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MARITIMES SUBREGION

EXECUTIVE SUMMARY

The footprint of the Maritimes Area is comprised of the provinces of New Brunswick (served by the New Brunswick System Operator - NBSO), Nova Scotia (served by Nova Scotia Power Inc. - NSPI), Prince Edward Island - PEI (served by the Maritime Electric Company Ltd. - MECL) and the Northern Maine Independent System Administrator, Inc (NMISA). NMISA serves approximately 40,000 customers in northern Maine and is radially connected to the New Brunswick power system. The Maritimes Area is a winter peaking Region.

Forecast peak demand for the Maritimes Area in 2010/11 is 5,655 MW. Forecast average annual growth rate is negative at -0.5%, and is mostly due to higher demand side management (DSM) projections.

Existing capacity resources for 2010/11 total 7,338 MW, including 504 MW of wind generation. Due in part to the projection of a negative total load growth rate, there is no future plans to add more conventional generation capacity in the Maritimes Area within the next 10 years. However, wind generation is forecast to grow by 414 MW by 2019/20 driven by Regional renewable energy targets. For each year of the forecast, the reserve margin of the Maritimes Area exceeds 34% and thus meets the 20% reserve margin criterion used for planning purposes.

The only new bulk transmission forecast in this review period is a Conceptual project in New Brunswick to build a parallel circuit to the existing 103 miles of 345 kV transmission between Coleson Cove and Salisbury. This project is under study for 2016.

There are no significant generating unit outages, transmission additions or temporary operating measures that are anticipated to impact the reliability of the Maritimes during the next ten years.

DEMAND

The 2010/11 peak demand forecast, representing the summation of the forecasts of each Maritimes Area jurisdiction, is 5,655 MW. This is 175 MW higher than last year. The forecast average annual peak demand growth rate is -0.5% over the next 10 years, and this is lower than the 0.9% growth rate forecasted last year. Contributing significantly to this lower growth rate were higher demand side management (DSM) projections from Nova Scotia Power (NSPI) as noted in the NSPI 2009 Integrated resource Plan Update Report.¹⁴⁹

Separate demand and energy forecasts are prepared by each of the Maritimes Area jurisdictions, as there is no regulatory requirement for a single authority to produce a forecast for the whole Maritimes Area. For Area studies, the individual forecasts are combined using the load shape of each jurisdiction.

¹⁴⁹<http://www.nspower.ca/site-nsp/media/nspower/2009%20IRP%20UPDATE%20-%20FINAL%20REPORT%20COMBINED%20REDACTED.pdf>.

The NBSO load forecast for New Brunswick is based on 30-year average temperatures (1971-2000) with the annual peak hour demand determined for a design temperature of -24°C over a sustained 8-hour period. It is prepared based on a cause and effect analysis of past loads, combined with data gathered through customer surveys, and an assessment of economic, demographic, technological and other factors that affect the use of electrical energy.

The NSPI load forecast for Nova Scotia is based on the 10-year average temperatures measured in the Halifax area of the province, along with analyses of sales history, economic indicators, customer surveys, technological and demographic changes in the market, and the price and availability of other energy sources.

The MECL load forecast for PEI uses an econometric model that factors in the historical relationship between electricity usage and economic factors such as gross domestic product, electricity prices, and personal disposable income.

The NMISA load forecast for northern Maine is based on historic average peak hour demand patterns inflated at a nominal rate and normalized to 30-year average historical weather patterns. Economic and other factors may also affect the forecast.

All jurisdictions in the Maritimes Area are winter peaking due to high electric heating load. Long term resource evaluations are based on a 20% reserve margin above the forecast firm winter peak load.

Current and projected Energy Efficiency are either incorporated directly into the load forecast (New Brunswick, PEI, and Northern Maine), or reported separately (Nova Scotia). The reported Energy Efficiency for 2011/12 is 101 MW, growing to 551 MW in 2019/20.

Nova Scotia Power Inc.'s Energy Efficiency programs are spread across various customer sectors - residential, commercial and industrial. They include programs for lighting, heating/cooling, refrigeration, water heating, motors and compressors. NSPI has developed an updated Demand Side Management (DSM) plan, which is presently before the Regulator. DSM is a relatively new initiative for the Utility and the program includes reporting mechanisms (independent evaluation by NSPI's Evaluation Consultant, and subsequent verification by the Regulator's Verification Consultant) to assess the demand and energy benefits particularly during the ramp-up period in the next few years.

