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Atlantic Energy Gateway Report on Regional Electricity System Operations

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APPENDICES

Executive Summary

- The Atlantic Energy Gateway (AEG) is an Atlantic Canada electricity and clean renewable energy project funded and coordinated by the Federal Government Department of Natural Resources Canada and The Atlantic Canada Opportunities Agency, with participation from the governments of the four Atlantic Provinces, four of the major regional utilities, and the Region's two system operators.

- The AEG is focused on contributing to achieving greater regional cooperation, benefits, and efficiencies among the various participants in the electricity and clean renewable energy sectors.

- The Atlantic Canada electricity industry can be described as three distinct systems: the Maritime Provinces system consisting of New Brunswick, Prince Edward Island, and Nova Scotia; the Island of Newfoundland; and Labrador.

- Electricity demand in the region is growing slowly and there is overcapacity in current generating capacity, which when combined with proposed new power projects, the expansion of energy efficiency programs, and provincial policies for clean renewable energy levels, increases the uncertainty for the outlook of the region's electricity operations.

- The profile of the Atlantic region electricity industry consists of crown-owned utilities in NB and NL, investor-owned utilities: NSPI in NS, and Fortis's subsidiaries in PEI and its retail distribution utility on the Island of Newfoundland. There are two system operators: the functionally unbundled NSP System Operator, and the independent NB System Operator. Each of the provinces has a provincially legislated utility regulator, and the federal government has the National Energy Board.

- Atlantic Canada is a relatively small electricity marketplace with approximately 8900MW of generating capacity, not counting the Upper Churchill Falls output of 5428MW, which is mostly exported to Quebec. Peak load demand for the region in 2010 was approximately 6700MW or 75% of capacity.

- The Atlantic region, like other jurisdictions, has introduced policies and legislated rules that relate to cleaner sources of energy and reduced impacts on air emissions, and these policies and rules are beginning to have an impact on the existing portfolio of generation assets in

all four Atlantic Canada provinces and on electricity costs, on future planning for new generation, and also on the operations and requirements of a regional transmission system.

- This Paper contains a description of the regulatory systems in place in the Atlantic Provinces, and also other relevant regulators including FERC, NERC, NPCC, and NEB. Increasing cooperation and coordination in the Atlantic Provinces will require the examination of a number of approaches to system operations in the northeast region of North America.

- Proposed new developments such as the Labrador Muskrat Falls hydro project, increased renewable power, expanded regional transmission between NB / NS, between NL / NS and PEI / NB, plus the implementation of FERC Order 1000 dealing with regional and interconnection planning, will likely require individual or multiple jurisdictions to review various components of the regional electricity system.

- As the Atlantic Provinces and utilities look to the future of system operations, the completion of new and expanded transmission capacity and linkages will be a very important factor in determining the needs for greater regional cooperation and shared opportunities to increase efficiencies and generate savings for consumers. A number of approaches to systems operations could be considered, collectively and individually, in addition to the changes that are currently underway with the "status quo": 1.) enhanced regional systems coordination; 2.) independent system administrator; and 3.) independent system operator.

- Planning in the Atlantic region is primarily within the control of the individual utilities, except in NB where the NBSO currently has the legal responsibility as resource planner and reliability planning coordinator. However, NBSO's role will be significantly changed under the recently announced NB "Energy Blueprint" which commits to integrating the independent system operator back into NB Power.

- The planning function is a key ingredient of the United States FERC and NERC regulatory planning functions, where significant effort is being placed on creating a standard that strengthens interconnection compatibility and reliability. Therefore as a member of NERC and being interconnected to the US system, the Maritimes Region must also meet the reliability standards of NERC.

- Increasing regional electricity and clean renewable energy cooperation could achieve potential efficiencies and cost benefits to consumers and industry, and expand economic opportunities and benefits for the region. Implementation considerations and some areas that could be reviewed in exploring increased coordination are:

    i. existing generation and transmission structures and policies;

    ii. examining opportunities for regional planning for expanded renewable energy sources to maximise market competitiveness;

    iii. planning for future system operations on a regional basis; and

    iv. harmonizing certain regulatory functions, while ensuring the Atlantic region maintains its close regulatory, reliability, and business relationships with the Northeast USA and related agencies.

- Increasing cooperation and coordination by the Atlantic Provinces' electricity sectors could become the start of an Atlantic Canada power market that is more competitive, both locally and internationally.

1. INTRODUCTION

The Atlantic Energy Gateway ("AEG") is an Atlantic Canada electricity and clean renewable energy project funded and coordinated by the Federal Government Department of Natural Resources Canada ("NRCan") and The Atlantic Canada Opportunities Agency ("ACOA"), with participation from the Governments of New Brunswick ("NB"), Prince Edward Island ("PEI"), Nova Scotia ("NS"), and Newfoundland and Labrador ("NL"); four of the region's major electrical utilities: New Brunswick Power Group of Companies ("NB Power"), Maritime Electric Corporation ("MECL"), Nova Scotia Power/Emera Inc. ("NSPI/Emera"), and Nalcor/Newfoundland and Labrador Hydro Corporation ("Nalcor/NLH"); and the region's two system operators: New Brunswick System Operator ("NBSO") and Nova Scotia Power System Operator ("NSPSO").

