have been revised upward for 2016-2017 while resources for 2017-2018 and 2018-2019 are similar to those presented in the last Comprehensive Review. The differences in planned resources since the 2014 Comprehensive review are mainly explained by:

- Higher firm capacity import due to a new capacity sharing agreement between Québec and Ontario (500 MW for winter 2016-2017);
- The reduction of expected interruptible load (-150 MW for winter 2016-2017);

Table 5 - Planned Resources Comparison (MW)

Winter Peak	2016 Interim Review	2014 Comprehensive Review	Difference
2016-2017	45,095	44,710	386
2017-2018	45,132	45,169	-37
2018-2019	45,227	45,268	-42

4. LOLE RESULTS

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 value not more than one day per ten years or 0.1 day per year for all the years covered by this review. In comparison to the LOLE values of the 2014 Comprehensive Review, these LOLE values are lower mostly due to load forecast decrease.

Table 6 - Planned Reserve and LOLE Results

Winter Peak	Planned Reserve (MW)		LOLE (Day / year)	
	2016 Interim Review	2014 Comprehensive Review	2016 Interim Review	2014 Comprehensive Review
2016 / 2017	6,239	4,918	0.017	0.086
2017 / 2018	6,253	5,380	0.028	0.071
2018 / 2019	6,649	5,779	0.015	0.068

The Québec Balancing Authority Required Reserve Margin is determined by using the NPCC resource adequacy criterion which requires that the loss of load expectation (LOLE) due to resource deficiencies shall be not more than 0.1 day per year. For this review, results show that the Required Reserve Margins of the Québec area range from 12.0 percent for the 2016-2017 winter period to 12.9 percent for the winter 2018-2019. These Required Reserve Margins are similar to those presented in the 2014 Comprehensive Review.

Table 7 - Required Reserve Margins at NPCC Criterion (LOLE = 0.1 days/year)

Winter Peak	Required Reserve (MW)		Required Reserve (%)		LOLE (Days/year)
	2016 Interim Review	2014 Comprehensive Review	2016 Interim Review	2014 Comprehensive Review	
2016 / 2017	4,664	4,758	12.0%	12.0%	0.100
2017 / 2018	4,858	4,920	12.5%	12.4%	0.100
2018 / 2019	4,974	5,049	12.9%	12.8%	0.100

4.2 High Case Demand Scenario

Results shown in Table 8 indicate that under the high case demand scenario, the Québec area would also meet the NPCC resource adequacy criterion for all the years

covered by this review. In comparison to the LOLE values of the 2014 Comprehensive Review, these LOLE values are lower mostly due to load forecast decrease.

Table 8 – Planned reserve and LOLE under the High Case Demand Forecast

Winter Peak	Planned Reserve (MW)		LOLE (Day / year)	
	2016 Interim Review	2014 Comprehensive Review	2016 Interim Review	2014 Comprehensive Review
2016 / 2017	5,307	3,698	0.046	0.323
2017 / 2018	5,180	3,999	0.065	0.279
2018 / 2019	5,423	4,150	0.049	0.270

5. CONCLUSION

The results of this review show that the Québec Balancing Authority Area will meet the NPCC resource adequacy criterion that requires a loss of load expectation (LOLE) value of not more than 0.1 day per year for all years of this review under both the base case and the high case demand forecast scenarios.