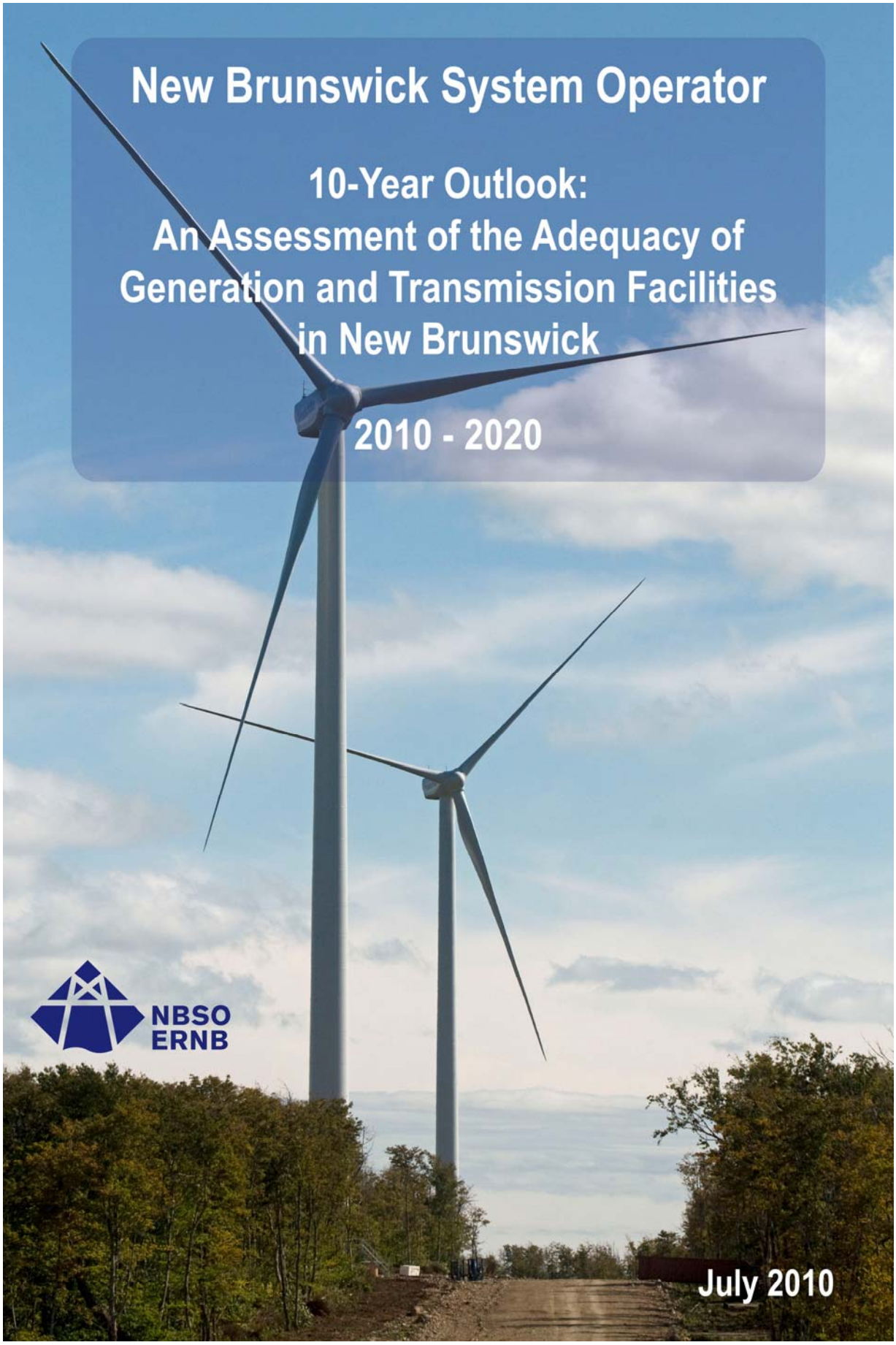
New Brunswick System Operator
10-Year Outlook:
An Assessment of the Adequacy of
Generation and Transmission Facilities
in New Brunswick
2010 - 2020
NBSO
ERNB
July 2010

EXECUTIVE SUMMARY

This 10-Year Outlook fulfills NBSO's obligation under Market Rule 9.2 to develop and publish an annual baseline plan for the New Brunswick Electricity Market. It includes an assessment of the potential need for investments in transmission facilities and other actions that may be required to maintain reliability of the SO-controlled grid, to improve performance of the market, and to reduce costs associated with transmission constraints on the SO-controlled grid. Under Market Rule 9.4, third parties may contact NBSO to bid on the projects identified in this report, or they may propose alternative solutions to these projects that may include, but are not limited to, transmission, generation, distribution, and energy efficiency projects.

Listed below are summaries of the report sections for load forecast, generation, resource adequacy, transmission, and regional system development.

Load Forecast

The NB Power load forecast in this 2010 assessment is similar to the 2009 review. The in-province energy forecast for 2010/11 is 14,190 GWh with an annual growth rate of 0.6%. The in-province demand forecast for 2010/11 is 3,030 MW with an annual growth rate of 0.6%.

Details of the load forecast, including history, monthly usage, and major forecast assumptions are found in section 2.0 of this report.

Generation

The ongoing refurbishment of the 660 MW Point Lepreau Nuclear Station is now 16-months behind schedule. As of April 1, 2010 its return to service date has changed from October 1, 2009 to February 1, 2011. Updates on the Point Lepreau refurbishment are provided by NB Power at: http://poweringthefuture.nbpower.com

Generation retirements projected in this 10-year assessment include:

- 5 MW at Musquash (January 2010)
- 57 MW at Grand Lake (March 2010)
- 299 MW at Dalhousie (March 2011)

NB Power has announced the following additional wind projects for New Brunswick:

Project Location	Size (MW)	Owner	In-service Date
Lamèque	49.5	Acciona	Delayed by developer
Aulac	64.5	Acciona	Delayed by developer
Kent Hills Expansion	54	TransAlta	December 2010

Resource Adequacy

The assessment of committed generation resources shows that the New Brunswick system does not require additional capacity in the next 10 years to meet the long term NBSO capacity based reserve criterion of 20% firm load or the largest generator. Details of the load and resources review are provided in section 4.0 of this report.

Transmission

Major projects within the next 10 years that impact the bulk transmission system include:

- Refurbishment of the Eel River HVDC station is under review.
- Planning studies are on-going to propose transmission solutions that will reliably supply the forecast loads in Southeastern NB and meet the current and future needs of the interconnections with PEI and Nova Scotia.
- Several other 138 kV and 69 kV transmission projects are identified in section 5.0 of this report.

Regional System Development

Updates to regional system development in New Brunswick, as well as neighbouring areas, is discussed in chapter 7 of this report, and includes the following:

- A cancelled energy agreement between New Brunswick and Québec.
- The 2009 New Brunswick Transmission Workshop hosted by NBSO.
- The New Brunswick Community Energy Policy.
- PEI wind development.
- A 2009 study of transmission and system operator options for Nova Scotia.

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1.0 INTRODUCTION

On October 1, 2004 New Brunswick's *Electricity Act* was proclaimed and the electric utility industry in New Brunswick was restructured. Competitive supplier choice for municipal utilities and large industrial customers served from the transmission system was provided; the Electricity Market under the New Brunswick Electricity Market Rules (Market Rules) issued by the Minister of Energy was opened; and a new corporation called New Brunswick System Operator (NBSO) was created.

NBSO is an independent not-for-profit statutory corporation separate from the NB Power group of companies. It is led by a President & CEO and governed by an independent Board of Directors. The primary responsibilities of NBSO are to ensure the reliability of the integrated electricity system for present and future needs, and to facilitate the development and operation of a competitive electricity market. These responsibilities take the form of operation of the NBSO-controlled grid and administration of the Open Access Transmission Tariff (OATT) and the Market Rules. They also include undertaking and coordinating power system planning, compliance with reliability standards, contract and agreement development, market monitoring, accounting, settlement, interconnection issues, and regional development.

The original OATT was approved by the New Brunswick Board of Commissioners of Public Utilities (PUB) in its decision of March 13, 2003, and was updated in its decision of April 26, 2005. It specifies the terms, conditions and rates for use of the NBSO-controlled transmission system. Any future changes and additions to the OATT will be made by NBSO and submitted for regulatory approval to the Energy and Utilities Board (EUB) created in February 2007 to succeed the PUB.

The Market Rules govern the rights and obligations of entities participating in the Electricity Market (Market Participants). The initial Market Rules were issued by the Minister of Energy effective October 1, 2004 and are based on principles recommended by the Market Design Committee in April 2002 and accepted by government. Several rule adjustments have been made in the last two years to improve pricing flexibility and market transparency, and also to allow demand bidding. Any future changes and additions to the Market Rules, similar to the past changes, will be made under the authority of the NBSO Board after consultation with stakeholders through the Market Advisory Committee (MAC). The MAC includes representatives from a wide range of interested parties (large industrial customers, municipal utilities, generators, transmission operators, transmission users, environmental groups, small consumers, etc.). The role of the MAC is to review and propose potential changes to the OATT and Market Rules and make appropriate recommendations to the NBSO Board of Directors regarding their implementation.

In addition to being the operating authority for the reliable operation of the New Brunswick electricity system, NBSO is responsible for its long-term planning and development. Under the Market Rules, NBSO is required to publish annually a 10-year assessment regarding the current and future adequacy of the NBSO controlled integrated electricity system. First published in 2005, this 2010 version of the report includes:

- A baseline plan showing the load forecast, committed supply resources only, and a review of resource adequacy.
- Recommended transmission plans for new projects and upgrades.
- A summary of regional system development activities.

This assessment does not deal with power costs, rate structures, economics, or business risks of the electric industry in New Brunswick, but focuses on reliability of supply. With this information, Market Participants will be able to assess potential market opportunities for themselves and their customers from a common base.

2.0 LOAD FORECAST

The load forecast represents the current 10-year forecast of the electricity requirements of in-province customers for 2010/11 to 2019/20. 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 utilization of electrical energy. This forecast incorporates the effects of the availability of natural gas in New Brunswick, energy efficiency and conservation measures, and changes in industrial customer self-generation.