The AEG is focused on contributing to achieving greater regional cooperation, benefits, and efficiencies among the various participants in the electricity and clean renewable energy sectors through increased collaboration, discussion and analysis of existing utility assets, and future requirements including additional clean renewable energy resources for regional and export purposes.

The AEG participants have worked collaboratively over the past two years sharing existing information pertaining to the electricity systems, development of Atlantic Canada's clean renewable energy resources, and where necessary, undertaking new analysis to improve the understanding of the region's electricity industry.

Some of the major components of the AEG work included: workshops on individual energy components in each of the four Atlantic Provinces; working committees on functional sectors such as transmission, resource generation, system operations; meetings and conference calls; participation by industry experts; and a number of external studies designed to provide a strategic and factual foundation on topics such as renewable energy financing, renewable energy R&D, supply chain development, and a study of the Eastern Canada and Northeast United States marketplace for electricity.

This Overview Paper supports the belief that the Atlantic Provinces have the opportunities and the natural resource base to expand its diverse clean and renewable energy potential, and to improve the efficiencies of its existing electricity generation and transmission assets, for both domestic and export markets. The region's portfolio of existing and potential indigenous energy assets includes large scale hydro, natural gas, and traditional clean renewable energy sources such as wind, solar, tidal, biomass, and small-scale hydro, as well as nuclear, coal and oil-fired generation assets.

Overview Paper Methodology

This Overview Paper describes the main characteristics of the current Atlantic Canada electricity system, including Eastern Quebec and the appropriate interconnected areas of the Northeastern United States. It focuses primarily on the organizational and system operations structures, relationships, regulatory, and administrative elements that currently comprise the electricity sector of the three Maritime Provinces and Newfoundland and Labrador. The Paper also presents an overview of the main policy and implementation considerations that have been identified in assessing areas and alternatives for increased Atlantic regional electricity cooperation and expanded clean renewable energy opportunities

The Paper utilizes relevant information and analyses provided by the provincial governments, utilities and system operators in the various AEG workshops and meetings.

1). PROFILE OF THE ATLANTIC CANADA ELECTRICITY INDUSTRY

The Atlantic Canada electricity industry can be described as three distinct systems:

1.) the Maritime Provinces' system consisting of New Brunswick, Prince Edward Island and Nova Scotia, where NBSO is the Regional Reliability Coordinator for the three systems plus Northern Maine, since that region of Maine is connected to the rest of the United States transmission system though the NB Power system.

2.) The Island of Newfoundland, which is currently isolated from both the mainland of Canada and from Labrador.

3.) Labrador has a domestic electricity network that serves a very spread out, coastal, and interior load for a small population and industrial base. It also has the huge Upper Churchill Falls hydropower plant (5428MW) that supplies the iron ore mining industry of Labrador City-Wabush, while the vast majority of the Upper Churchill power is exported to Hydro Quebec under a long-term contract.

Ownership of the main utilities in Atlantic Canada varies: crown corporations operate in New Brunswick (NB Power), and in Newfoundland and Labrador there is both a crown corporation (Nalcor and NLH) and an investor-owned utility, Newfoundland Power ("NP"), a subsidiary of publicly listed Fortis Inc. ("Fortis"); in Nova Scotia, Emera is an investor-owned corporation and NSPI is its 100% owned subsidiary; and in Prince Edward Island the main utility is MECL, a subsidiary of Fortis.

In addition to the main regional utilities, there are a number of municipal utilities, specific industry power generators (e.g. Kruger Paper in Deer Lake, NL), and a growing number of independent power producers for renewable energy, mostly wind.

Some Factors Impacting the Regional Industry

Atlantic Canada's combined population in the four provinces is 2,357,000 or 6.84% of Canada's population of 34,483,000. The cumulative growth rate for Atlantic Canada's population in the past 5-years is 1.35%, less than one third of Canada's 4.72% percentage growth.

The current population totals by Atlantic Province are:

a) Nova Scotia - 945,400

b) New Brunswick - 755,500

c) Newfoundland and Labrador - 510,600

d) Prince Edward Island - 145,900

The population growth rates within Atlantic Canada during the period 2007-08 to 2001-2012 ranged from 5.6% in Prince Edward Island to .8% in Newfoundland and Labrador.

Economic performance in Atlantic Canada has become a "tale of two economies" to quote the Atlantic Provinces Economic Council. Newfoundland and Labrador's extensive mining and oil and gas resources are driving growth rates that are above the national average, while the three Maritime Provinces are lagging the Canadian averages. This is creating a macro employment impact where NL will be struggling to find enough skilled workers, and PEI, NB, and NS may have less employment growth.

The trends in macroeconomics, population, and demographics in the Atlantic Provinces have implications for the demand forecasts for electricity. Electricity demand in the region is growing slowly. When combined with the expansion of energy efficiency, demand side management programs, and the adoption of much more aggressive provincial policies for "clean renewable energy levels and improved air emissions", these factors increase the uncertainty of the outlook for the electricity operations of the region as a whole.

