Approved by the RCC
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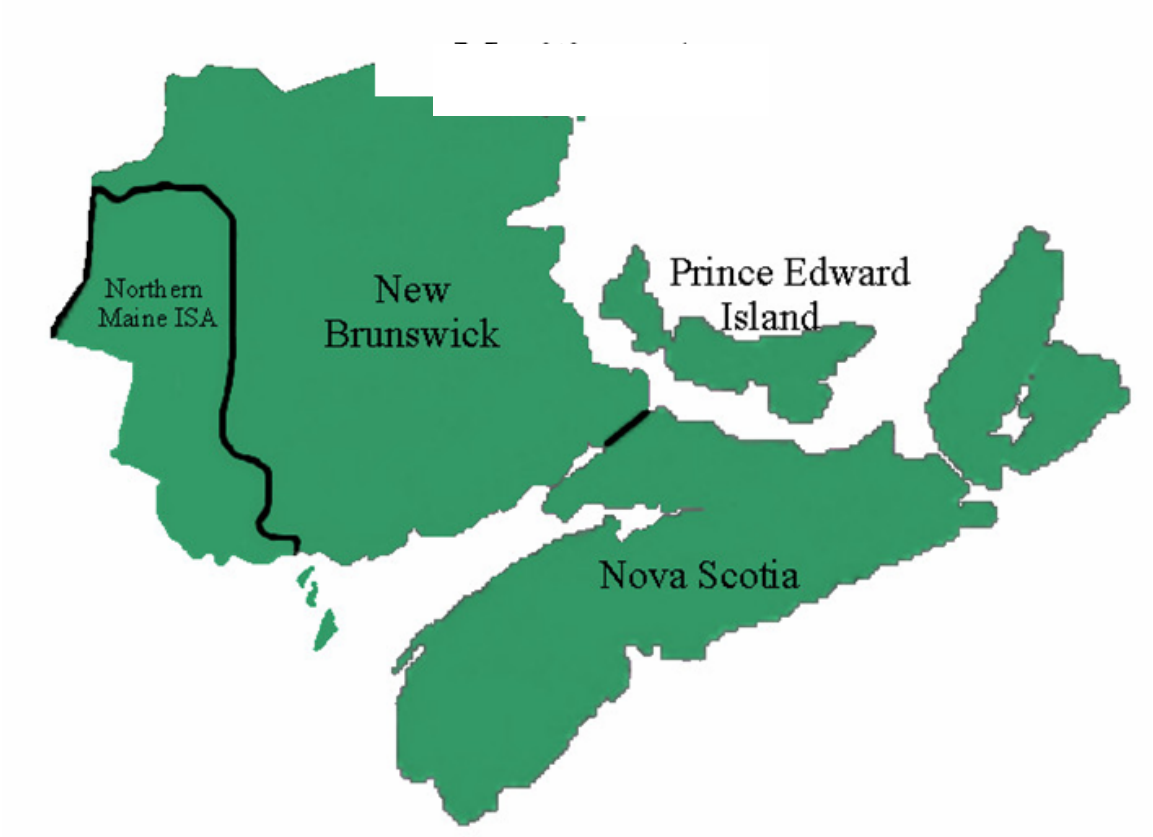
NPCC
MARITIMES AREA
INTERIM REVIEW OF RESOURCE ADEQUACY



December 2006

Executive Summary

This is the 2006 Maritimes Area Interim Review of its 2004 Triennial Review of Resource Adequacy. This interim review covers the years 2007 to 2009, and follows the resource adequacy review guidelines as outlined in the NPCC B-8 Document "Guidelines for Area Review of Resource Adequacy." The Maritimes Area consists of the regions of New Brunswick, Nova Scotia, Prince Edward Island, and Northern Maine.

The LOLE results in this study reflect the Maritimes Area modeled as an isolated system, without any consideration of the interconnection benefits. Results in this review show that the isolated Maritimes Area will comply with the NPCC resource adequacy reliability criterion in years 2007 and 2008, as was the case in the 2004 Triennial Review. In 2009, the isolated Maritimes Area requires 100 MW of additional capacity to meet the NPCC resource adequacy criterion, whereas the 2004 Triennial Review had a deficiency of 240 MW. The most significant cause of the 2009 capacity shortfall is the April 2008 to October 2009 planned refurbishment of the 635 MW Point Lepreau Nuclear Station. New Brunswick Power Distribution and Customer Service is in the process of evaluating options for meeting its capacity requirements for the refurbishment period, including making capacity purchases over its interconnections from neighboring areas.

The smaller 2009 deficiency in this review is predominantly due to the addition of 72 MW of effective wind capacity to the system, along with a reduced load forecast for all years. Primary factors behind the reduced load forecast are higher than anticipated natural gas penetration, and demand elasticity due to increased electricity rates.