Energy requirements and peak hour demand are affected by weather conditions, the most significant being temperature. The energy forecast 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.

2.1 Annual Requirements

The 10-year load forecast in this report is based on the NB Power document *Load Forecast 2010 – 2020.* Table 1 shows the 10-year load forecast of annual energy and peak load requirements for New Brunswick. System net energy has a forecast growth rate of 0.6% per year, and the peak hourly demand is forecast to grow at 0.6% per year.

The period of highest energy consumption in New Brunswick is December through February, mainly due to the electric heating load. The period with the lowest energy consumption is June through August, due primarily to warmer temperatures.

Although January represents the peak month for energy consumption, the peak hourly demand in New Brunswick is forecast to occur in the first week of February. The forecast for a February peak hourly demand occurs because historically the January peak load has been lowered through curtailments of interruptible customers on the coldest days, and these curtailments have occurred more often in January than in February.

Table 2 shows a summary of major assumptions built into the load forecast.

Figure 1 shows the forecast consumption of annual system net energy on a monthly basis.

Figure 2 shows how the monthly peak loads are forecast to vary as a percentage of the annual forecast peak load.

Table 3 shows a summary of load forecast sensitivities for the year 2019/20.

Table 1: New Brunswick 10-year Load Forecast

Year	System Net Energy (GWh)	Peak Hourly Demand (MW)
2010/11	14,190	3,030
2011/12	13,794	2,970
2012/13	14,037	2,990
2013/14	14,193	3,020
2014/15	14,333	3,060
2015/16	14,494	3,080
2016/17	14,616	3,110
2017/18	14,744	3,140
2018/19	14,884	3,170
2019/20	15,033	3,210
Overall Increase (from 2010/11)	843	180
Average Annual Growth Rate	0.6%	0.6%

Table 2: Major Load Forecast Assumptions

Parameter	Description
GDP Growth	Projections from NB Dept. of Finance • 2010/11 - 1.7% • 2011/12 - 1.8% • 2012/13 - 1.9% • 2013/14 - 2.0% • 2014/15 to 2019/20 - 2.2% per year
Temperatures	• Temperature at peak of -24 degrees Celsius • Annual energy forecast is based on 30-year average temperatures
Residential Customers	• 3,890 new customers per year • Population growth of 15,200 over the forecast period. • Household size declines by an average of 0.9% over the forecast period. • Real price of electricity assumed to remain constant over the forecast period.

Large Industry Assumptions	• Continued operation of large customers during the forecast period. • Bowater Maritimes, UPM Kymmene, Olin Chemicals, Blue Note Caribou Mines, Atlantic Fine Yarns, and NB Coal Midlands assumed to remain closed over the forecast period. • Industrial shutdowns include: - Brunswick Mines in April 2011. - Brunswick Smelting in September 2011. • New industrial loads include: - Potash of Saskatchewan second mine (full production by 2015).
Natural Gas Availability	• Gas territory forecast as available to 30% of NB population.
Energy Efficiency Assumptions	• 90 MW reduction in demand by 2019/20 • 345 GWh reduction in energy by 2019/20

Figure 1: Monthly Consumption of Annual System Net Energy

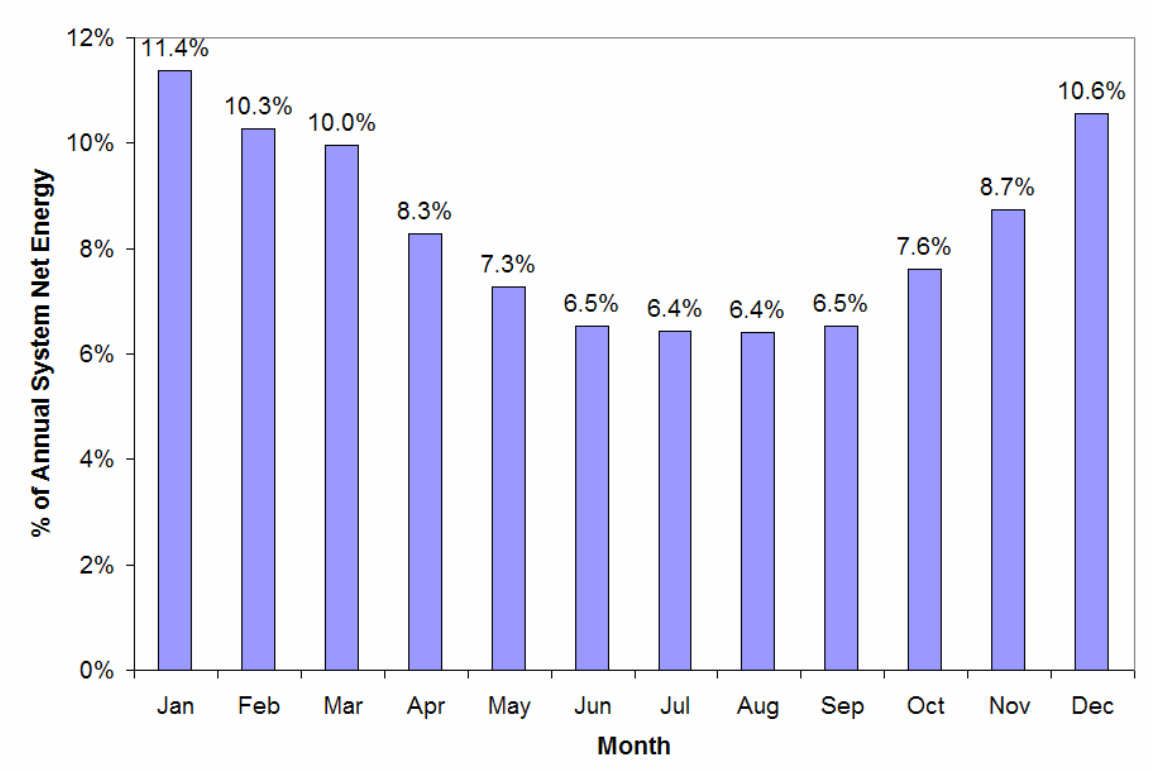


Figure 2: Monthly Peak Loads as a Percentage of Annual Peak Load

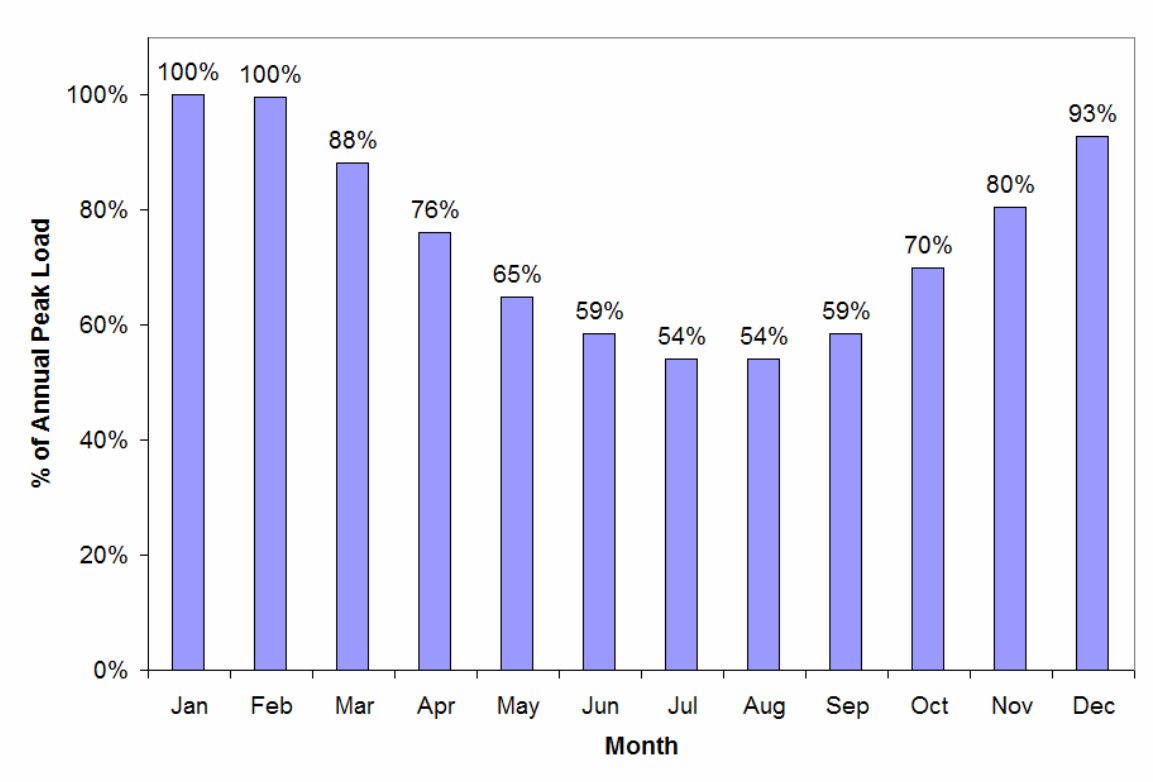


Table 3: Sensitivities of Load Forecast Assumptions

Sensitivity	Impact in year 2019/20	
	Energy GWh	**Demand MW**
± 100 residential customers per year	± 20	± 5
0.1% change in rate of GDP growth	± 26	± 5
1.0% change in 2010/11 price increase	± 43	± 5
Efficiency NB Program savings ± 25%	± 86	± 23
0.1% annual change in residential plug load growth rate	± 18	± 5

2.2 Historical and Forecast Requirements

NB Power Distribution and Customer Service (DISCO) currently serves 99.8% of all New Brunswick customer load. The remaining 0.2% are Perth Andover customers that are served by WPS Canada Generation Inc. in Maine. Each year DISCO prepares a load forecast that represents the long term projection of in-province customer requirements for demand and energy. This forecast reflects the fact that the New Brunswick economy is very electrically intensive, due in large measure to the forestry and mining industries.

Figure 3 shows the actual annual energy consumption from fiscal year ending 1973 to 2010, and the forecast annual energy consumption for 2011 to 2020.