Overview of the Four Provincial Electricity Sectors

New Brunswick

NB Power is a provincial crown corporation and is the largest of 4 distribution utilities in the Province of New Brunswick directly serving approximately 330,000 customers. The recent "Energy Blueprint" released by the provincial government signals a return to a fully integrated utility structure. Currently NB Power's responsibilities and operating conditions are established by the Electricity Act and related legislation. Regulatory oversight of the electricity industry in NB is provided by New Brunswick Energy and Utilities Board ("EUB"). The other 3 distribution utilities service specific municipalities serving markets from 36,000 customers by Saint John Energy to

1,000 customers with Perth Andover. The City of Edmundston with 5,700 customers operates its utility as part of a municipal government including generation capacity from small hydro. Saint John Energy purchases all its electricity from NB Power; Edmundston buys what it needs beyond its own production from NB Power; while Perth Andover purchases its energy from Algonquin Power's local Tinkers dam. Ownership of the municipal utilities is held by individual local governments.

NB Power provides its residential, commercial and industrial customers with electricity generated at 14 facilities including a Candu6 nuclear facility at Point Lepreau. The company generating capacity consisting of: 1728mw of thermal, 889MW of hydro, 525MW of combustion turbine capacity, and 635MW of nuclear capacity for total capacity of 3,777MW. There are also a number of private generation facilities that provide through power purchase agreements up to 721MW of energy to NB Power. These private facilities include wind, biomass, hydro, and natural gas facilities within the province, and additional wind from connected jurisdictions.

There are approximately 370,000 customers in the province, direct and indirect through municipal utilities, serviced by an extensive system with 6,703km of transmission lines, 46 terminals and switchyards, and 20,030km of distribution lines. NB Power is also active in the import/export market for electricity through interconnections with New England, Quebec, Nova Scotia, and Prince Edward Island.

The policy direction in the Energy Blueprint would result in significant changes in the operations of the provincial electricity system. It outlines changes in the regulatory role of the EUB, and a resulting expansion in the operational information that NB Power will have to present regularly to the EUB. These changes include submitting an Integrated Resource Plan; presenting all proposed rate changes for approval; and including generation operations in future rate change hearings. The Energy Blueprint also commits to integrating the current independent electricity system operator, NBSO, back into NB Power.

Nova Scotia

NSPI, a subsidiary of Emera, is a vertically integrated investor-owned utility that produces approximately 95% of the electricity consumed in Nova Scotia. NSPI is regulated by the Nova Scotia Utility and Review Board ("UARB"). In addition to NSPI, the Nova Scotia electricity sector is comprised of 6 small Municipal Utilities that buy almost all of their power from NSPI, and a number of Independent Power Producers ("IPP"), mostly generating wind power, and some hydro.

NSPI generates approximately 75% of its power from plants using imported coal and petroleum-coke, and one oil/natural gas plant. It generates 15% from its hydro plants and one tidal plant, and the balance from renewable energy, mostly wind, which on an average windy day will produce 10-

15% of NSPI's production. Total NSPI revenues in 2010 were $1.167 billion and profit after taxes were $121 million.

The transmission system of NSPI is 5,200 km and distribution lines total approximately 26,000km, serving 490,000 residential, commercial and industrial customers. Total power generation capacity from NSPI's fleet of oil, gas, coal, hydro, biomass and wind units is 2368MW, plus an estimated 186MW from IPPs. The NSPI system peak production in 2010 was 2121MW, and the low for the year was 771MW. The transmission inter-tie between Nova Scotia and New Brunswick historically has had export capacity of 350MW and import capacity of 300MW; however, in recent years the load growth in the Moncton, NB area in particular has significantly reduced the "firm transfer" capability of that interconnection.

NSPI's recent growth in electricity consumption has been in the range of 0.5 to 0.9 per cent, lower than the long-term historical average.

Prince Edward Island

MECL is a wholly-owned subsidiary of Fortis Inc. and operates under the provisions of the Electric Power Act and the Renewable Energy Act, and is regulated by the Island Regulatory and Appeals Commission ("IRAC"). MECL owns and operates a fully integrated system that provides the generation, transmission, and distribution of electricity to customers throughout Prince Edward Island, except for the City of Summerside.

The City of Summerside operates its own distribution utility with its own diesel and wind generation. In addition, it purchases electricity, under term contracts, from NB Power and NSPI, and from wind farms owned by private operators and the PEI government crown corporation, PEI Energy Corporation.

MECL sources the majority of its electricity from off-island sources which is transmitted over two submarine transmission cables under the Northumberland Strait from New Brunswick. The current import-electricity supplier is NB Power. MECL also purchases up to 52MW of wind generation from PEI Energy Corporation's North Cape and Eastern Kings wind farms, and has 149MW of oil and diesel fuelled capacity for peak periods and security from transmission disruptions from the mainland.

There are approximately 5,000 kilometres of power lines on Prince Edward Island with 4400km for distribution and 600km for transmission.

PEI has some of the highest electricity rates in the country and has taken steps in 2011 to manage the cost by entering into an "Energy Accord" between the provincial government and MECL. Under the Energy Accord electricity rates will be reduced by 14% due to a combination of the provincial government taking on responsibility for funding the deferral costs associated with the PEI commitment to the Point Lepreau nuclear plant (5%), and the terms of a new Power Purchase Agreement with NB Power.