Major System Changes

Point Lepreau Refurbishment

In the 2004 Triennial Review, it stated that the planned refurbishment of the 635 MW Point Lepreau Nuclear Generating Station was awaiting approval. Final approval for New Brunswick Power Corp. to proceed with this project was given by the New Brunswick provincial government in July 2005. This planned refurbishment requires an 18-month outage of the station, beginning in April 2008 with completion by October 2009.

Second International Power Line to New England

The 2004 Triennial Review stated that construction of a second tie between New Brunswick and New England was expected to begin in Fall 2005, with a planned in-service date of Fall 2006. Construction on this tie began in early 2006, and its target in-service date is December 2007. It is expected that this second tie will increase the transfer capability between New Brunswick and New England by 300 MW bi-directionally.

Wind Development

The 2004 Triennial Review stated that the installed wind capacity in the Maritimes was 47 MW, with plans to develop an additional 130 MW. However, the 2004 review did not assign any capacity credit to these wind projects, and they were thus excluded from the LOLE analysis.

Wind project capacity was modeled in this interim review based upon results from the Sept. 21, 2005 NBSO report "Maritimes Wind Integration Study". This report showed that the effective capacity from wind projects, and their contribution to LOLE, was equal to or better than their seasonal capacity factors. Coincidence of high winter wind generation with the peak winter loads results in the Maritimes Area receiving a higher capacity benefit from wind projects than would a summer peaking area. The effective wind capacity calculation also assumes a good geographic dispersion of the wind projects in order to mitigate the occurrences of having zero wind production.

It is assumed for this study that all wind turbines installed in the Maritimes Area will be suitable for cold climate operation. Current technologies allow for cold climate wind turbines to operate at temperatures as low as -30^{o}C (-22^{o}F). For extreme weather events below -30^{o}C, these wind turbines do not operate. Since the Maritimes Area winter peak load forecast assumes a -24 ^{o}C (-11 ^{o}F) temperature, the cold climate wind turbines are capable of supplying the forecast peak load.

The following table describes the wind capacity in each sub-area, along with their winter and summer effective capacity percentages.

Table 1

Maritimes Area Wind Capacity 2007 to 2009

	Nameplate Wind Capacity by Year (MW)				
Maritimes Sub-area	2007	2008	2009	Winter Effective Capacity	Summer Effective Capacity
New Brunswick	0	0	0	n/a	n/a
Nova Scotia	49	63	108	32%	16%
PEI	53	53	53	40%	20%
N. Maine	42	42	42	40%	20%
Total	144	158	203		

Although Table 1 shows New Brunswick with no wind capacity, it is anticipated that New Brunswick Power Corp. will announce power purchase agreements involving 200 MW of wind capacity by the end of 2006, with target in-service of this capacity before

2009. However, since these wind projects have yet to be formally announced, they have not been included in this review.

Load Forecast

In the 2004 Triennial Review, the forecast 2007 coincident peak load was 5744 MW with a forecast annual growth rate of 1.35%. The updated load forecast used in this review is lower in all years, starting at 5635 MW in 2007 with an annual growth rate of 1.84%. Table 2 shows the year-by-year comparison of these load forecasts.

Table 2

Load Forecast Comparison

Winter Peak (Month of February)	2006 Interim Review MW	2004 Triennial Review MW	Difference MW
2007	5635	5744	-109
2008	5744	5828	-84
2009	5844	5900	-56
Average Annual Compound Growth Rate			
Four Year Period	2007-2009	2007-2009	
Growth Rate	1.84%	1.35%	

Generation Resources

Changes in the outlook for generation resources in the Maritimes Area include the following:

- The 23 MW Caribou oil fired plant was brought out of its mothball state and reactivated for all years of this review.
- The 98 MW Courtenay Bay 4 oil fired plant has been retired.
- The refurbishment of Tuft's Cove units 4 and 5, providing an additional 50 MW, is now planned for 2010 instead of being upgraded by 52 MW for 2006.
- Point Lepreau derations in years 2007 to 2008 are slightly greater in this study.
- Effective wind capacity, as per Table 1, has been added to all years.
- Minor capacity additions are planned for small hydro facilities.

Table 3 shows the year by year generation resources forecast for this review compared to the last Triennial Review.

Table 3

Generation Resources Comparison

Winter Peak (Month of February)	2006 Interim Review MW	2004 Triennial Review MW	Difference MW
2007	6653	6734	-81
2008	6666	6725	-59
2009	6122	6147	-25

Assessment of Installed Capacity Requirements

The Maritimes Area uses a 20% reserve capacity planning criterion. Due to similar changes in the load forecast and the planned generation resources, the % reserve outlook is very close to that of the Triennial Review. In 2009, the outlook for the planned reserve is 290 MW short of the 20% reserve criterion.

Table 4 shows a comparison of the planned and required reserve for this review.