Figure 3: New Brunswick Annual Energy Consumption

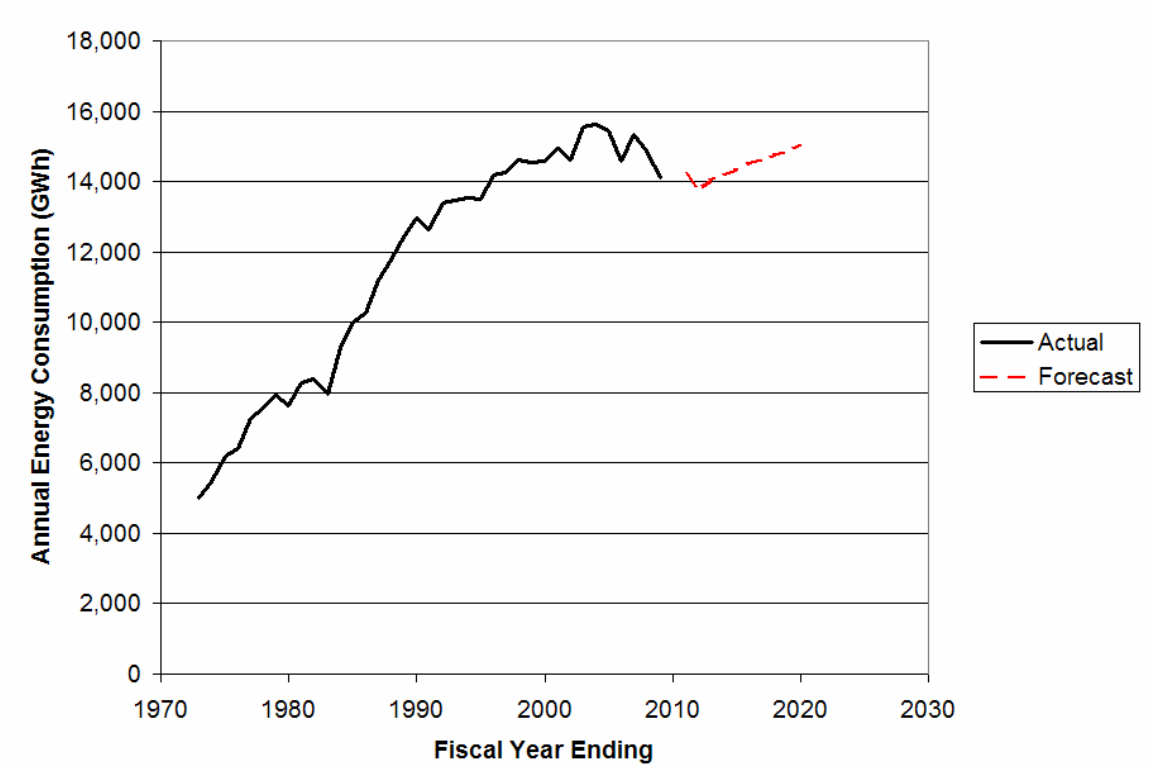
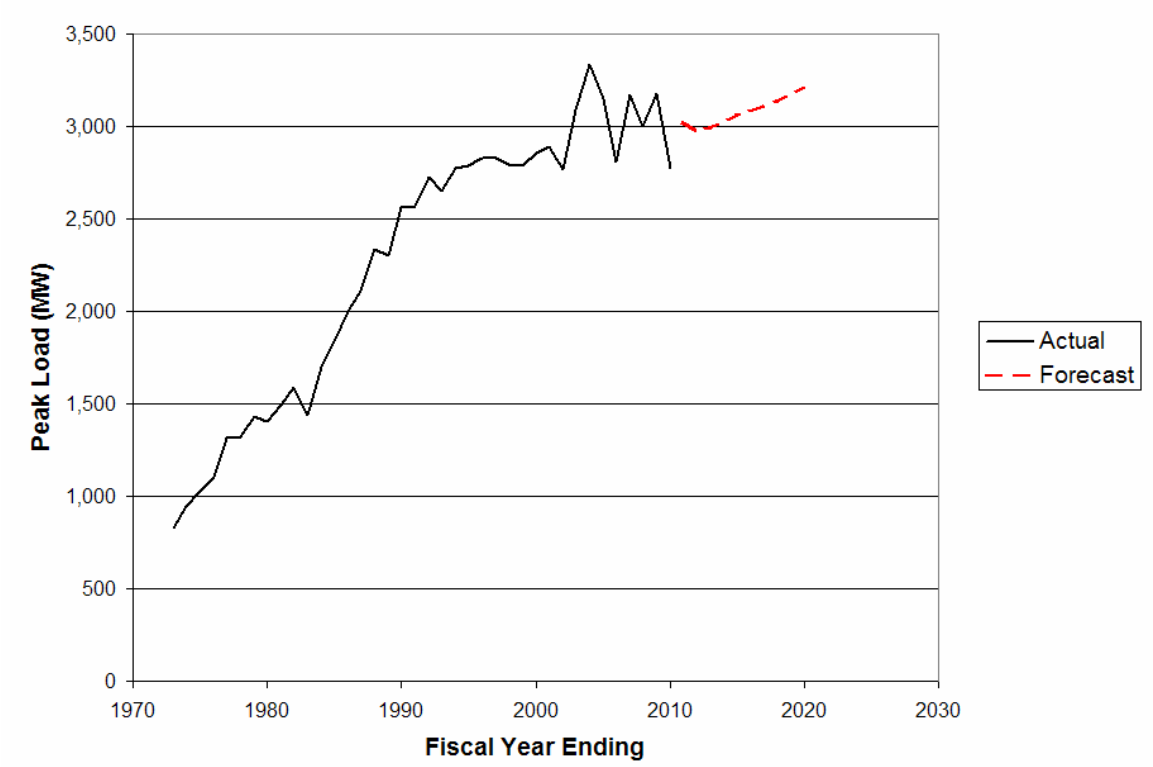


Figure 4 shows the actual peak hourly demand from fiscal year ending 1973 to 2010, and the forecast peak hourly demand for 2011 to 2020.

Figure 4: New Brunswick Peak Hourly Load



2.3 Demand Side Management Forecast

Efficiency New Brunswick is the Energy Efficiency and Conservation Agency of New Brunswick. Its mission is to offer sound advice and practical solutions to help New Brunswickers use energy more efficiently, make better energy choices, manage energy expenses and lessen the impact of energy use on the environment.

Projected demand side management (DSM) numbers from Efficiency New Brunswick are incorporated into the base load forecast. This projected efficiency results in a 90 MW reduction in demand by 2019/20 and a 345 GWh reduction in energy by 2019/20. These estimates are related to the following programs:

- Existing Homes Energy Upgrades Program
- Energy Efficient New Homes Program
- Upgrades Program for Multi-Unit Residential Buildings
- Retrofit Program for low-income households

More information regarding Efficiency New Brunswick can be found at its website http://www.efficiencynb.ca.

3.0 GENERATION RESOURCES

3.1 Existing Generation Resources

New Brunswick's generation plants comprise one of North America's most diverse generating systems. The mix of fuel types includes oil, hydro, nuclear, coal, natural gas, biomass, diesel powered stations, and wind. Table 4 lists the New Brunswick generators along with their fuel types and capacities as of January 1, 2010.

Table 4: New Brunswick Generation Resources

Plant	Unit	Type	Net Capacity MW	Notes
Point Lepreau	1 SG1&2	Nuclear Diesel	660 5	Refurbishment Apr 2008 – Feb 2011
Belledune	2	Coal	457	
Coleson Cove	1,2,3	Oil	972	
Dalhousie	1 2	Oil Oil	96 203	
Bayside	6	Natural Gas	263	Capacity includes combined cycle operation
Grand Lake	8	Coal	57	Retired Mar 2010
Grand Manan	3	Diesel	29	
Millbank	1 2 3 4	Diesel Diesel Diesel Diesel	99 99 99 99	 Tied to sale contract until Nov 2011 Tied to sale contract until Nov 2011
Ste Rose	1	Diesel	99	
Grandview	1,2	Natural Gas	90	
Frasers	1	Biomass	39	
St. George	1,2	Hydro	16	
Musquash	1,2	Hydro	5	Retired Jan 2010
Mactaquac	1 2 3 4 5 6	Hydro Hydro Hydro Hydro Hydro Hydro	110 110 110 115 112 112	
Beechwood	1 2 3	Hydro Hydro Hydro	36 36 41	
Grand Falls	1 2 3 4	Hydro Hydro Hydro Hydro	16 17 16 17	
Tobique	1 2	Hydro Hydro	10 10	
Nepisiguit	1,2,3	Hydro	11	
Sisson	1	Hydro	9	
Milltown	1	Hydro	4	
Kent Hills		Wind	29	96 MW @ 30% capacity credit
Caribou		Wind	30	99 MW @ 30% capacity credit
TOTAL CAPACITY			**3678**	Total capacity as of January 2010, excluding Point Lepreau (refurbishment)

The bulk of the energy produced by hydro facilities usually comes during the spring run-off period when the snow melts in the watersheds in the upper reaches of the Saint John River. New Brunswick does not have major storage capability in its river system, and as a result, hydro facilities are not always fully available to supply at maximum power output on a continuous basis. The hydro system does serve a vital role in meeting short term peaking needs as well as providing immediate replacement power in the case of a sudden trip-off of another generating unit.

3.2 Changes in Capacity

The committed generation additions in this assessment include 54 MW of new wind project capacity from the Kent Hills Expansion in December 2010, and 660 MW of nuclear capacity by February 2011 due to refurbishment of Point Lepreau. Additional capacity also results from the termination of a 198 MW capacity export contract to Hydro-Québec in November 2011.

Generation retirements projected in this 10-year assessment include:

- 5 MW at Musquash (January 2010)
- 57 MW at Grand Lake (March 2010)
- 299 MW at Dalhousie (March 2011)

Recent announcements regarding committed generation additions include the following:

- The ongoing refurbishment of the 660 MW Point Lepreau Nuclear Station is now 16-months behind schedule. Its return to service date has changed from October 1, 2009 to February 1, 2011. Updates on the Point Lepreau refurbishment are provided at: http://poweringthefuture.nbpower.com
- NB Power has announced the following additional wind projects for New Brunswick:

Project Location	Size (MW)	Owner	In-service Date
Lamèque	49.5	Acciona	Delayed by developer
Aulac	64.5	Acciona	Delayed by developer
Kent Hills Expansion	54	TransAlta	December 2010

Table 5 provides a summary of the generation capacity changes from January 2010 to December 2012 with no changes forecast from 2012 to 2020.