The PEI government has identified total wind potential of 500MW and is working to expand wind-powered generation through the PEI Energy Corporation. In order to support greater wind generation, increased demand and reliability, the PEI government is in negotiations with the federal government to construct a third interconnection transmission line from PEI to the NB mainland.

Newfoundland and Labrador

Nalcor is the prime energy crown corporation for the Province of Newfoundland and Labrador. It has three subsidiaries that are in the electricity sector: NLH, Churchill Falls (Labrador) Corporation ("CFLCo"), and the Lower Churchill River Power Project (Muskrat Falls and Gull Island). NLH is the only regulated utility in the Nalcor group and is regulated by the Board of Commissioners of Public Utilities ("PUB") on the basis of cost of service and an approved return on rate base.

The main generator of power for domestic consumption in the province is NLH which has 1635MW of capacity, plus power purchase agreements for approximately 54MW of wind. NLH supplies the industrial load and also has 35,000 mostly rural retail customers in both Labrador (11,300) and on the Island (23,700). Most of NLH's generated power is supplied as wholesale energy to NP, a subsidiary of Fortis that has been in business for 125 years. NP buys 93% of its energy from NLH to service its 243,000 residential and commercial customers, while the remaining capacity of 140MW is generated from its own plants and delivered over its 11,000km of distribution and transmission lines.

NLH's generation comes from its 9 hydroelectric plants (939MW), one oil-fired plant (490MW), 4 gas turbines (150MW) and 25 diesel plants (58MW). NLH operates approximately 3750 km of transmission lines, while most of the Province's distribution lines are owned and operated by NP.

Nalcor owns 65.4% of CFLCo, which owns a large hydropower plant in Churchill Falls, Labrador, and Hydro Quebec owns the remaining equity. CFLCo has an 11-unit total capacity of 5428MW and annual power generation of 34 terawatt hours. Most of CFLCO's energy is sold to Hydro Quebec under a 1969 Power Contract that has a 40-year term to 2016 and a 25-year renewal to 2041.

Nalcor is also the owner and developer of the Lower Churchill River Power Project which consists of the Gull Island site, 225km downstream of CFLCo (2000MW), and the Muskrat Falls site which is 60km downstream of Gull Island (824MW). The Muskrat project is under active development and in the environmental approval and engineering design stages, with in-service power targeted for 2017.

In November 2010 Nalcor and Emera announced a project partnership and a "Term Sheet" for the $6.2 billion Muskrat project. The project consists of: (1.) the 824MW (4.9 terawatt hours) generation plant at Muskrat Falls; (2.) an 1100km, 900MW transmission line from Muskrat Falls, Labrador by a 30km sub-sea cable under the Strait of Belle Isle, and a new transmission line across the Island to just outside St. John's; and (3.) a 180km, 500MW sub-sea cable across the Cabot Strait to Cape Breton, Nova Scotia to connect with the NSPI transmission system. In addition, Emera has assigned to Nalcor its "transmission rights" to 265MW of capacity on the NB transmission system that links to the New England marketplace. The Government of Canada has announced that it will provide a "loan guarantee or equivalent" to the Muskrat Falls project.

The Term Sheet between Nalcor and Emera outlines the expected consumption of the 824MW of capacity at Muskrat Falls to be: 20% or 170MW (.98 terawatt hours) to Emera for 35 years; decommissioning of Hydro's 490MW oil-fired plant at Holyrood and replacing it with Muskrat hydropower; leaving approximately 40% or 2 terawatts hours of energy annually for export to Canadian provinces and the Northeast USA, or new economic development opportunities in Labrador or on the Island.

Atlantic Region Regulatory Systems

Each of the four Atlantic Provinces has a regulator for its electricity sector that in some cases also regulates a number of other utility-type functions such as bus transportation, natural gas rates, automotive insurance rates, certain municipal services, petroleum pricing, and energy efficiency programs, and cost recovery. The provincial regulators are: Nova Scotia-UARB; New Brunswick-EUB; Prince Edward Island-IRAC; and Newfoundland and Labrador-PUB. The federal regulator for certain interprovincial and international electricity transmission and sales purposes is the National Energy Board of Canada ("NEB").

A summary of each of the provincial regulators and the NEB is contained in Schedule 1.

Regional Environmental and Renewable Policies, Rules, and Targets

The electricity sectors in Canada, North America, and in many parts of the world have undergone a significant shift in public policy and regulation in recent years as it relates to cleaner sources of

energy and reduced impacts on air emissions. These policies and legislated rules will be having a significant impact on the existing portfolio of generation assets in all four Atlantic Canada provinces, on future planning for new generation, and also on the operations and requirements of the transmission systems.

The majority of growth in new generation capacity in the past five years in the Atlantic region has come from the addition of wind power, and a small amount from natural gas. No new coal or oil-fired generation has been built. In the near term, new clean renewable energy capacity is expected to come from wind power, biomass, solar, tidal, and the proposed 824MW hydropower plant on the Lower Churchill River in Labrador at the Muskrat Falls dam site.

Some of the key challenges for the regional electricity industry surround the need to reduce its dependence of fossil fuels in order to meet Greenhouse Gas ("GHG") policies that have been established at both the provincial and federal levels and to achieve the clean energy or renewable energy portfolio percentages that have been set. Since there are different mixes of generating assets in each of the Atlantic Provinces, addressing these challenges will not be the same for every province, and in some cases the challenges themselves will continue to be different. However, there would appear to be a number of areas where increased cooperation and the possibility of integrating certain electricity systems and assets could improve the overriding objective of cleaner energy sources and relatively more stable customer rates.