One of the Demand Response programs currently used in the Maritimes Area is interruptible demand. For 2010/11, the interruptible demand forecast for the peak month is 385 MW, which represents 7% of the peak demand forecast. In Nova Scotia, NSPI's Demand Response programs are primarily rate design-driven and along with interruptible pricing for large industrials, include time of day pricing for residential customers with electric thermal storage home heating equipment, and the Extra Large Industrial Interruptible Two Part Real Time Pricing rate for NSPI's two largest customers. Interruptible demand is reported separately; the other programs are incorporated directly into the load forecast.

While demand side management resources are considered for meeting Regional targets for greenhouse gas reductions, they are not currently counted towards Regional renewable portfolio standards.

In its comprehensive reviews of resource adequacy, the Maritimes Area uses a load forecast uncertainty representing the historical standard deviation of load forecast errors based upon the four-year lead time required to add new resources.

GENERATION

The Maritimes Area capacity resources in 2010/11, with wind capacity in brackets, are:

Table NPCC-2: Maritimes Capacity

	2010-2011	2019-2020
Existing Capacity	7,338 MW (504 MW) ¹⁵⁰	7,338 MW (504 MW)
Certain	7,257 MW (504 MW)	7,257 MW (504 MW)
Other	0 MW (0 MW)	0 MW (0 MW)
Inoperable	82 MW (0 MW)	82 MW (0 MW)
Future-Planned	209 MW (209 MW)	414 MW (414 MW)
Future Conceptual	0 MW (0 MW)	0 MW (0 MW)

Wind project capacity for the Maritimes is modeled based upon results from the September 2005 NBSO report "Maritimes Wind Integration Study."¹⁵¹ This report showed that the effective capacity from wind projects, and their contribution to Loss of Load Expectation (LOLE) was equal to or better than their seasonal capacity factors. The coincidence of high winter wind generation with the peak winter loads results in the Maritimes Area receiving a higher capacity benefit from wind projects versus that of 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.

In Nova Scotia, the capacity contribution of wind projects during the peak is based on a three year rolling average of the winter peak period actual capacity factor (combined with the annual forecasted capacity factor, if in service less than three years). This is based on an agreed formula between the Renewable Energy Industry Association of Nova Scotia and NSPI.

The Biomass capacity values are 109 MW of Existing-Certain in both 2010/11 and 2019/20.

There is no Conceptual capacity resources expected to come on-line during the study period.

¹⁵⁰ The number in brackets () represents wind capacity

¹⁵¹ <http://www.nbso.ca/Public/private/2005%20Maritime%20Wind%20Integration%20Study%20Final.pdf>

With relatively flat and even slightly negative load growth, there are no current plans for additional MW of conventional generation within the Maritimes Area. Future-Planned capacity for this study period consists entirely of new wind capacity driven by Regional renewable energy targets.

CAPACITY TRANSACTIONS ON PEAK

The Maritimes Area does not forecast any capacity imports from other Regions during the next 10 years.

For the period 2010 through October 2011, there is a firm capacity sale of 200 MW from the Maritimes to Hydro-Québec. This sale is tied to two 100 MW oil combustion turbines at Millbank, NB and is backed up by a transmission reservation.

TRANSMISSION

In terms of Conceptual transmission, New Brunswick is studying a 345 kV transmission line project between Coleson Cove and Salisbury. This line would be 103 miles in length, and is targeted for 2016. As this project is still Conceptual, there are no reliability impacts in not meeting its proposed in-service date.

There are no transmission constraints in the Maritimes Area affecting reliability.

No other significant substation equipment additions planned for the Maritimes Area within the next 10 years.

OPERATIONAL ISSUES

There are no significant generating unit outages, transmission additions or temporary operating measures that are anticipated to impact the reliability of the Maritimes Area during the next ten years.

In the 2007 Maritimes Comprehensive Review of Resource Adequacy¹⁵² scenarios of high load growth and zero wind availability were studied, with the result that the Maritimes Area was still able to meet its 20% reserve criterion in all cases with no more than 35 MW of necessary interconnection support. This level of interconnection support represents only 2% of the Maritimes Area tie benefits capability.

There are no current environmental or regulatory restrictions that could potentially impact the reliability of the Maritimes Area.

Plans are underway for the individual jurisdictions within the Maritimes Area to coordinate the sharing of wind data and possibly wind forecasting information and services.