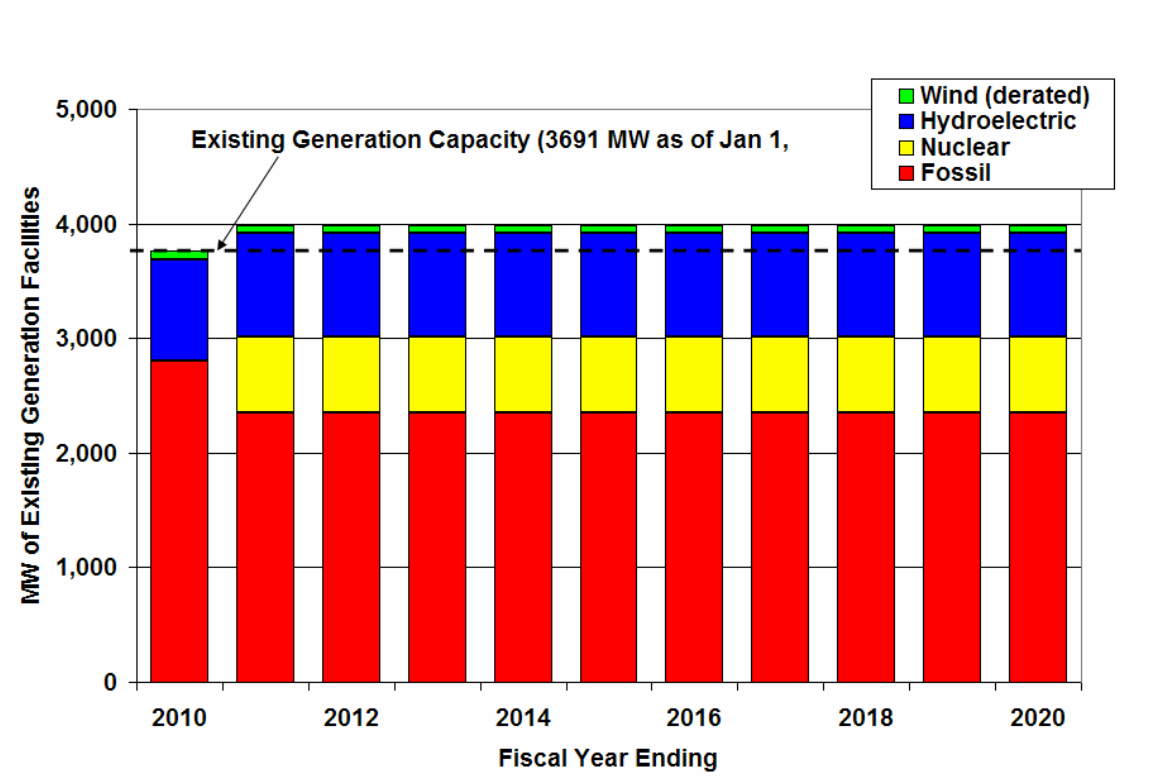
Table 5: Summary of New Brunswick Generation Changes

Year	January Capacity MW	December Capacity MW	Generation Capacity Change MW	Explanation
2010	3,678	3,632	-46	Grand Lake retired (-57 MW), Musquash retired (-5 MW), Wind capacity added (54 MW * 30% = +16 MW)
2011	3,632	3,993	+361	Point Lepreau refurbishment (+660 MW), Dalhousie retirement (-299 MW)
2012	3,993	3,993	0	No changes forecast from 2012 to 2020.

3.3 New Brunswick Generation Capacity Forecast

Figure 5 illustrates the forecast of generation facilities in New Brunswick until 2020 using the information listed in Tables 4 and 5.

Figure 5: Forecast of New Brunswick Generation Capacity



3.4 System Impact Studies

The Market Rules require NBSO to perform Connection Assessments for proposed projects that wish to connect to the SO-controlled grid at 69 kV or higher voltage. NBSO is required to conduct all System Impact Studies that are required for such projects. A

listing of completed and queued studies is available on the NBSO website at http://www.nbso.ca/Public/en/op/transmission/connecting/SIS.aspx

Connection Applications for System Impact Studies are placed into two separate queues; (i) the generation SIS queue, and (ii) the load and Point-to-Point SIS queue. The generation SIS queue includes all projects that involve the connection of new non-embedded generation to the SO-controlled transmission grid. The load and Point-to-Point SIS queue includes all other projects, including the connection of load projects, embedded generation projects, and assessments of new Point-to-Point transmission service.

Table 6 shows the System Impact Study list of queued projects as of April 1, 2010.

Table 6: NBSO List of Queued System Impact Studies (April 1, 2010)

Number	Project Name	Project Location	Project Size (MW)	Project Type	Company Name	SIS Initiation Date
1	McAdam Wind Farm	McAdam, NB	52	Generation	FPLE Canadian Wind, ULC	Aug 3, 2007
2	Mann Siding Wind Farm	St. Quentin, NB	150	Generation	Shear Wind Inc.	Aug 30, 2007
3	Caribou Mines Wind Farm Phase II	Caribou, NB	101	Generation	Ventus Energy Inc.	Aug 31, 2007
4	Grand Manan Wind Project	Grand Manan, NB	21	Generation	Dark Harbour Wind Inc.	Jan 28, 2008
5	Benjamin Wind Project	Benjamin, NB	150	Generation	Shear Wind Inc.	May 23, 2008
6	Kent Hills Expansion	Kent Hills, NB	54	Generation	TransAlta	Dec 21, 2009
7	70 MW Load Increase at Penobsquis	Penobsquis, NB	70	Load	Potash of Saskatchewan	Jan 7, 2010

3.5 Impact of Greenhouse Gas Emissions

On May 9, 1992, Canada was one of 150 world governments to adopt the United Nations Framework Convention on Climate Change. Building upon the climate change convention, the world governments adopted the Kyoto Protocol with its legally binding constraints on greenhouse gas (GHG) emissions in 1997. Canada has ratified the Kyoto Protocol on climate change with a commitment to reduce greenhouse gas emissions by 6% of 1990 levels during the period between 2008 and 2012. Russia ratified the Kyoto Protocol in December, 2004, and it came into effect February 16, 2005.

While New Brunswick accounts for 3% of Canada's GHG (2006), all jurisdictions will be called upon to address climate change. Approximately 93% of New Brunswick's 18 million tonnes of carbon dioxide emissions come from the combustion of fossil fuels with electricity generation accounting for 38% or 6.4 million tonnes.

In addition to the Kyoto Protocol, the New England Governors and Eastern Canadian Premiers agreed in 2001 to a Climate Change Action Plan to reduce regional GHG in a cost effective manner while maintaining reliable energy supplies. That plan set regional reduction targets as follows:

- Reduce regional GHG emissions to 1990 emission levels by 2010;
- Reduce regional GHG emissions by at least 10% below 1990 emissions by 2020 and establish a five-year process in 2005 to adjust or establish future emissions reductions goals; and
- Reduce regional rate of emissions by 20% per MWh by 2025 from the 2000 rate.

A GHG reduction plan for Canada was released by the Federal Government in March 2008. Key points of this plan for the electricity sector include:

- Targeting an initial 18% intensity reduction using 2006 as a base year.
- Adding 2% intensity reduction per year for next 10 years to 2020.
- An additional requirement for the electricity sector is a 25 million tonne GHG reduction that could come from various new projects, including East-West transmission, Lower Churchill Project, Peace River, new nuclear, etc. Nothing has yet to be determined but opportunities for New Brunswick and Atlantic Canada are possible.
- No regulations are currently written so details of specific implementation, trading mechanisms, offset credits, etc., are still needed.
- There is also a long-term reference to 2050 that suggests the electricity sector will need to reduce 90% from its 2006 levels of GHG emissions.

Meeting the targets of this plan will be a major challenge for New Brunswick and put pressure on its continued use of fossil generation. The 2006 base year is especially challenging for New Brunswick as the 2006 GHG intensity factor was well below average because of above average nuclear and hydro generation. NBSO will track these GHG regulations as they are implemented in order to analyze their impact on system adequacy.

In January of 2009, the NBSO started publishing the average monthly GHG intensities of the generation units that it dispatches. The information is included in the NBSO's "Monthly Market Report" which can be found at:
http://www.nbso.ca/Public/en/op/market/data/reports/report_List.aspx?path=\market%20reports%20(en)

In September 2008, the Province published the report "Climate Change Action Plan 2007-2008 Progress Report." This report is a follow up to the June 2007 New Brunswick

Climate Change Action Plan (NBCCAP) that targeted a reduction in New Brunswick GHG emissions by 5.5 megatonnes (Mt) annually in 2012. Initiatives involving the electricity sector cited in this report include the following:

- NB Power has committed to purchasing 400 MW of wind-generated electricity by 2010.
- The Department of Energy initiated a study to develop a Community Wind Energy Program for New Brunswick.
- An analysis of the potential for tidal power generation has been completed, and a Strategic Environmental Assessment was undertaken to assess further opportunities.
- The Department of Natural Resources released a new policy on allocation of Crown lands for research in support of in-stream tidal power generation. Following a call for proposals, Crown land leases were offered to Irving Oil, in partnership with the Huntsman Marine Centre, to explore tidal power generation in the Bay of Fundy.
- The Department of Energy continued to lead an interdepartmental committee to assess the opportunities for bio-energy from the forest, agricultural sources and waste material.

A copy of this report is published on the Province's website at:
http://www.gnb.ca/0009/0369/0018/0004.e.pdf

4.0 RESOURCE ADEQUACY

4.1 Operating Reserve Criterion

NBSO is responsible for determining the capacity needs of the integrated electricity system, and for ensuring that Market Participants procure and provide sufficient capacity to meet these needs. The capacity required by the system is the sum of the NBSO forecasts for load, required reserve, and firm capacity sales. The capacity available to the system is the sum of the installed capacity, firm capacity purchases, and interruptible load, minus any capacity that is derated or unavailable due to a planned maintenance outage.

