

NPCC  
2010 QUÉBEC AREA  
INTERIM REVIEW  
OF  
RESOURCE ADEQUACY

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**November 2010**

## 1. Executive Summary

The 2010 Québec Balancing Authority Area “Québec Area” Interim Review of Resource Adequacy covers the period between November 2010 and October 2013. For instance the planning year 2011 corresponds to a hydraulic cycle beginning in November 2010 and ending in October 2011. This assessment has been prepared to satisfy the Reliability Assessment Program established by the Northeast Power Coordinating Council (NPCC)<sup>1</sup>.

2010 Interim Review underlines the changes in assumptions that have been made since the 2008 Comprehensive Review and assesses the impact of these changes on the reliability of the Québec Control Area.

Results of this review show that the Québec Area will comply with the NPCC resource adequacy reliability criterion that requires a loss of load expectation (LOLE) value of less than 0.1 days/year for all years from 2011 to 2013 under the base case load forecast. Under the high case load forecast, Québec Area would need additional capacity purchases of 700 MW in 2011 and 800 MW in 2013.

A summary of the Québec Area LOLE values for 2011 to 2013 is shown in Table 1 below.

**Table 1– LOLE Under Base Demand Forecast**

<b>Year (Winter peak period)</b>	<b>2008 Comprehensive Review (Days/Year)</b>	<b>2010 Interim Review (Days/Year)</b>
<b>2011</b>	0.051	0.091
<b>2012</b>	0.088	0.030
<b>2013</b>	0.080	0.089

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<sup>1</sup> This assessment follows the resource adequacy review guidelines as outlined in the *NPCC Regional Reliability Directory #1 Appendix D (Adopted: December 1, 2009)*.

## 2. Introduction

This 2010 Interim Review is the second update of the 2008 Québec Area Comprehensive Review of Resource Adequacy approved by NPCC in March 2009. Major assumptions of this review are consistent with the 2011-2020 Procurement Plan of Hydro-Québec Distribution (HQD) filed to the Québec Energy Board in November 1<sup>st</sup>, 2010<sup>2</sup>.

## 3. Assumption Changes

### 3.1 Base case demand forecast

Table 2 compares the Québec Area peak demand forecasts for this interim review and the 2008 comprehensive review. The peak load forecast for the Québec Area over the period of this review has decreased in comparison to the forecasts presented in the 2008 comprehensive review. This reflects the general economic slowdown and is mainly explained by the loss of certain industrial loads such as aluminum smelters, chemical industry and paper mills.

**Table 2 – Base Case Peak Load Forecast Comparison (Winter Peak)**

Year (Winter peak period) (MW)	2008 Comprehensive Review	2010 Interim Review	Difference
2011	38,130	37,528	-602
2012	38,527	37,870	-657
2013	39,375	38,251	-1,124
Average growth rate	1.5%	0.6%	

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<sup>2</sup> [http://internet.regie-energie.qc.ca/Depot/Projets/86/Documents/R-3748-2010-B-0004-DEMANDE-PIECE-2010\\_11\\_09.pdf](http://internet.regie-energie.qc.ca/Depot/Projets/86/Documents/R-3748-2010-B-0004-DEMANDE-PIECE-2010_11_09.pdf)

### 3.1.1 Load Forecast Uncertainty

Load forecast uncertainty is derived from load sensitivity to weather conditions and the evolution of economic and demographic parameters affecting load demand. In this Interim Review, load forecast uncertainty has been reviewed downward in comparison to figures presented in the last comprehensive review. This reduction stems from a revision of the climatic uncertainty at peak. Table 3 presents a comparison of load forecast uncertainty between this review and the 2008 comprehensive review.

**Table 3- Load forecast uncertainty**

Reviews	Current year	+1 year	+2 year
2008 Comprehensive Review	4.7%	5.0%	5.4%
2010 Interim Review	4.3%	4.6%	4.9%
Difference	-0.4%	-0.4%	-0.5%

### 3.1.2 High case demand forecast

The high demand forecast is based on a high economic forecast and was revised downward to reflect the trend in the reference demand forecast.

**Table 4 – High Peak Load Forecast Comparison (Winter Peak)**

Year (Winter peak period) (MW)	2008 Comprehensive Review	2010 Interim Review	Difference
2011	39,561	38,410	-1,151
2012	40,280	38,895	-1,358
2013	41,404	39,743	-1,661
Average growth rate	2.3%	1.7%	

The load uncertainty considered in reliability evaluations based on high load demand forecast is limited to impact of weather conditions. Then, one standard deviation of load uncertainty considered in such evaluations is equal to 3.8%, which is 0.5% lower compared to the 2008 Comprehensive Review.

### 3.2 Resources Forecast

The total planned resources presented in this interim review are lower than those forecasted in the 2008 comprehensive review. Table 5 presents the difference between planned resources in both reviews.

