

**NPCC**  
**2012 Québec Balancing Authority Area**  
**Interim Review of**  
**Resource Adequacy**

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**Approved by the NPCC**  
**Reliability Coordinating Committee**  
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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*” (Adopted in December 1, 2009).

This 2012 Interim Review of Resource Adequacy covers the study period from winter 2012/2013 through winter 2015/2016. Assumptions changes regarding facility and system conditions, generation resources availability, load and electricity sector regulations, since the last Comprehensive Review and their impacts on the overall reliability of the Québec electricity system are highlighted therein.

The Load forecast has been revised downward since the last Comprehensive Review due mainly to a decrease in the expected electricity use for space heating in the residential and commercial sectors. Planned resources have also been revised downward due to major unit retirements.

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.

**Table 1 - Summary of LOLE Results**

Winter Peak	2012 Interim Review (days / year)	2011 Comprehensive Review (days/ year)
2012 / 2013	0.045	0.064
2013 / 2014	0.048	0.079
2014 / 2015	0.045	0.034
2015 / 2016	0.070	0.021

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## 2. INTRODUCTION

This 2012 Interim Review is the first update of the 2011 Québec Balancing Authority Area Comprehensive Review of Resource Adequacy approved by the Reliability Coordinating Committee (RCC) in November 2011. This review covers the period between November 2012 and October 2016. The Québec Area is a winter peaking area with the peak load forecast occurring generally in January. Major assumptions of this review are consistent with the second progress report of Hydro- Québec Distribution (HQD) 2011-2020 Supply Plan filed with the Québec Energy Board on November 1<sup>st</sup>, 2012<sup>1</sup>.

## 3. ASSUMPTION CHANGES

### 3.1 Base Case Demand Forecast

The Québec area's internal peak load forecast<sup>2</sup> over the period of this review has decreased, on average, by 450 MW in comparison to the internal load forecast presented in the 2011 Comprehensive Review. This reduction in the load is mainly attributed to a decrease in the expected electricity use for space heating purposes in the residential and commercial sectors. However, it is partially offset by additional firm export commitments of the Québec area in the New England FCM market by 2015-2016<sup>3</sup>.

Table 2 below compares the peak load forecast between the two reviews.

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<sup>1</sup> <http://www.regie-energie.qc.ca/audiences/Suivis/index.html>

<sup>2</sup> Québec's load forecast excluding firm exports

<sup>3</sup> Export firm commitments included in this assessment are those for the month of January, which amounted to 500 MW.

**Table 2 - Base Case Load Forecast Comparison (MW)**

Base case Scenario			
Winter Peak	2012 Interim Review	2011 Comprehensive Review	Difference
<b>2012 / 2013</b>	37,939	38,248	-310
<b>2013 / 2014</b>	38,208	38,660	-452
<b>2014 / 2015</b>	38,688	39,149	-462
<b>2015 / 2016</b>	39,203	39,313	-110
<b>Average Growth Rate</b>	1.1%	0.9%	

### 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 Interim Review, load forecast uncertainty has been revised downward in comparison to what was used in the last Comprehensive Review. This reduction reflects mostly the revision of economic uncertainty.

**Table 3 - Load Forecast Uncertainty between the two Reviews**

Resource Adequacy Review	Current year	1 year ahead	2 years ahead	3 years ahead
<b>2012 Interim Review</b>	4.2 %	4.3%	4.5%	4.7%
<b>2011 Comprehensive Review</b>	4.3%	4.6%	4.9%	5.1%
<b>Difference</b>	-0.1%	-0.2%	-0.4%	-0.5%

### 3.2 High Case Demand Forecast

In this review, the high case demand forecast level is set to 1.3 standard deviations of economic uncertainty over the reference scenario. The load uncertainty considered in the high case scenario is limited to weather conditions.

**Table 4 - High Case Load Forecast Comparison (MW)**

High case Scenario			
Winter Peak	2012 Interim Review	2011 Comprehensive Review	Difference
2012 / 2013	38,663	39,196	-533
2013 / 2014	39,131	39,856	-725
2014 / 2015	39,766	40,674	-908
2015 / 2016	40,464	41,312	-848
Average Growth Rate	1.5%	1.8%	

### 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 reviewed downward since the last Comprehensive Review due to major unit retirements<sup>4</sup>.

The difference in planned resources between the two reviews is mainly explained by:

- The retirement of the La Citière oil G.S (280 MW)
- The delayed commissioning of one unit of La Sarcelle hydro G.S (50 MW)
- The retirement of the Gentilly-2 nuclear G.S which was previously expected to be refurbished from 2013 to 2014 (a decrease of 700 MW from the expected capacity after refurbishment)
- The mothballing period extension of the natural gas unit operated by TransCanada Energy (TCE) beyond the period covered by this review (547 MW)
- The Addition of interruptible load has been added to the system (150 MW)

<sup>4</sup> The mothballed Tracy thermal unit (450 MW) was retired on March 2012 and has no impact on reliability assessment.