NBSO regularly performs assessments of operational resource adequacy for each capability period and for the next 18 months (conducted semi-annually). The main operational criterion is to have sufficient reserve capacity to meet 100% of the largest contingency plus 50% of the next largest contingency.

A seasonal assessment takes place six months prior to the start of each winter or summer capability periods. The winter capability period starts November 1 and ends March 31. The summer capability period starts April 1 and ends October 31. NBSO forecasts the capacity requirements for the total system for the respective capability period and allocates those requirements to all load-serving Market Participants on the basis of their non-coincident peak demands. It is then the responsibility of the load-serving Market Participants to demonstrate to the satisfaction of NBSO that they have secured capacity equal to or in excess of their individual capacity obligations at least four months prior to the start of the capability period.

4.2 Planning Reserve Criterion

To assess the long-term generation resource adequacy of the system, NBSO applies a capacity based reserve criterion that is equal to the higher of the largest contingency or 20% of the firm load.

As a member of the Northeast Power Coordinating Council (NPCC), NBSO also reports its resource adequacy with respect to meeting the NPCC generation reliability criterion, which states:

> The probability (or risk) of disconnecting firm load due to resource deficiencies shall be, on average, not more than one day in ten years as determined by studies conducted for each Resource Planning and Planning Coordinator Area. Compliance with this criterion shall be evaluated probabilistically, such that the loss of load expectation (LOLE) of disconnecting firm load due to resource deficiencies shall be, on average, no more than 0.1 day per year. This evaluation shall make due allowance for demand uncertainty, scheduled outages and deratings, forced outages and deratings, assistance over interconnections with neighboring Planning Coordinator Areas, transmission transfer capabilities, and capacity and/or load relief from available operating procedures.

NBSO submits a comprehensive resource adequacy review to NPCC every three years, and interim reviews of resource adequacy are submitted in the years subsequent to completing the comprehensive review. In the most recent comprehensive review, the *2007 Maritimes Area Comprehensive Review of Resource Adequacy* [1], it was found that the 20% planning reserve criterion used by the Maritimes Area combined with 50 MW of additional capacity provided through interconnection support would meet the NPCC criterion for the existing system. This confirmed that the NBSO capacity based criterion is acceptable under the NPCC criterion.

4.3 Load and Resources Review

The load and resources review looks at whether the sum of the generation resources and non-firm industrial load customers are adequate to meet the sum of the forecast requirements for peak load, firm interconnection contracts, and required planning reserve. A surplus indicates that the planned resources are adequate, whereas a deficit indicates that the planned resources are not adequate.

Table 7 summarizes the load and committed resources from 2010/11 to 2019/20.

Table 7: Load and Resources Review for New Brunswick 2010/11 to 2019/20

		Fiscal Year Ending									
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
A	Load Forecast	3,030	2,970	2,990	3,020	3,060	3,080	3,110	3,140	3,170	3,210
B	Non-Firm Industrial	39	39	39	39	39	39	39	39	39	39
C	Required Reserve C = 20%*(A - B) or largest generator*	630	630	630	630	630	630	630	630	630	634
D	Interconnection Contracts (+Export/-Import)	270	100	87	50	50	50	50	50	50	50
E	Total Supply Resources excluding Wind	4,213	3,914	3,914	3,914	3,914	3,914	3,914	3,914	3,914	3,914
F	Committed Wind	249	249	249	249	249	249	249	249	249	249
G	Committed Wind (@ 30% capacity credit)**	75	75	75	75	75	75	75	75	75	75
H	Total Supply Resources including Wind H = E + G	4,288	3,989	3,989	3,989	3,989	3,989	3,989	3,989	3,989	3,989
I	(+Surplus/-Deficit) I = H + B – A – C – D	397	329	322	329	289	269	239	209	179	135
J	Projected Wind***	0	75	75	75	75	75	75	75	75	75
K	Projected Wind (@	0	23	23	23	23	23	23	23	23	23

	30% capacity credit)**										
L	Projected (+Surplus/-Deficit) L = I + K	397	352	345	352	312	292	262	232	202	158

* From 2011 to 2019, the largest generator is calculated to be 630 MW, based upon the 660 MW Point Lepreau minus a 30 MW participation agreement with PEI (Maritime Electric)

** Wind capacity values are derated according to the NB Energy Market Rules. Wind projects in New Brunswick have their capacity values derated to their seasonal (winter and summer) capacity factors. The purpose of derating wind capacity is to approximate its reliability contribution to the grid, and 30% is a conservative estimate of the expected capacity factor of a new wind project. Once a wind project is built and its seasonal capacity factors demonstrated, its accredited capacity is adjusted accordingly.

*** The projected wind capacity of 75 MW by 2011/12 is the initial phase of the Community Energy Policy announced by the Province in February 2010.

Projected Demand Side Management (DSM) numbers from Efficiency New Brunswick are incorporated into the base load forecast. This projected efficiency results in a 75 MW reduction in demand by 2018/19 and a 366 GWh reduction in energy by 2018/19. These estimates are related to the following programs:

- Existing Homes Energy Upgrades Program
- Energy Efficient New Homes Program
- Upgrades Program for Multi-Unit Residential Buildings
- Retrofit Program for low-income households

The projected wind capacity of 75 MW by 2011/12 is based upon the initial phase of the Community Energy Policy announced by the Province in February 2010.

Wind capacity values are derated according to the NB Electricity Market Rules, where wind projects in New Brunswick have their capacity values derated to their seasonal (winter and summer) capacity factors. The purpose of derating wind capacity is to approximate its reliability contribution to the grid, and 30% is a conservative estimate of the expected capacity factor of a new wind project. Once a wind project is built and its seasonal capacity factors demonstrated, its accredited capacity is adjusted accordingly.

Other than NB Power Distribution and Customer Service Corporation's (DISCO) obligation to provide standard offer service, there is no prescribed requirement under the Market Rules for specific Market Participants to make up any deficit indicated by this long term review. The purpose of the 10-year load and resources review is to provide information to Market Participants and potential Market Participants of any forecasted deficiency. Similarly, the results of the 18-month assessments do not prescribe actions by specific Market Participants or trigger sanctions, but do provide important information to NBSO and the marketplace about impending deficits.

As noted in Section 6.1, both winter and summer capability periods are assessed. The Market Rules require Market Participants for load facilities to secure capacity resources equal to or greater than their obligation four months prior to each capability period. Non-compliance on the part of a Market Participant may lead to sanctions.

4.4 Strengths and Weaknesses

The geography of New Brunswick provides significant advantages towards the development of a vibrant energy market. An advantage for new thermal power projects is that they can be sited at many high quality coastal locations in the province that have access to low temperature cooling water. Another geographic advantage is that the strong interconnections between New Brunswick and neighbouring power systems in Québec, New England, Nova Scotia, Prince Edward Island, and Northern Maine enhance the opportunities for New Brunswick Market Participants to buy and sell power. These opportunities are also enhanced due to the seasonal diversity of the winter peaking New Brunswick load and the summer peaking New England load.

The cost of electrical supply in New Brunswick is stabilized with a diversified generation mix of hydro, nuclear, wind, and thermal sources. However there is a weakness in the lack of indigenous power generation resources, especially hydro power reservoirs and low cost, low sulphur coal reserves. Extensive reliance on thermal generation leads to high dependency on thermal fuels that can be subject to disruption in supply, wide price swings and the need to meet stringent emission standards.

The geographic dispersion of the people of New Brunswick and the lack of population density makes for a complex and sophisticated transmission system connecting generating stations to substations distributing electricity to customers throughout the province.

5.0 TRANSMISSION SYSTEM

5.1 System Evolution

The existing transmission has evolved over the past century. It began mainly as 69 kV lines connecting small generating stations to municipal distribution systems in the first half of the 20th century. Following the Second World War as loads grew and additional stations were constructed, the 138 kV system was expanded to form a figure eight network around the province by the 1960s. Expansion continued into the early 1970s with completion of a 230 kV tree connecting from the northeast (Dalhousie-Bathurst-Newcastle) area to Keswick in the west and across the province past Grand Lake to Salisbury in the southeast. The main bulk system voltage increased to 345 kV with the completion of the New England interconnection and the Coleson Cove Generating Station in the late 1970s. Through the 1980s and 1990s the 345 kV system has expanded to encircle the province and extend into Nova Scotia.

Today the system is very robust with generation dispersed at different system locations and sufficient transmission capacity to economically dispatch generation for exports as well as all in province load levels. As a result congestion is rare except under extreme contingency conditions and power can be transferred in significant quantities in all directions.

5.2 Interconnections to External Systems

New Brunswick is interconnected to neighbouring power systems in Québec, New England, Nova Scotia, Prince Edward Island, Northern Maine, and Eastern Maine. Similar to the development of the internal transmission system these interconnections have evolved over time. The first interconnections were constructed at the 69 kV and 138 kV levels with the Maine Public Service Company (MPS) in Northern Maine and Nova Scotia Power Inc in the 1950s. The initial interconnections with Québec, New England and Prince Edward Island were completed as part of the major transmission expansions of the 1970s. Addition of the 345 kV interconnection to Nova Scotia and a second Québec interconnection occurred in the 1980s. Further expansion of the New England interconnection with a second 345 kV transmission line occurred in 2007/08.

The two interconnections with Québec are through High Voltage Direct Current (HVDC) stations and there is the ability at each to radially connect a portion of the New Brunswick load directly to the Québec system. This enables increased transfer capability from Québec to New Brunswick. All other interconnections are synchronous AC transmission lines and they connect the Maritimes Area systems as part of the very large Eastern Interconnection of North America.

Table 8 shows the transfer capability between New Brunswick and its neighbouring systems.

Table 8: Interconnection Transfer Capability

Neighbouring System	Transfer Capability to New Brunswick (MW)	Transfer Capability from New Brunswick (MW)
Québec	1000	691
New England	550†	1000
Nova Scotia	350††	300††
Prince Edward Island	124	222
Northern Maine	100	90
Eastern Maine	15	15

† transfer capability from New England varies according to New Brunswick's largest contingency, load levels in Maine, status of area 345 kV MVAR resources, and the generating status of units near Orrington, Maine.

†† transfer capability to and from Nova Scotia is constrained by the import and export limits of the Nova Scotia electricity system.