A summary of the environmental and renewable energy policies for each of the four Atlantic Provinces and of the recent federal government coal-generated power regulations, are contained in Schedule 2.

2). REGIONAL ELECTRICITY SYSTEM OPERATIONS

The electricity sector in North America continues to evolve from a collection of isolated, independent systems to a network of interconnected high voltage transmission systems. Increased interconnection has resulted in expanded regulatory oversight to reduce the potential of power outages occurring and spreading between jurisdictions. The need for expanded and more reliable interconnection was highlighted by the wide power outage of August 2003 when a rolling power black-out started in Ohio and spread all the way to New York through Ontario and numerous other states. The entry point from Maine through New Brunswick was able to prevent the spread of the black-out to the Maritime Region.

In Canada, the provinces have the authority to regulate the electricity sector within their boundaries and the federal government deals mainly with certain international transmission activities. The broader North American regulatory and reliability issues are dealt with mainly in the United States where the Federal Energy Regulatory Commission ("FERC") has the prime authority vested in it by the federal government. FERC and other regulatory agencies have established international approaches to the electricity sector focused on reliability, safety, and open access and include the North America Electricity Reliability Corporation ("NERC"), the Northeast Power Coordinating Council ("NPCC",) and the NEB.

A overview Note on the regulatory system affecting the Atlantic Provinces, including FERC, NERC, NPCC, NEB and other involved agencies, is contained in Schedule 3. This Note was developed for the AEG by the Nova Scotia Department of Energy in 2010, and while it is written from a Nova Scotia perspective, the information associated with the NSPI, NSPSO and the UARB could be largely applicable to all the regional jurisdictions seeking access to the US market.

NERC produced in 2009 Version 5 of its Reliability Functional Model, "Function Definitions and Functional Entities". The Model is intended to provide a framework for which NERC reliability standards are developed and applied. It is not a standard and does not have compliance requirements but serves as a guideline. The Functional Model describes a set of Functions that are preformed to ensure the reliability of the bulk electric system.1

These international regulators continue to add requirements to the bulk transmission system. An example is the July 2011 FERC Order 1000 which is focused on the transmission planning process and the approach FERC feels should be followed to secure the reliability of the North American transmission system.

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1 http://www.nerc.com/files/Functional_Model_V5_Final_2009Dec1.pdf

Current Regional System Operations

There are a number of approaches to system operations in the northeast region of North America. These jurisdictions—Atlantic Provinces, Quebec, and New England—are connected and operate in a cooperative manner using different approaches. The ability to cooperate is tied to the international regulators requiring market standards to allow the movement of electricity.

A summary profile of regional system operations approaches in Atlantic Canada, Quebec and the Northeast USA is contained in Schedule 4. In brief:

- New Brunswick uses an independent system operator (NBSO) that serves as reliability coordinator for the Maritime Provinces region.
- Nova Scotia uses a functionally unbundled independent unit, NSPSO, within the utility NSPI that operates under a Standard of Conduct.
- Prince Edward Island uses a functionally independent unit within MECI, operated under a Standard of Conduct.
- Northern Maine utilities operate an independent system administrator (NMISA) with NBSO filling the role of Reliability Coordinator, Interchange Coordinator, and Balancing Authority.
- The Island of Newfoundland system has operating standards developed by NLH and administered by its system operators within the NLH Energy Control Centre.
- The Labrador system is operated by NLH using the same standards as the Island of Newfoundland.
- Quebec uses a functionally independent unit within Hydro Quebec operated under a Standard of Conduct with the Regie de l'energie which has been delegated, among other functions, responsibility for reliability coordination.
- New England uses an independent system operator (ISO-NE) that has responsibility for reliability market operations and planning for the six states.

These specific Standards of Conduct for NS and PEI were established to govern relationships that NSPI and MECL have with their transmission customers and potential customers, independent power producers, and includes detailed operating procedures and guidelines that cover the expected behaviour of employees of each utility and their affiliates. These Standards of Conduct are based on FERC Order 2004 and earlier Orders 889 and Order 888 regarding non-discriminatory transmission open access, i.e. OATT.

In most cases planning has remained the responsibility of the individual jurisdictions and utilities, with NBSO and ISO-NE having responsibility in New Brunswick and New England respectively, and the individual utilities being responsible in the other provinces.

In the October 2011 New Brunswick's "Energy Blueprint", the government outlined the province's approach to energy development and management for the next ten years. As part of this policy, the government stated that many NBSO functions will be rolled back into the reintegrated utility, NB Power, and structured with a Standard of Conduct operating approach as is used elsewhere.

This new NB approach will result in the need for the region to determine how they will coordinate regional activities currently undertaken by NBSO. The establishment of system operations in NB Power could result in each of the provincial jurisdictions taking a similar approach of the provincial utility operating the transmission system under a Standard of Conduct.