In Nova Scotia, provincial legislation is in place to meet renewable supply targets in 2010 and 2013 (including variable/intermittent resources). The 2008 Wind Integration Study¹⁵³ commissioned by the Nova Scotia Department of Energy found that for the 2013 target, more detailed impact studies are required to fully understand the cost and technical implications related to possible transmission

¹⁵² <http://www.npcc.org/documents/reviews/Resource.aspx>

¹⁵³ <http://www.gov.ns.ca/energy/resources/EM/Wind/NS-Wind-Integration-Study-FINAL.pdf>

upgrades and new operational demands on existing infrastructure. Future study will be needed to fully understand the cost and stability issues of increasing wind supply beyond these levels.

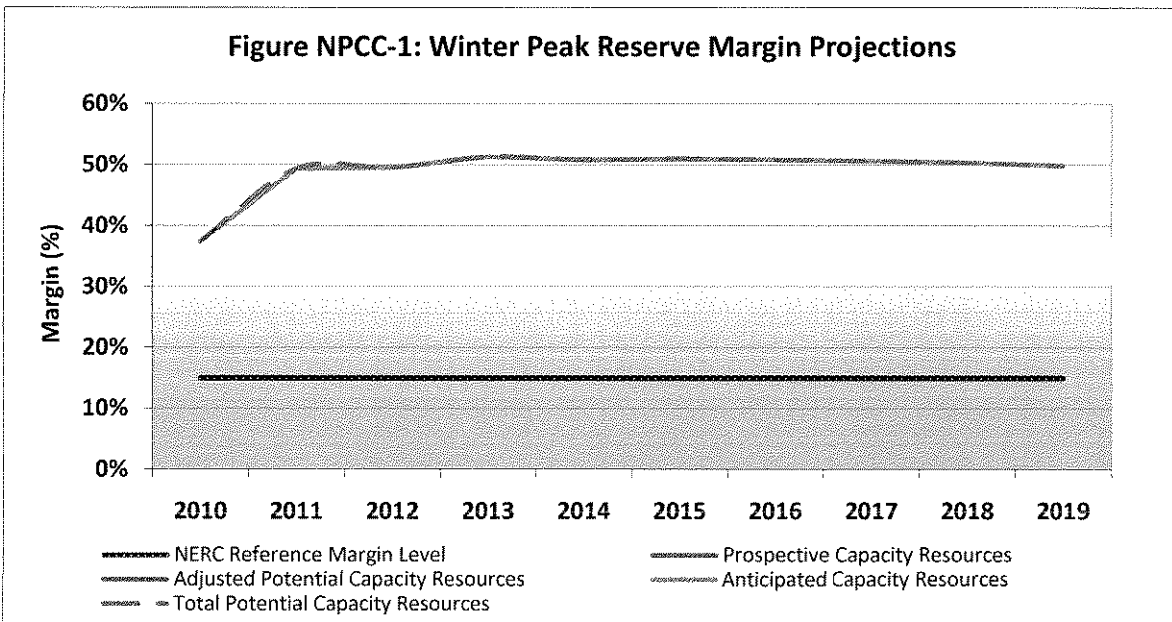
There are no operational changes or concerns resulting from distributed resource integration in the Maritimes Area other than in Nova Scotia.

In Nova Scotia, as increased amounts of renewable generation are connected to the distribution system, further study will be required to fully understand the cost and technical implications related to possible transmission system upgrades and new operational demands on existing infrastructure.

No reliability issues are anticipated from Demand Response resources for the Maritimes Area, which consist mainly of interruptible customers totaling 7% of peak demand in 2010/11.

RELIABILITY ASSESSMENT ANALYSIS

For each year of the forecast, the reserve margin of the Maritimes Area exceeds 34%. The Maritimes uses a reserve criterion of 20% for planning purposes and it was shown in the 2007 Maritimes Comprehensive Review of Resource Adequacy that adherence to this criterion complies with the NPCC reliability criterion.



The Maritimes conducts resource adequacy studies to identify the resources needed to meet the NPCC resource adequacy criterion of less than 0.1 day per year of Loss of Load Expectation (LOLE).

In its 2007 Maritimes Comprehensive Review of Resource Adequacy it was shown that the NPCC reliability criterion of less than 0.1 day of firm load disconnections per year is not exceeded by the Maritimes Area for all years in the 2008-12 study period, and varies between 0.001 to 0.086 day/yr for the base load forecast with load forecast uncertainty.