6.0 TRANSMISSION PLAN

6.1 Transmission Planning Responsibilities

The Transmission Plan represents an analysis of the existing high voltage transmission network, and the development required to meet the forecast load in compliance with the established transmission planning criteria.

NBSO is responsible for ensuring that the integrated electricity system, at all times, has adequate capacity to satisfy all applicable reliability criterion. NBSO is also responsible for addressing congestion issues that impact the efficient operation of the Electricity Market.

NBSO, upon identifying a system adequacy issue or a congestion issue, will consult with Transmitters and Market Participants to develop technically feasible options for addressing the issue. These options will then be published on the NBSO website, along with a notice of intent by NBSO to request proposals to resolve the issue. Transmitters and Market Participants may then participate in a formal Request for Proposals (RFP) process leading to the final selection by NBSO of the preferred project.

6.2 Transmission Planning Criteria

The New Brunswick bulk transmission system is planned, designed and operated in accordance with single contingency criteria. The overall system quality of supply, as it relates to frequency and duration of interruption to customers and/or generation and voltage magnitude and waveform, is primarily a function of the accepted System Design Criteria in Appendix A.

NBSO policy is to use the transmission planning criteria widely accepted and used by North American utilities, and the system reliability criteria to which NBSO is obliged to conform through its participation in NPCC. NPCC's role in monitoring conformance with the *NPCC Design and Operation of the Bulk Power System* [2] is limited to those instances where non-conformance could result in adverse consequences to more than one Area.

These criteria can be summarized as follows:

1. Voltage Criterion

   Under all normal (no contingency) heavy or light load operating conditions, there should be sufficient reactive support to enable the 230 kV and 138 kV load bus voltages to be held in the range of 95% to 105% of rated value. This includes the condition of peak load in combination with maximum hydro generating capability and also the condition of reduced load (50% variable + 100% industrial load) in combination with minimum hydro generating conditions.

2. Single Contingency Criterion

A single contingency is defined as an event leading to the loss of one or more system components. The most common interpretation of this definition is the assumption of the loss of one transformer or one transmission circuit or one generator. The loss of both circuits on a double circuit structure is considered a single contingency as required by NPCC for stability tests.

Each 138 kV area load should have less than one 1.0 hour/year expected outage on the loss of the most significant supply. For evaluation under this criterion, all transmission line loadings shall be within the limits where the CSA Code ground clearances can be maintained, and/or the conductor does not exceed 100 ºC, at 2 feet/sec. wind speed.

Under single contingencies, transformers can be loaded up to 119% of their forced cooled 65 ºC rating during the winter months when ambient temperatures does not exceed zero ºC.

6.3 Transmission Planning Methodology

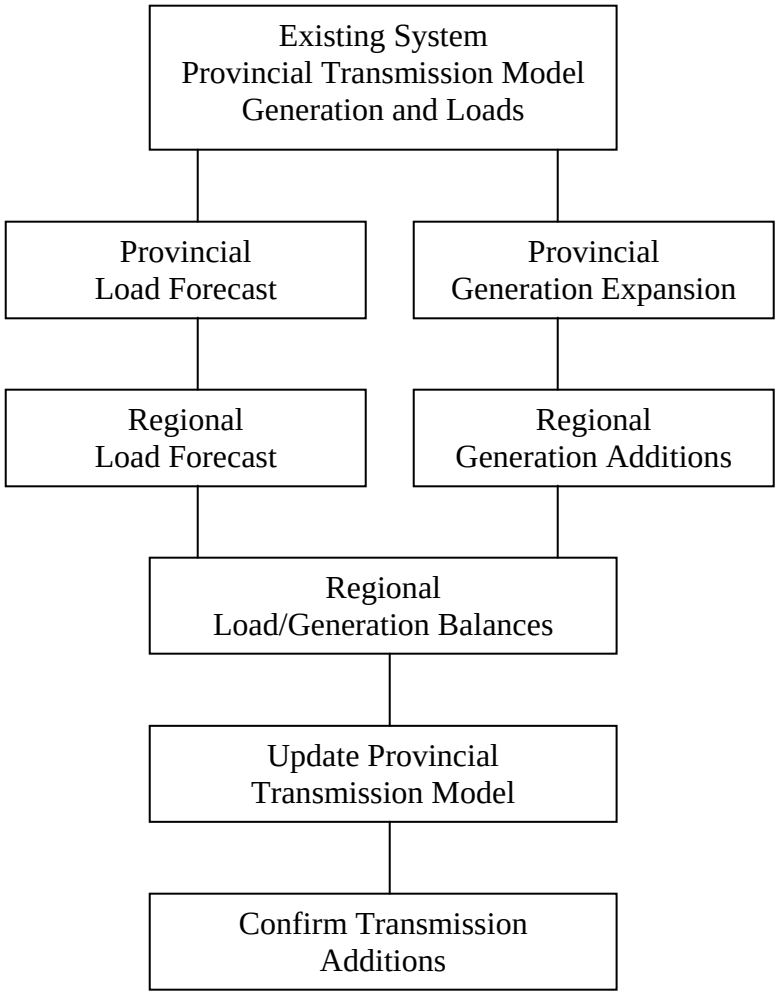
The NPCC Design and Operation of the Bulk Power System, upon which are based the design of the 345 kV (Bulk) Transmission expansion, is available at http://www.npcc.org/ .

The planning of the major transmission system has to respond to the forecast load growth and the integration of new generating stations. The objective of transmission planning is, therefore, twofold. It has to satisfy both the transmission of power from generating stations to load centres, and the interconnection and integration of generating stations to enable economic and reliable utilisation of the generating capability available to the market.

In the process of transmission planning, the geographic location of loads and generating stations play a role equally important to that of the magnitude of load and capacity of generating stations. Moreover, the planning methodology has to address imbalances between load and generation in any region as well as dynamics (e.g. fault conditions, stability) in order to provide reliable supply to customers.

Figure 6 illustrates the transmission planning process.

Figure 6: Transmission Planning Process



There are three inputs to the transmission planning process.

1. A computer model of the base year for the existing system is required that includes generation, loads, transmission lines and substations. This model simulates generating unit capacities, loads concentrated at load centres, transmission lines and transformers with their transmission characteristics and capabilities. This model, commonly referred to as the load flow model, is used to test the system for satisfactory transmission capability.

2. The second component is the load forecast. The in-province load forecast provides year by year prediction of loads at existing and future substations down to the 69 kV transmission level. Load information is compiled on individual substation peak loads that may or may not occur at the time of system peak. The prediction of sales to and purchases from neighbouring

utilities, based on actual contracts and expected sales or purchases is also an important aspect of the forecast.

3. The third component is the size and location of the present and proposed future generating units and stations.

As major transmission requirements are related to the balance of loads and generation in a geographic region, the first step in planning is to allocate loads and generation to regions. Such regions or transmission planning areas are defined on the basis of general load concentrations. The five regions in New Brunswick defined by the NB Power Transmission Corporation (TRANSCO) for major transmission planning purposes are:

1.	Northern	including, Miramichi, Bathurst, Caraquet, Belledune, Eel River and Dalhousie
2.	Western	including Edmundston, Iroquois, Saint Andre, Grand Falls, Beechwood and Woodstock
3.	Central	including Keswick, Fredericton, Millville, Grand Lake, Marysville and Mactaquac
4.	Southern	including Saint John, Courtenay Bay, Pennfield, Oak Bay, Coleson Cove, Norton and Point Lepreau
5.	Eastern	including Salisbury, Moncton, Memramcook and Murray Corner

The loads and generating capabilities are allocated to the above regions annually during the planning period and the balance, positive or negative, is a measure of transmission capability required into the region to meet load demand or out of the region to transmit surplus generation. This balance is calculated not only for the annual peak hour demand, but also for intermediate load levels.

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The regional balances give an indication of the magnitude of transmission requirements and provide an appreciation of the long-term variation of such requirements.

To ensure an adequate level of reliability in the northeast part of the continent and across North America, criteria have been established to guide utilities in the design, operation and maintenance of their power systems. Member areas of NPCC agree to abide by guidelines and criteria that have been established by experience over the years. It is these guidelines that form the basis for operation and maintenance of the bulk power system in New Brunswick.

The essential requirement is to provide service continuity to customers, and to avoid jeopardising the reliability of neighbouring power systems in the event of loss of a major

transmission component, line or transformer, or loss of a generating unit. This is commonly referred to as the 'single contingency' planning criterion.

6.4 Transmission Development 2010 to 2020

This section summarizes the future project plans for the New Brunswick transmission system. Under Market Rule 9.4, third parties may contact NBSO to bid on or propose alternatives to projects identified in this report. Alternative solutions may include, but are not limited to, transmission, generation, distribution, and energy efficiency projects.

Each of the transmission projects listed in this section includes the primary driver of the project, as well as the cost category for the future projects. Cost categories are based on preliminary estimates only, and are assigned as follows:

Table 9: Transmission Project Cost Categories

Category Number	Estimated Cost Range
1	0 to 2 Million
2	2 to 5 Million
3	5 to 10 Million
4	10 to 20 Million
5	20 to 50 Million
6	50 to 100 Million
7	100 to 200 Million
8	200 to 500 Million

The following transmission projects are grouped as follows:

- Planned Transmission Infrastructure Upgrades
- Planned Transmission Infrastructure Upgrades Required due to Substation Changes
- Transmission Infrastructure Upgrades Under Study

Planned Transmission Infrastructure Upgrades

The following projects are required to maintain the reliability of the NB Power system to meet the forecast system loads, forecast generation supplies, and the forecast import and export requirements with neighbouring utilities.

Norton Terminal 138/69 kV Transformer

A 138/69 kV transformer rated at 65 MVA will be installed at Norton in 2010 and connect into 69 kV line 0003. This reinforcement to the supply to line 0003 will allow the removal of the Brookville Switching Station which is at the end of its life.
Cost Category: 2

Moncton 138 kV Bus Re-configuration

In 2010, the Moncton end termination of 138 kV line 1156 will be moved from Bus 12 to Bus 11 and 30 Mvar capacitor bank C3 will be connected to L1157. This will allow the Moncton 138 kV Bus to be operated open at switch TSB11-B12 which will limit the loss of load for a breaker failure contingency at Moncton to 250 MW.
Cost Category: 1

Newcastle 138 kV Transformer T1 Breaker

138/69 kV transformers T1 and T2 at Newcastle are presently supplied from the same node on the Newcastle 138 kV bus. A new 138 kV breaker will be added at the Newcastle Terminal in 2010 to allow these transformers to have separate supply nodes. The new breaker will improve the reliability of the supply to T1 and T2. These transformers supply all of the 69 kV substations in the Miramichi region.