The difference between the two reviews was mainly due to:

- Gently-2 nuclear station refurbishment delay. The plant will be shut down a year later than previously expected and will be back on service in 2015 as opposed to 2013.
- Eastmain-1A hydro plant will be in service in 2012 as scheduled adding 235 MW to installed capacity.
- The first La Sarcelle unit will be in service for the planning year 2011-2012, which is one unit less (50 MW). The entire hydro plant (150 MW) will be available the following year.
- One unit (150 MW) at the Tracy thermal plant will be out of service for all the period covered by this review,.
- A downward revision of the forecasted levels of reservoirs due to a mild winter and low rainfall during the actual year (2010). The impact on available capacity in 2011 is about 190 MW.
- Hydro-Québec Production's purchase from New Brunswick is no longer included among the planned resources (200 MW).
- The natural gas unit operated by TransCanada Energy (TCE) at Bécancour (under contract with HQD) will be mothballed for the next peak period. In fact, on June 15, 2010, HQD filed a case to the Québec Energy Board to renew the temporary shutdown for 2011. The option to restart TCE is revaluated on a yearly basis. For the purpose of this review, Bécancour is not expected to be in service for the period covered by this review (547 MW).
- Purchases from Churchill Falls hydro plant are reduced from 4,930 MW to 4,765 MW for the entire review period (165 MW).
- HQD has reviewed downward its Interruptible programs for all the years of this review and are set to a maximum of 850 MW. Historical data of these programs has shown that the potential capacity on which Québec Area can rely is at most 850 MW. Compared to 2008 comprehensive review, this is a decrease of 150 MW.
- Short term purchases represent only the required purchases that are needed by HQD (Load Serving Entity in Québec) to meet its capacity requirement. It varies year after year according to the load increase and capacity contracted on long term basis becoming in service. The planned short term purchases are 220 MW, 510 MW and 870 MW for the 3 years covered by this review respectively. The maximum potential short term purchases from other Areas is set to 1,100 MW and assumed to come primarily from New York Area. Massena (1,000 MW) and Dennison (100

MW) interconnections transfer capacity are designated by Hydro-Québec Distribution to meet its resource requirement during winter peak period.

- Biomass has been reduced by 20 MW in the two first years and by 94 MW in the last year.
- A capacity contribution of wind power has been introduced in the 2009 interim review. A presentation of methods and results of HQD evaluations of wind power capacity contribution has been performed to the NPCC in 2009. The same results are used in this interim review. Installed wind capacity in Québec Area reached 659 MW in 2010/2011 peak period. A part of this capacity (212 MW) is under contract with Hydro-Québec Production and is still de-rated by 100%. The remaining capacity (447 MW) is under contract with Hydro-Québec Distribution and is de-rated by 70%.

**Table 5 – Planned Resources Comparison (Winter peak period)**

Year (Winter peak period) (MW)	2008 Comprehensive Review	2010 Interim Review	Difference
2011	43,336	41,238	-2,098
2012	43,158	42,612	-546
2013	44,238	42,773	-1,465

**Table 6 – Total Wind Power Capacity**

Year (Winter peak period) (MW)	Wind Installed Capacity		Capacity Credit 2010 Interim
	HQP <sup>1</sup>	HQD <sup>2</sup>	
2011	212	447	134
2012	212	1,124	337
2013	212	1,830	549

<sup>1</sup>: Completely de-rated in this review.

<sup>2</sup>: Capacity credit equals to 30% of installed capacity.

### 3.3 Transfer Limits

Québec Area transfer capabilities assumptions of internal transmission system are slightly different from those presented in the 2008 Comprehensive Review. These differences have no impact on the Area's reliability. The actual and planned transmission system should be more than adequate to deliver all the resources to the load.

The Baie James – Québec Centre and Québec Centre – Montréal limits are both estimated to go up by about 300 MW due to a system upgrade in 2011-2012. This project was included in the NPCC Comprehensive Review Assessment of the Québec Transmission System for 2012.

Table 7 below shows both internal Québec area transfer limits assumptions and import capability limits from its neighbouring control areas. These imports limits are considered in the assessment of maximum potential of short term capacity purchases of HQD. However, Québec Area does not consider tie benefits in its resource adequacy reviews.