The Maritimes Area requires no support from its interconnections to meet the NPCC reliability criterion for all years of the 2008-12 study periods. The Maritimes Area is also shown to adhere to its own 20% reserve planning criterion in all years for the base load forecast, with reserve levels varying between 22% and 40%.

The Maritimes Area has sufficient resources to meet its 20% reserve requirement for each of the 10 years of this assessment. No additional internal or external resources are required.

The Maritimes Area participates in a Regional reserve sharing program with New England, New York, and Ontario for 100 MW of 10-minute reserve. This reserve is counted as 25% spinning and 75% supplemental.

Both short-term and long term capacity requirements are the same in the Maritimes Area.

In its 2007 Maritimes Comprehensive Review of Resource Adequacy, the scenarios of high load growth and zero wind availability were studied, with the result that the Maritimes Area was still able to meet its 20% reserve criterion in all cases with no more than 35 MW of necessary interconnection support. This level of interconnection support represents only 2.1% of the Maritimes Area tie benefits capability.

Wind project capacity for the Maritimes is modeled 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 Loss of Load Expectation (LOLE) was equal to or better than their seasonal capacity factors. The coincidence of high winter wind generation with the peak winter loads results in the Maritimes Area receiving a higher capacity benefit from wind projects versus 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.

In Nova Scotia, the capacity contribution of wind projects during the peak is based on a three year rolling average of the winter peak period actual capacity factor (combined with the annual forecasted capacity factor, if in service less than three years). This is based on an agreed formula between the Renewable Energy Industry Association of Nova Scotia and NSPI.

Wind capacity required to meet Maritimes Area Renewable Portfolio Standard (RPS) mandates have been included within Future Capacity.

All generation projects connecting to the transmission grid, including wind, must undergo a System Impact Study (SIS) and satisfy all connection requirements determined by the SIS and local grid code. Wind projects are required to transmit atmospheric data (wind speed, wind direction, temperature) to the local System Operator for wind forecasting needs.

The Demand Response in the Maritimes Area consists primary of interruptible customer load equivalent to 7% of peak load for 2010/11. The performance of these customers is metered in real-time to ensure compliance with operator instructions.

There are no unit retirements during the period of this assessment that significantly impact the reliability of the Maritimes Area.

At this time, there are no plans to install more Under Voltage Load Sharing (UVLS) in the Maritimes Area. Collectively, UVLS in New Brunswick can shed up to 25% of load. There are no plans for additional Special Protection Systems (SPS) schemes in the Maritimes Area in this assessment.

The Maritimes Area addresses the loss of generation through its operating reserve requirements, and due to its diverse fuel mix and fuel storage capability, there are no long-term fuel disruptions anticipated.

NPCC has established a Reliability Assessment Program (NRAP) to bring together work done by the Council, its member systems and Areas relevant to the assessment of bulk power system reliability. As part of the NRAP, the Task Force on System Studies (TFSS) is charged on an ongoing basis with conducting periodic reviews of the reliability of the planned bulk power transmission system of each Area of NPCC and the transmission interconnections to other Areas. The purpose of these reviews is to determine whether each NPCC Area's planned bulk power transmission system is in conformance with the NPCC Regional Reference Directory #1 "Design and Operation of the Bulk Power System". Since it is NPCC's intention that the *Basic Criteria* be consistent with the *NERC Planning Standards*, conformance with the NPCC *Basic Criteria* assures consistency with the *NERC Planning Standards*.

The Transmission Review for 2009 is an Intermediate level, covering the year of 2014. The results of this study concluded that the bulk power system for the Maritimes Area remains in conformance with Directory #1. There are no reactive power-limited areas on the bulk power system for the Maritimes Area. Voltages on the system are operated within the limit of 0.95 per unit to 1.05 per unit.

There are no new FACTS or "smart grid" devices planned for the Maritimes Area bulk power system during the assessment period, and no specific new projects that impact reliability in the Maritimes Area over the next 10 years

REGION DESCRIPTION

Table NPCC-2: Maritimes Description

Jurisdiction	System Operator	Peak Season	Square Miles	Population
New Brunswick	NBSO	Winter	28,000	750,000
Nova Scotia	NS Power	Winter	21,000	940,000
Prince Edward Island	Maritime Electric	Winter	2,200	140,000
Northern Maine	Northern Maine ISA	Winter	3,600	90,000