Cost Category: 1

Grand Lake Terminal Rebuild

The Grand Lake Plant will be shutdown in the summer of 2010. Due to the age of equipment at the Grand Lake Terminal and the physical location of the some of the equipment in the 69 kV terminal yard, following the shutdown of the Plant, the Grand Lake Terminal will be rebuilt. This rebuild will include a relocation of the 69 kV terminal yard and replacement of all breakers, switches, and associated control and protection. As part of the rebuild project, 69 kV line 0142 will be terminated with its own breaker position (line 0142 is presently tapped off line 0006 just outside of the Grand Lake Terminal). The rebuilt terminal will be in service in 2011.

Cost Category: 2

Line 0112 Extension to Nepisiquit Falls

A new 16 km extension of 69 kV transmission line 0112 will be constructed in 2011 to connect into the Nepisiquit Falls Generating Station. A new 69 kV terminal will also be constructed at Nepisiquit Falls to terminate the extension of line 0112.

Cost Category: 1

L0045 Cable Replacement

Line 0045 underwater cable from St. George to Grand Manan is to be replaced in 2018. The cable will be 40 years old at that time and will have reached its maximum life expectancy.

Cost Category: 5

Planned Transmission Infrastructure Upgrades Required due to Substation Changes

The following projects require infrastructure changes to the transmission system to facilitate the planned changes to distribution system substations. The cost category only includes costs associated with the transmission infrastructure upgrades.

Supply to Claudie Road 69 kV Substation

A new substation will be built on the Claudie Road in Fredericton in 2010. The new substation will off-load the Nashwaaksis Substation. This substation will be built directly under the existing 69 kV line 0020 and will require some changes to the structures on line 0020 in the vicinity of the substation as well as a set of drop leads into the substation.

Cost Category: 1

Supply to Sweeney Lane 138 kV Substation

The existing Sweeney Lane substation in Miramichi is supplied at 69 kV from line 0009 and has two 69/12.47 kV transformers rated at 8.4 MVA each. A new 138/12.47 kV transformer rated at 16.8 MVA will be added to the existing 69 kV substation to off-load the existing transformers. This will require transmission to build a new 138 kV supply into the Sweeney Lane substation. This supply will be a tap off 138 kV line 1203 and approximately 1 km in length. The routing for the tap will be completed in 2010 and constructed in 2011.

Cost Category: 1

Transformer Replacement at Rexton Substation

The existing Rexton substation is supplied at 138 kV from line 1118 and has one 138/12.47 kV transformer rated at 8.4 MVA. This transformer is being replaced with a 20 MVA transformer in 2010 for increased capacity at the substation. The existing transmission supply to the transformer is via fuses. As part of the transformer replacement, the fuses are being replaced with a circuit switcher. This will require a reconfiguration of the transmission supply into the substation to accommodate the circuit switcher.

Cost Category: 1

Removal of Supply to Dorchester Substation

The Dorchester Cape substation will be removed from service in 2010. The load supplied by the substation will be supplied from the nearby College Bridge substation. The present supply into Dorchester Cape substation is via 69 kV line 0118, which is 15 km in length. This line will be decommissioned and dismantled.

Cost Category: 1

Supply to Nepisiquit Falls Substation

A new 69 kV substation will be built near the Nepisiquit Falls generating station in 2011 to supply local area loads that are currently supplied via the local 33 kV system. This will require a 100 meter tap be constructed off of the yet to be constructed line 0112 tap into the Nepisiquit Falls Generating Station terminal to supply the new substation.

Cost Category: 1

Supply to Elliot Road Substation

A new substation will be built on the Elliot Road in Quispamsis in 2012. The new substation will consist of two transformer bays and initially have one 138/12.47 kV transformer with a rating of 16.8 MVA. This substation will provide a new source for load growth in the area. This substation will be built directly under the existing 138 kV line 1163 and will require some changes to the structures on line 1163 in the vicinity of the substation as well as a set of drop leads into the substation.

Cost Category: 1

Supply to Charles Lutz Substation

A new substation will be built on Charles Lutz road in Moncton in 2013. The new substation will consist of two transformer bays and initially have one 69/12.47 kV

transformer with a rating of 10 MVA. This substation will provide a new source for load growth in the area. The substation will initially be supplied at 69 kV, but will be built to 138 kV standards to allow for an upgrade of supply to 138 kV in the future. This substation will be built directly under the existing 69 kV line 0010 and will require some changes to the structures on line 0010 in the vicinity of the substation as well as a set of drop leads into the substation.
Cost Category: 1

Supply to Neguac Substation
A new substation will be built to replace the existing Neguac substation in 2014. The new substation will be approximately 1 km in distance from the existing substation and will initially be supplied at 69 kV, but will be built to 138 kV standards to allow for an upgrade of supply to 138 kV in the future. The substation will have one 138/69/12.47 kV transformer rated at 16.8 MVA. This will require a new 3.5 km section of transmission line be built tapping off of line 0104 to supply the new substation. This section of line will be built to 138 kV standards to allow for the future upgrade of the supply to the substation to 138 kV. This will also allow the removal of the approximately 3 km of 69 kV line 0104 which supplies the existing Neguac substation.
Cost Category: 1

Transmission Infrastructure Upgrades Under Study

The following projects may be at various stages of study and the final plans for infrastructure upgrades have not yet been established.

Eel River HVDC Station Refurbishment
Eel River HVDC was commissioned in 1972 and was built as the world's first solid state back-to-back converter stations. There has been no major refurbishment done to the station except for the replacement of the converter transformers in the mid-1980s due to a design defect. A recent engineering study of the Eel River facility recommended the replacement of the HVDC converter stations controls and the upgrades of the air cooled thyristor valves with conventional liquid cooled thyristor valves. The planning and timing for this project is under review.

L0070 Loading
The peak loading on line 0070 has reached its maximum design rating. Line 0070 supplies the Edmundston East, Edmundston North, Baker Brook, and Clair substation loads. Various alternatives including transmission and distribution upgrades are being explored to reduce the loading on line 0070.

Dalhousie Plant Options
A planning study is under way to identify the transmission system upgrades which will be required to maintain the reliability of the power system if Dalhousie Plant is not operating.

Point Lepreau 345 kV Breaker

Historically, import limits to NB from Maine have been calculated based on the most limiting contingency in NB being the trip of the Point Lepreau Nuclear Plant. However, recent studies have identified a more limiting contingency. A fault on transmission line 3009 followed by a breaker failure protection operation which also trips the Point Lepreau Nuclear Plant is more limiting to the imports into NB from Maine. This contingency must be accounted for as dictated by applicable NPCC planning criteria. This contingency will result in a reduction of import limits by 200 MW from existing limits, which vary due to system conditions but range from 300 MW (firm) to 550 MW (non-firm) with all transmission elements in service. To mitigate the reduction in import limits, a new 345 kV breaker is proposed to be installed at the Point Lepreau terminal in series with existing breaker P3-5.

Moncton Area Loading

The load growth in the Moncton Area has exceeded that of other parts of NB in recent years. The existing 138 kV transmission lines into the Moncton Area are loaded near levels that are dictated by applicable planning criteria. Planning studies are under way to propose transmission solutions which will reliably supply the forecast Moncton Area loads into the future.

Southeastern Interface Loading

In recent years the load growth in Southeastern NB around the Greater Moncton Area has exceeded load growth in other areas of the province. This has resulted in increased reliance on the Dedicated Path Logic (DPL) Special Protection Scheme (SPS) as well as the Eastern Undervoltage Load Shedding schemes for the loss of 345 kV lines which supply Southeastern NB. Planning studies are on-going to propose transmission solutions which will reliably supply the forecast loads in Eastern NB and meet the current and future needs of the interconnections with PEI and Nova Scotia.

Tinker Transformer Replacement/Upgrade

A transformer replacement/upgrade at Tinker is being reviewed in the 2011 timeframe by Algonquin Tinker Genco. The current 138/69 KV transformer, built in 1968, has a nameplate rating of 50 MVA. The potential upgrade would see the rating increase to 100 MVA in order to alleviate Northern Maine congestion issues at the Tinker/NBSO interface. This project will be implemented in accordance with the requirements of the necessary reviews by the NBSO, Algonquin Tinker Genco and the Northern Maine System Administrator.

6.5 Life Extension of Transmission Lines

Once designed and constructed, transmission lines are inevitably affected by the effects of time, the environment, repeated mechanical and electrical loading, etc. Transmission system reliability incorporates dependability and security. Dependability relates to the continuity of electricity to customers. In the event of equipment failure, system security ensures that system failures are localized and long-term damage is minimized. As would be expected, older systems normally provide less reliability and security.

The New Brunswick transmission system uses four different voltage levels. Higher voltage transmission lines provide greater power carrying capacity and lower losses.

1. 345 kV for "bulk" transmission delivery

2. 230 kV and 138 kV for "underlay" transmission

3. 138 kV for “underlay” support as well as transmission delivery to local areas

4. 69 kV for transmission delivery to local distribution areas

The 345 kV transmission system is comprised of 1363 km of steel tower transmission lines that are relatively new and are forecast to provide sufficient capacity to ensure reliable, economic delivery of electricity for the current planning period.

The 230 kV transmission system has 540 km of transmission lines (wood poles) and the 138 kV transmission system comprises some 2404 km of transmission lines (majority wood poles) that are generally near the midpoint of their estimated 45-year useful life.

The 69 kV transmission system has 2497 km of transmission lines and transmits power to the majority of in-province loads. These facilities have an average age of 39 years.

The average age of the 138 kV and 69 kV facilities has created the need for a comprehensive maintenance program. NB Power Transmission has recognized this need and is in the middle of an eight year program designed to improve reliability and extend the useful life of the 69 kV lines. This program includes preventive maintenance activities, such as:

- pole replacement
- cross arm and guy wire replacement
- capping and butt treatment of older poles
- using the latest methodology to determine the remaining useful life

Plans have been implemented to carry out a similar program for the 138 kV and 230 kV transmission lines.