**Table 7 – Québec Transfer Capacities (in MW)**

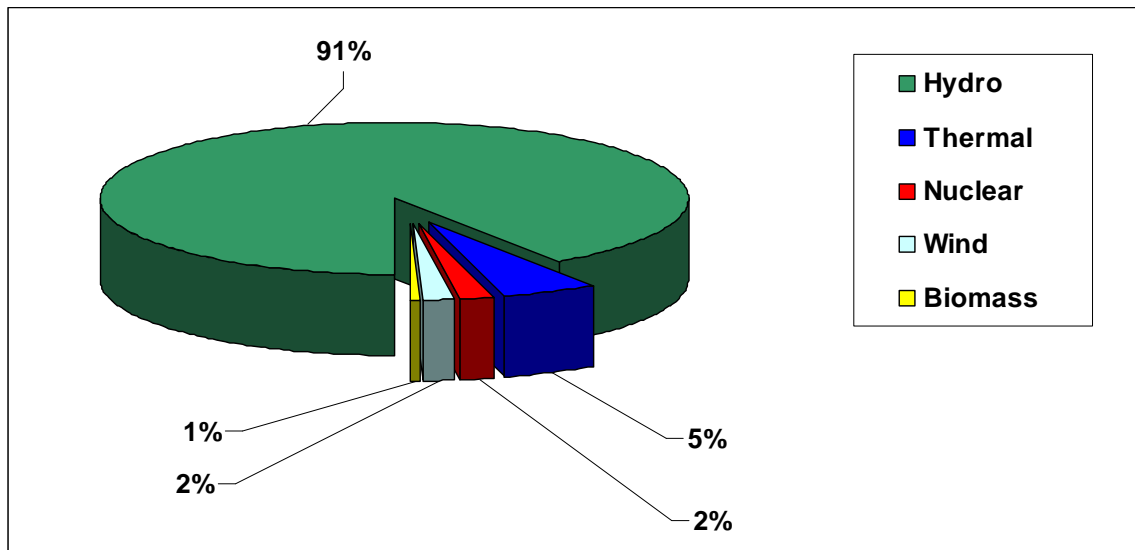
	Interface	Limits assumed in 2008 Comprehensive Review	Limits assumed in 2010 Interim Review
<b>Internal Transfer Limits</b>			
	Churchill Falls to Manicouagan	5,200	5,200
	Manicouagan to Québec Centre	11,750	11,750
	Québec Centre to Montréal	17,750	18,000
	Baie James to Québec Centre	13,800	14,100
	Baie James to Nicolet	2,250	2,250
	Nicolet to Montréal	2,138	2,138
<b>External Transfer Limits</b>			
	New York imports (MASS + CRT)	Not reported	1,100
	New England imports (HG+R-S-P)*	Not reported	1,870
	Ontario imports (LAW+Q4C+OTTO+ON)	Not reported	1,945
	New Brunswick imports	Not reported	785

\* The import capacity related to Nicolet Sandy Pond HVDC line is not available during Quebec peak load period. Then, firm imports from NE at peak cannot exceed 170 MW.

### 3.4 Québec capacity by fuel type

Figure 1 below shows the 2010 Québec capacity by fuel type. Most of the installed capacity is hydro (91%). The rest of capacity is from thermal which is used only in peak period when necessary (5%). Each of the nuclear and wind power accounts for 2% of the total installed capacity. Biomass accounts only for 1% of the total installed capacity.

**Figure 1: 2010 Québec Installed Capacity by fuel type\***



\* Breakdown by fuel type does not include installed capacity located outside Québec



## 4. Results

### 4.1 Base Case Demand Scenario

Results shown in Table 8 and 9 indicate that the Québec Area will comply with the NPCC resource adequacy criterion that requires a loss of load expectation (LOLE) value of less than 0.1 days/year for the entire period covered by this review.

**Table 8- LOLE under base case demand**

Year (Winter peak period)	Forecast Reserve (MW)		LOLE (Days/year)		Required Reserve (MW)	
	2008 comprehensive review	2010 interim review	2008 comprehensive review	2010 interim review	2008 comprehensive review	2010 interim review
2011	5,206	3,711	0.051	0.091	4,106	3,622
2012	4,631	4,793	0.088	0.030	4,381	3,697
2013	4,863	4,522	0.080	0.089	4,588	4,420

**Table 9- Planned and required reserves (in %)**

Year (Winter peak period)	Forecast Reserve (%)		Required Reserve (%)	
	2008 comprehensive review	2010 interim review	2008 comprehensive review	2010 interim review
2011	13.7	9.9	10.8	9.7
2012	12.0	12.7	11.4	9.8
2013	12.4	11.8	11.7	11.6

### 4.2 High load forecast

Results shown in Table 10 indicate LOLE(s) under a high demand scenario in the Québec Area that would entail additional purchases of 700 MW in 2011 and 800 MW in 2013 in order to meet a LOLE of 0.1 days/year. In this review, the high demand forecast level is set to 1.5 standard deviation over the reference scenario. Thus, the probability of exceeding such a load level is very low.

**Table 10 – LOLE under High Demand Forecast**

Year (Winter peak period)	Planned Resources (MW)	Annual peak load (MW)	Planned Reserve		LOLE (Days/year)	
			(MW)	(%)	2008 comprehensive review	2010 interim review
2011	41,238	38,410	2,828	7.40	0.121	0.203
2012	42,612	38,894	3,718	9.70	0.257	0.077
2013	42,773	39,743	3,030	7.62	0.286	0.249

## 5. Conclusion

Results show that the Québec Balancing Authority Area will comply with the NPCC resource adequacy reliability criterion that requires a loss of load expectation (LOLE) value of less than 0.1 days/year for all years from 2011 to 2013 under the reference load forecast. Under the high load forecast, it was shown that the Area would need additional purchases of 700 MW and 800 MW over the reference load forecast for 2011 and 2013 to satisfy a LOLE of 0.1 days/year.