The Atlantic region's electricity system operations could have a number of significant new developments in the next few years that may require individual or multiple jurisdictions to review various components of the regional system. Some examples of these factors include:

- The addition of new electricity generation from Muskrat Falls, tidal sites, wind, and upgraded hydro.
- Connection of Labrador to the Island of Newfoundland system and the Maritimes, thereby ending the current isolated system situation.
- The implementation of FERC Order 1000 which deals with an expanded approach to regional and interconnection planning.

The relatively small size of the Atlantic Canada regional electricity system with regard to generation capacity, load demand, and transmission highlights the need to examine all possibilities for regional cooperation and additional efficiencies.

System Operations Alternatives

As the Atlantic Provinces and utilities look to the future of system operations, there are a number of approaches to consider, collectively and individually. Regional cooperation and ccoordination can assist the review of reliability standards, compliance, planning and other functions outlined in the NERC Reliability Functional Model. The extent of any increased technical, policy and/or regional collaboration will depend on the utilities and governments assessing the importance of a number of factors and considerations, some of which are outlined in Section 4 .

The current "status quo" of the Atlantic region electricity system will not likely exist for much longer given the proposed restructuring of NB Power and elimination of the current scope of responsibilities for NBSO, and the probability that the Muskrat Falls hydropower project will proceed and result in significant changes to the transmission system and renewable energy

portfolio because of the new high voltage transmission interconnections between Labrador and the Island of Newfoundland and also between the Island and Nova Scotia. The two most likely changes outlined above, plus slower market conditions for electricity demand, increased clean renewable energy sources, and the requirements to coordinate reliability standards with those of the USA, point in the direction of a changing "status quo" in the near term, and in the longer term, some evolving regional system operations coordination or cooperation arrangement or structure.

Outlined below are three alternative system operations approaches that could be considered for the region in the future.

Enhanced Regional Systems Coordination

Coordination and cooperation within the Maritime area and the Northeast USA have been underway for years. For example: coordinated emergency response, the Maritime Area Technical Planning Committee, the current AEG process, the multi-utility Power Shift Atlantic project, regional committees including NERC, the NPCC "Working Group on System Resource Adequacy", and the Northeast International Committee on Energy ("NICE") which is part of the Conference of New England Governors and Eastern Canada Premiers, focused on renewable energy. This broad range of electricity coordination occurs among utilities and provincial and federal governments, and the USA.

An interesting example of regional planning and policy coordination at a government level can be seen in the New England States Committee on Electricity, or NESCOE.

> "*NESCOE represents the collective interests of the six New England states on electricity matters by advancing policies that will provide electricity at the lowest possible price over the long term, while maintaining reliable electric service and environmental quality*" *(http://www.nescoe.com)*

NESCOE is directed by Managers appointed by each of the six New England Governors and advances policies based on collective research currently in the areas of system planning and expansion, as well as resource adequacy. They work in a coordinated manner with the existing organizations and committees functioning in the region. Examples of their work include producing the New England Governors Renewable Energy Blueprint in 2009, commenting on national and international issues on behalf of the member states and providing comments on ISO-NE Draft Regional System Plan. The role and scope of NESCOE activities is established by state governors as they identify areas of common public policy interest.

NESCOE is a vehicle for government level planning and policy coordination with the technical coordination provided by ISO-NE. The NESCOE coordination and technical support model may

have some future applicability to the Atlantic region. Such an organization would allow individual jurisdictions and utilities to continue to control their bulk transmission systems while having a common understanding and approach to identifying and reporting on potential common opportunities.

An approach as described above would allow utilities to examine services that are currently provided by the NBSO and the agreements it administers for utilities and regulators in the region—such as NSPI, NMISA, and MECL—and to assess whether enhanced interconnection and coordination agreements could produce regional system operations benefits in the future. This would include examining potential benefits that could be created from the proposed Nalcor/NLH new HVDC transmission system from Muskrat Falls to Nova Scotia by way of Emera/NSPI's proposed sub-sea transmission cable.

Cooperating on policy and enhanced technical coordination could provide the Atlantic region with an approach that provides value to the electricity and clean renewable energy sector without having direct involvement in the operations of the individual utility transmission systems. It could also provide governments and utilities with researched papers on policy initiatives, and technical and R&D reviews focused on topics such as improving the performance of the region's electricity market, and on some degree of regional planning, standards development, and compliance enforcement.

Independent System Administrator

Independent System Administrator ("ISA") is a term familiar to the Maritime Provinces' region because of the existence of the Northern Maine ISA ("NMISA") which provides select services to the utilities operating in those parts of Maine not connected to the rest of the State. The structure and the operating functions that are to be coordinated by an ISA are determined by negotiations among the affected utilities, regulators, and governments. There are no defined restrictions on what can be included in an ISA structure, including the possibility of incorporating an independent system operator role.

NMISA was established in 2000 in response to the development of FERC Orders respecting the ownership of integrated utilities, and the belief there should be separation and independence between the operation and ownership of generation and transmission functions. In Northern Maine this resulted in a number of small utilities that have transmission and distribution systems seeking a method of operating collectively in an isolated US region. These utilities currently have a combined peak load of 130MW.