Contingency plans are in place in the event of the loss of any single element of the bulk transmission system. This requires the 230 kV and 138 kV underlay system to be maintained in top form.

7.0 REGIONAL SYSTEM DEVELOPMENT

Under the *Electricity Act* and the Market Rules, NBSO is responsible for undertaking and coordinating power system planning and development responsibilities to maintain and ensure the adequacy and reliability of the integrated electricity system for present and future needs, and for the efficient operation of the market. Studies and future scenario analyses are regularly conducted by NBSO to assess possible system and market impacts of potential local New Brunswick projects as well as potential major projects in neighbouring areas affecting the NBSO system.

In 2009/10, regional system development activities by NBSO were considerably focussed on a proposed energy agreement between the Province and Hydro-Québec. This proposed agreement, originally announced in October 2009 and later cancelled in March 2010, was to cause significant changes in New Brunswick related to electricity legislation, Market Rules, corporate structure of NBSO and the NB Power Group of Companies, ownership of utility assets, and operations. To ensure that power system reliability would be maintained after implementation of this agreement, it was necessary for NBSO to make preparations for changes to its internal systems and processes related to market and operational functions, and to facilitate any changes to the roles and responsibilities of Market Participants.

Details of the proposed agreement are contained in Section 7.1. Other sections in this chapter include the NBSO transmission planning workshop, the New Brunswick Community Energy Policy, PEI wind development, and a study regarding transmission and system operator options for Nova Scotia.

7.1 Proposed Energy Agreement between New Brunswick and Québec

On March 24, 2010 the Province announced that it will not proceed with an energy agreement with Hydro-Québec. A press release regarding this announcement is available at: http://www.gnb.ca/cnb/news/pre/2010e0405pr.htm

Previous to this announced cancellation, the Government of New Brunswick and Government of Québec (the "Parties") signed a Memorandum of Understanding (MOU) on October 29, 2009 whereby Hydro Québec (HQ) would acquire substantially all of the assets of NB Power (NBP). On January 20, 2010 the Parties announced an energy agreement (the "Agreement") that included some changes from the MOU.

With respect to adequacy and reliability of supply, the Agreement contained the following:

- HQ would acquire from NBP approx. 2000 MW of NBP generation assets, including
    - The 7 NBP hydroelectric generation assets
    - The diesel peaking units at Millbank and Ste. Rose.
    - The Point Lepreau Nuclear Station once the refurbishment is completed

- HQ would acquire from NBP firm transmission rights associated with these generation assets, including 670 MW to New England.
- NBP will retain ownership of generation facilities at Coleson Cove and Belledune and operate them for the benefit of HQ under the framework of tolling agreements.
- NBP will retain ownership of generation facilities at Dalhousie and Grand Lake, deemed as surplus facilities in the Agreement.
- NB Power will retain its ownership of the transmission and distribution assets.
- Under a long term power contract, HQ will provide to NBP 14 TWh of electricity per year.
- New Brunswick System Operator will continue to operate as an arm's length agency.

The Agreement included a scheduled closing date for the transaction on or about March 31, 2010. On Feb. 26, 2010 the Province announced a schedule whereby the legislation and detailed agreements for this deal would be submitted to the legislative assembly on March 31, 2010 with the objective to complete the legislative process by May 21, 2010.

A press release regarding the MOU is available at:
http://www.gnb.ca/cnb/news/pre/2009e1698pr.htm

A press release regarding the Agreement is available at:
http://www.gnb.ca/cnb/news/pre/2010e0073pr.htm

7.2 New Brunswick Transmission Planning Workshop

Within New Brunswick, NBSO is to undertake and coordinate power system planning and development responsibilities to maintain and ensure the adequacy and reliability of the integrated electricity system for present and future needs and for the efficient operation of a competitive market. An objective of the NBSO planning process is that it be coordinated, open, and transparent to all transmission customers and interconnected neighbours on a nondiscriminatory basis.

To carry out its objective, NBSO hosted a Transmission Planning Workshop on June 24, 2009. Approximately 125 persons attended with representation from all forms of stake holders including Government Regulatory/Environment and Department of Energy, transmission planners from Nova Scotia, New Brunswick, and Princes Edward Island, municipalities, members of the New Brunswick Market Advisory Committee, Load Serving Entities, Distribution Providers and large industry. Presentations at this workshop included transmission planning responsibilities, criteria, system needs and proposed projects, the facility connection process, and stakeholder involvement in transmission planning.

The 2009 workshop program can be seen using the following link.

http://www.nbso.ca/public/en/pm/news/article.aspx?id=8a1f7023-b597-47b5-b073-c5810ed562f5

Additional transmission planning workshops are to be hosted by NBSO on an annual basis. These future workshops may also include presentations from NBSO regarding its participation on various Northeast Power Coordinating Council (NPCC) committees, including the development of Transmission Planning Standards.

7.3 New Brunswick Community Energy Policy

On February 9, 2010 the Province released its Community Energy Policy regarding the participation of interested communities and First Nations in the development of community-owned renewable energy projects.

The initial phase will consist of 75 MW, of which 50 MW will be assigned to community-owned projects and the other 25 MW to First Nations projects. Approved projects will receive 10 cents/kWh for electricity produced beginning in 2010. After five years, the price of the electricity produced will increase with the consumer price index in New Brunswick.

To qualify under the policy, projects must not be larger than 15 MW in capacity. They must be majority-owned by First Nations, municipalities, co-operatives, not-for-profit organizations or institutions. New Brunswick-based private corporations and investors may be minority partners.

A press release for the Community Energy Policy announcement is available at:
http://www.gnb.ca/cnb/news/ene/2010e0178en.htm

7.4 PEI Wind Development

On October 26, 2009 it was announced that Maritime Electric (MECL) would be seeking proposals for the development of up to 130 MW of new renewable energy. 30 MW of this total would be purchased by MECL under a 20-year contract to supply the PEI domestic market, while the remaining 100 MW would be shipped for export along Maritime Electric lines but not subject to any guaranteed contract. The required in-service dates are October 1, 2012 for the 30 MW and October 1, 2013 for the 100 MW.

Bidding for this RFP closed on January 29, 2010, and MECL anticipates that contracts with successful bidders will be completed during spring 2010.

A press release for the MECL 130 MW Request For Proposals is available at:
http://www.gov.pe.ca/eef/index.php3?number=news&dept=&newsnumber=6626&lang=E

7.5 Study of Transmission and System Operator Options for Nova Scotia

The Government of Nova Scotia, through the Department of Energy (NS-DOE), contracted SNC-Lavalin to undertake an independent Transmission and System Operator Study (T&SO Study) to identify and assess the opportunities and challenges of an expanded provincial and regional transmission system; and to identify and assess various system operator alternatives. The main focus of the T&SO Study was to review, develop and assess the Province's public policy options for future transmission and system operator activities and decisions.

Amongst its recommendations, the T&SO study includes the following:

Discussions and policy definitions regarding the future scope of the electricity market in Nova Scotia, and to some extent in the whole Maritimes region, are needed before committing to a change in the SO arrangements for Nova Scotia.

Some key aspects that need to be considered in the discussions of a regional electricity market for the Maritime region were identified as:

- *Possibility of a regional approach to just wind integration as a first step towards a more comprehensive regionalization*
- *Improved access to regional interconnections by preventing the exercise of market power in allocating transmission capacity*
- *Elimination of rate pancaking*
- *Change to a public-good transmission concept*

A copy of the T&SO Study is available at:
http://www.gov.ns.ca/energy/resources/EM/renewable/NS-Transmission-SO-Options.pdf

8.0 SUMMARY OF RESULTS

Load Forecast

- The New Brunswick load forecast for the 10-year planning period has an average growth rate of 0.6% per year for system net energy. This equates to an overall increase of 843 GWh for the planning period.

- The load forecast has an average growth rate of 0.6% per year for the peak hour demand, an increase of 180 MW for the planning period.

Generation Resources

- As of January 2010 the total capacity of New Brunswick generation resources was 3,678 MW. The committed generation additions in this assessment include 54 MW of new wind project capacity from the Kent Hills Expansion in December 2010, and 660 MW of nuclear capacity by February 2011 due to refurbishment of Point Lepreau. Additional capacity also results from the termination of a 198 MW capacity export contract to Hydro-Québec in November 2011.

- NB Power has announced the following additional wind projects for New Brunswick:

Project Location	Size (MW)	Owner	In-service Date
Lamèque	49.5	Acciona	Delayed by developer
Aulac	64.5	Acciona	Delayed by developer
Kent Hills Expansion	54	TransAlta	December 2010

- Generation retirements projected in this 10-year assessment include:
  - 5 MW at Musquash (January 2010)
  - 57 MW at Grand Lake (March 2010)
  - 299 MW at Dalhousie (March 2011)

Resource Adequacy

- The load and resources review shows that the New Brunswick system will have sufficient generation resources to meet the in-province load obligations throughout the next 10 year period.

Transmission Projects

- Major projects in the planning period that impact the bulk transmission system include:
  - Refurbishment of the Eel River HVDC station is under review.

- Planning studies are on-going to propose transmission solutions that will reliably supply the forecast loads in Eastern NB and meet the current and future needs of the interconnections with PEI and Nova Scotia.
- Several other transmission projects are identified in this report to maintain supply reliability to customers served from the 138 kV and 69 kV systems.

Regional System Development

- Updates to regional system development in New Brunswick, as well as neighbouring areas, is discussed in chapter 7 of this report, and includes the following:
  - A proposed energy agreement between New Brunswick and Québec.
  - The 2009 New Brunswick Transmission Workshop hosted by NBSO.
  - The New Brunswick Community Energy Policy.
  - PEI wind development.
  - A 2009 study of transmission and system operator options for Nova Scotia.

9.0 REFERENCES

[1] *2007 Maritimes Area Comprehensive Review of Resource Adequacy,* Report approved by NPCC Reliability Coordinating Council March 5, 2008.

[2] *Design and Operation of the Bulk Power System*, Northeast Power Coordinating Council Regional Reliability Reference Directory #1, December 1, 2009