- The increase of Biomass capacity by 50 MW to 100 MW over the period of this review

**Table 4 - Planned Resources Comparison**

Winter Peak	2012 Interim Review	2011 Comprehensive Review	Difference
2012 / 2013	42,522	42,666	-144
2013 / 2014	42,958	43,029	-71
2014 / 2015	43,651	44,612	-961
2015 / 2016	43,929	45,401	-1,472

### 3.4 TRANSMISSION AND INTERFACE LIMITS

Internal transfer capability assumptions are identical to those presented in the 2011 Comprehensive Review. External interfaces to the Québec system are not modeled.

During the period of this review, two important transmission projects will be placed in service to strengthen the bulk power system and allow new hydro and wind capacity to be integrated to the system.

First, the construction of the first phase of transmission infrastructures for the Romaine River Hydro Complex project has now begun. The Generating Stations will be integrated on a 735 kV infrastructure initially operated at 315 kV. Romaine-2 and Romaine-1 will be integrated in 2014 - 2016 at Arnaud 735/315 kV substation. A new 735 kV switching station (named "Aux Outardes") near the existing Micoua 735 kV station will be commissioned in 2014 to upgrade the system.

Second, Hydro-Québec TransÉnergie is adding a new 735 kV section at Bout-de-l'Île (east end of Montréal Island) substation. This was originally a 315/120 kV station. The existing Boucherville – Duvernay 735 kV line (line 7009), which passes by Bout-de-l'Île, will be looped into the new station. This new 735 kV source will allow redistribution of load around the Greater Montréal area and will absorb load growth in the eastern part of Montréal. Two ±300 Mvar Static Compensators will be commissioned in this station in 2013 and 2014.

**Table 5 - Internal Interface Limits (MW)**

Sub area		2012 Interim Review	
From	To	2012/13 winter peak period	2015/16 winter peak period
Churchill Falls	Manicouagan	5,200	5,200
Manicouagan	Québec Centre	12,100	12,900
Québec Centre	Montréal	20,250	22,290
Baie James	Québec Centre	15,050	15,050
Baie James	Nicolet (CC)	2,250	2,250
Nicolet (CC)	Montréal	2,138	2,138

#### 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 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 last Comprehensive Review, these LOLE values are lower in the first two years due to load forecast decrease and higher in the last two years due to unit retirements.



**Table 6 - Planned Reserve Margins and LOLE Results**

Winter Peak	Planned Reserve (MW)		LOLE (Days / year)	
	2012 Interim Review	2011 Comprehensive Review	2012 Interim Review	2011 Comprehensive Review
2012 / 2013	4,584	4,418	0.045	0.064
2013 / 2014	4,750	4,369	0.048	0.079
2014 / 2015	4,963	5,463	0.045	0.034
2015 / 2016	4,726	6,088	0.070	0.021

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 no more than 0.1 day per year. For this review, results show that the Required Reserve Margins vary between 10 percent and 11 percent. These Required Reserve Margins are lower than the Required Reserve Margin presented in the 2011 Comprehensive Review due to lower load forecasts and uncertainties.

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

Winter Peak	2012 Interim Review Required Reserve		2011 Comprehensive Review Required Reserve		LOLE (Days / year)
	MW	(%)	MW	(%)	
2012 / 2013	3,814	10.1%	3,818	10.0%	0.100
2013 / 2014	3,941	10.3%	4,059	10.5%	0.100
2014 / 2015	4,044	10.5%	4,448	11.4%	0.100
2015 / 2016	4,182	10.7%	4,805	12.2%	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 need additional capacity for the 2015/2016 winter peak period to meet a LOLE of 0.1 day per year. This could be achieved by additional purchases or by the restarting of TransCanada Energy's (TCE) unit earlier than expected.

**Table 8 - LOLE under the High Case Demand Forecast**

Winter Peak	Planned Resources (MW)	Annual peak load (MW)	LOLE (Days / year)	
			2012 Interim Review	2011 Comprehensive Review
2012 / 2013	42,522	38,663	0.060	0.091
2013 / 2014	42,958	39,131	0.083	0.161
2014 / 2015	43,651	39,766	0.089	0.080
2015 / 2016	43,929	40,464	0.168	0.076
<b>2015 / 2016 with TCE (547 MW)</b>			0.082	

## 5. CONCLUSION

The results of this review show that the Québec Balancing Authority Area will comply with 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 the base case demand forecast scenario. As for meeting the high case demand forecast scenario, the Québec area will need additional capacity or TransCanada Energy's unit back to service for the 2015/2016 winter peak period.