The NMISA is the only example of a complete ISA system in North America and describes itself as follows:

> *"The NMISA, a non-profit entity responsible for the administration of the Northern Maine transmission system and electric power markets in Aroostook and Washington counties, with a load of approximately 130 MW. The NMISA is responsible for providing an independent, objective and non-discriminatory administration of all transmission access, transmission information access, and related functions, and will monitor and operate the markets in Northern Maine for energy, ancillary, and other services. The NMISA administers the transmission systems of the investor-owned and cooperatively-owned utilities in Northern Maine, and its members also include all municipally-owned utilities, generators, suppliers of energy, and large retail customers operating in the service area."*

NMISA entered into a Products and Services Agreement ("PSA") with NB Power in 2000, primarily because Northern Maine (N.ME") relies on NB Power for essential support as it is not connected directly to the New England transmission grid. The PSA ensured that N.ME could obtain balancing service, reliability and improved transmission access, notably with respect to tie line interruption. As the NPCC and NBSO developed, the operational terms of the PSA, though not technically abrogated, were replaced by a more integrated relationship between NMISA and NBSO. NBSO serves as the Reliability Coordinator and Balancing Authority for NMISA, both functions having been required by FERC/NERC. NMISA also is assigned its proportionate share of the operating reserve requirement of the Maritime Control Area. Power suppliers to N.ME are required to make their own transmission arrangements, and NMISA is responsible for ensuring adequate transmission in N.ME and the interconnections with NB Power.

An ISA-type structure allows individual system owners/operators to maintain operating control of their transmission systems while entering into agreements that establish an administrator, i.e. an ISA, to oversee agreements that establish rules agreed upon by participants in the system, including operators, utilities, governments and regulators. These agreements establish the rules, penalties, and roles of participants and other key elements of operating a system within the region. The role of an ISA could be expanded to be a more active participator in the operations of the electrical system, as noted in the Manitoba Hydro example below, or remain in a more administrative role as in N.ME.

Another example of a restricted operating agreement is the arrangement where Manitoba Hydro operates its system through a functionally independent system operator under a Standard of Conduct. However, it has established a regional operating relationship with the US Midwestern Independent System Operator ("MISO"). Under this MISO arrangement, Manitoba Hydro is associated as a Coordination Member with MISO, which by contractual agreement provides

reliability coordination and regional planning services to Manitoba's provincial utility. This formal system coordination arrangement with MISO allows Manitoba Hydro to independently operate its system, while complying with North American standards that protect its position in the US market for the sale of surplus electricity.

There are other examples of multiple jurisdiction power cooperation structures such as the Nord Pool Spot group power exchange in Europe which originated in the Nordic countries of Norway, Finland, Sweden and Denmark starting with Norway in 1991 and now has market activities in many European markets. Nord Pool contributes to a more integrated and efficient energy market that offers its customers the highest standards and provides cost synergies. It is a model for a more connected and efficient European energy market whose vision is to stretch from Portugal to Finland.

In the Northeast USA, the original cooperation structure was the New England Power Pool ("NEPOOL") established in 1971, whose prime mission was "to ensure the reliability of the bulk power grid in New England and neighboring power systems at the lowest costs". NEPOOL was formed in response to the 1965 Northeast blackout, when the lack of shared resources and transmission management severely reduced reliability.

NEPOOL was known as a "tight power pool" where there was central dispatch of generating resources called economic dispatch and which allowed for the use of the lowest cost generation mix at any given moment. NEPOOL was also the control area for the New England region, ensuring that reliability was maintained at all times by having sufficient generating resources available.

The transmission system remained under the control of the individual transmission owners. A new generator was not allowed to connect to the New England grid unless its output could be dispatched anywhere in New England without degrading reliability. Some generators could be designated as "pool planned units" if they were considered to be necessary additions to the resources needed to maintain reliability.

The market was largely bilateral with buyers and sellers making their own deals. Utilities could also purchase through NEPOOL, especially for short-term needs. Thus, NEPOOL provided for the use of generating and transmission systems across six states and nine major systems to provide the lowest cost power supply and strong reliability. The NEPOOL structure created a basic open market without any utility which owned generation and/or transmission assets relinquishing control over its resources, except to meet NEPOOL requirements for ensuring reliability and dispatch both at a lower cost. NEPOOL and the transmission owners were FERC-regulated.

NEPOOL was later transitioned into the New England Independent System Operator ("ISO-NE"). ISO-NE took over the management of the transmission system and operation of the market, and

NEPOOL became the participants' committee of end-use customers, generators, and transmission owners for the regional stakeholders' consultations which are required by FERC.

Another example of cooperation is the currently evolving coordination of intra-hour revisions to "tie schedules" between New York and Quebec as part of a broader regional market initiative.

In summary, there can be significant operational benefits obtained from establishing a regional ISA, or some other system administrative and operations structure among a number of utilities that could focus on some or all of the following system functions:

- Planning for the area covered by the ISA agreement for transmission, reliability and resource requirements;
- Market design and administration including balancing mechanisms, reserve margins, economic dispatch, ancillary services, and resource/capacity adequacy;
- Tariff design to deal with issues including pancaking, treatment of losses, out charges, and cost allocation; and
- Regulatory oversight required by international and regional regulatory authorities.