Table 4

Comparison of Planned and Required Reserve

Month Of February	Installed Capacity MW	Forecast Coincident Peak MW	Interruptible Load MW	Planned Reserve		Required Reserve	
				MW	%	MW	%
2007	6653	5635	492	1510	29.4	1029	20.0
2008	6666	5744	496	1418	27.0	1050	20.0
2009	6122	5844	501	779	14.6	1069	20.0

Table 5 shows the year by year LOLE results for this review and the Triennial Review, along with the required interconnection support to meet the NPCC reliability criterion. The LOLE results in this study reflect the Maritimes Area modeled as an isolated system without consideration of interconnection benefits. The isolated Maritimes Area will comply with the NPCC resource adequacy reliability criterion in years 2007 and 2008, as was the case in the 2004 Triennial Review. In 2009, the isolated Maritimes Area requires 100 MW of additional capacity to meet the NPCC resource adequacy criterion, whereas the 2004 Triennial Review had a deficiency of 240 MW. The most significant cause of the 2009 capacity shortfall is the April 2008 to October 2009 planned refurbishment of the 635 MW Point Lepreau Nuclear Station. New Brunswick Power Distribution and Customer Service is in the process of evaluating options for meeting its capacity

requirements for the refurbishment period, including making capacity purchases over its interconnections from neighboring areas.

Table 5

Maritimes LOLE and Required Interconnection Support

Calendar Year	Expected Number of Firm Load Disconnections (Days/Year)		Required Interconnection Support MW	
	2006 Interim Review	2004 Triennial Review	2006 Interim Review	2004 Triennial Review
2007	0.002	0.012	0	0
2008	0.007	0.047	0	0
2009	0.191	0.380	100	240

Due to software limitations in the Maritimes Area LOLE calculation program, the results in Table 5 were calculated with only a single area LOLE model for the Maritimes Area, not a multi-area model to recognize possible congestion on the interface between New Brunswick and Nova Scotia. Next year, in the 2007 Maritimes Area Comprehensive Review, a new software program will be implemented that is capable of multi-area LOLE calculations. The analysis that follows details how the single area LOLE model was used to calculate the LOLE of the two sub-areas of the Maritimes Area.

To evaluate whether the isolated Maritimes Area could meet the NPCC reliability criterion without exceeding intra-area transmission capability limits, the system was split into two sub-areas, one on each side of the New Brunswick to Nova Scotia interconnection. This is the only intra-area transmission line that is subject to congestion.

Table 6 shows the LOLE for the Nova Scotia sub-area, along with the available sub-area support and required external interconnection support. In all years, the Nova Scotia sub-area meets the NPCC reliability criterion without any external interconnection support.

Table 6

Nova Scotia Sub-Area LOLE and Required Interconnection Support

Calendar Year	Expected Number of Firm Load Disconnections (Days/Year)	Total Required Sub-Area Support MW	Total Available Support From NBSO Sub-Area MW	External Interconnection Support Required MW
2007	0.022	-90	0	0
2008	0.036	-60	0	0
2009	0.062	-30	0	0

Table 7 shows the LOLE for the NBSO sub-area (New Brunswick, PEI, and Northern Maine), along with the available sub-area support and required external interconnection support. In 2007, the NBSO sub-area does not require external interconnection support to meet the NPCC reliability criterion. In 2008 and 2009, the NBSO sub-area requires external interconnection support of 135 MW and 400 MW respectively. These requirements are primarily due to the planned 18-month outage for Point Lepreau beginning in April 2008, but are well within the 1500 MW NBSO import capability from external interconnections. The 2005 NPCC report "Review of Interconnection Assistance Reliability Benefits – 2nd Tie Addendum" confirmed that the Maritimes Area has a Maximum Tie Benefit Potential equal to its 1500 MW import capability.

Table 7

NBSO Sub-Area LOLE and Required Interconnection Support

Calendar Year	Expected Number of Firm Load Disconnections (Days/Year)	Total Required Sub-Area Support MW	Total Available Support From Nova Scotia Sub-Area MW	External Interconnection Support Required MW
2007	0.044	-	-	-
2008	0.512	195	60	135
2009	2.149	430	30	400

Conclusion

Results of this Interim Review show that the Maritimes Area will comply with the NPCC resource adequacy reliability criterion in years 2007 and 2008. In 2009, this review shows that the Maritimes Area requires 100 MW of additional capacity to meet the NPCC resource adequacy criterion, whereas the 2004 Triennial Review had a deficiency of 240 MW. The most significant cause of the 2009 capacity shortfall is the April 2008 to October 2009 planned refurbishment of the 635 MW Point Lepreau Nuclear Station. New Brunswick Power Distribution and Customer Service is in the process of evaluating options for meeting its capacity requirements for the refurbishment period, including making capacity purchases over its interconnections from neighboring areas.

Analysis of the sub-areas of the Maritimes shows that the Nova Scotia sub-area meets the NPCC reliability criterion in all years, but the NBSO sub-area (New Brunswick, PEI, and Northern Maine) will require external interconnection support of 135 and 400 MW in years 2008 and 2009 respectively. These requirements, which are primarily due to the planned 18-month outage for Point Lepreau beginning in April 2008, are well within the 1500 MW NBSO import capability from external interconnections.