Independent System Operator

An Independent System Operator ("ISO") is an organization formed to coordinate, control, and monitor the operation of the bulk transmission system within a single jurisdiction. Examples of an ISO exist in Ontario, Alberta, New Brunswick, and there is a multiple jurisdictional ISO in New England (ISO-NE). An ISO operates a region's electricity grid, administers the region's wholesale electricity markets, and provides reliability planning for the jurisdiction's bulk electricity system. The extent of an ISO's role is established through agreements with participants, or through legislation. The mission statement for ISO-NE can be summarized as follows:.

ISO-NE is*: through means including, but not limited to, planning, central dispatching, coordinated maintenance of electric supply, and demand-side resources and transmission facilities, obtaining emergency power for market participants from other control areas, system restoration (when required), the development of Market Rules, the provision of an open access regional transmission tariff (OATT), and the provision of a means for effective coordination with other control areas and utilities situated in the United States and Canada.*

The New Brunswick independent system operator, NBSO, currently has responsibility for a number of the functions described in the NERC Reliability Functional Model. NBSO has operating responsibility as "regional reliability coordinator" on behalf of the entire Maritime Region, and also

performs, on behalf of PEI and N.ME, the interchange and balancing functions. On behalf of New Brunswick, the NBSO current responsibilities are:

1. Facilitate the operation of a competitive electricity market;
2. Direct the operation and maintain the adequacy and reliability of the system operator controlled grid and integrated electricity system;
3. Undertake and coordinate power system planning;
4. Develop and adopt mandatory reliability standards and criteria;
5. Perform functions such as the Reliability Coordinator for the Maritime Provinces and N.ME;
6. Be the Balancing Authority for NB-PEI-N.ME;
7. Do the administration of the OASIS for NB and NS;
8. Perform transmission operation functions on behalf of NB Power Transmission through an operating Agreement; and
9. Administer the NB Open Access Transmission Tariff (OATT) and is subject to EUB oversight for its revenue requirements.

In summary, NBSO's activities cover planning reliability, resource planning, market operations, transmission service, and transmission operations. These tasks are undertaken in most other provinces by the utilities with regular staff or in-house system operators.

The NB Energy Blueprint policy direction of establishing the system operation function inside NB Power leaves the regional provincial utilities with the similar basic structure for system operation. However, NBSO's current provision of the reliability coordination services is a 24/7 activity that requires active supervision of the region's bulk transmission system and reporting to the regulators on 'as required basis'. In the absence of a NBSO carrying out these reliability functions for the region, an alternative will be required.

Schedule 5 is a "Matrix of Regional Electricity System Operations Options" which summarizes and compares various system operations structures and characteristics, including implementation considerations.

Current System Planning

Planning in the Atlantic region, while subject to provincial public policy and regulatory oversight, is primarily within the control of the individual utilities, except in New Brunswick where NBSO has the legal responsibility as resource planner and reliability planning coordinator. As a member of NERC and interconnected to the US system, the Maritime region must also meet the reliability standards of NERC as laid out in its Reliability Functional Model. The Model's three main planning areas are Planning Reliability, Resource Planning, and Transmission Planning:

- Planning Reliability Coordinator – the functional entity that coordinates, facilitates, integrates and evaluates (generally one year and beyond) transmission facility and service plans, resource plans within a Planning Coordinator area and coordinates those plans with adjoining Planning Coordination areas.
- Resource Planner- the functional entity that develops a long term (generally one year and beyond) plan for the resource adequacy of specific loads (customer demand and energy requirements) within a resource planning area.
- Transmission Planner – the functional entity that develops a long term (generally one year and beyond) plan for the reliability (adequacy) of the interconnected bulk electric transmission systems within a Transmission Planner area.

ISO-NE undertakes all of these functions as part of its mandate. Significant coordination among the Atlantic utilities now occurs, with management of confidential economic data being a priority. The planning function is a key ingredient of the FERC and NERC regulatory planning functions, with significant effort being placed on creating a standard that strengthens interconnection compatibility.

Recently FERC released Order 1000 which is a Final Rule addressing electric transmission planning and cost allocation requirements for public utility transmission providers. This Order builds on the reforms of Order 888 by Order No. 890 and corrects what it states are remaining deficiencies with respect to transmission planning processes and cost allocation methods.

The impacts of Order 1000 on the planning and operating systems of Atlantic Canada are not known yet as each jurisdiction must determine where they fit, how they fit, and who they will have to work with on regional planning and with interconnecting regions. New Brunswick would be the most affected because of its multiple interconnections, especially with ISO-New England and N.ME.

FERC Order 1000 establishes three requirements for transmission planning:

1. Each public utility transmission provider must participate in a regional transmission planning process that satisfies the transmission planning principles of Order No. 890 and produces a regional transmission plan.
2. Local and regional transmission planning processes must consider transmission needs driven by public policy requirements as established by state or federal laws and regulations. Each public utility transmission provider must establish procedures to identify transmission needs driven by public policy requirements and evaluate proposed solutions to those transmission needs.

3. Public utility transmission providers in each pair of neighbouring transmission planning regions must coordinate to determine if there are more efficient or cost-effective solutions to their mutual transmission needs.

FERC Orders are significant as they not only establish the approaches being followed in the US electricity industry, but are also used to determine the standard of interconnection provincial jurisdictions must have with the US market. FERC Orders are mandatory on NERC who has authority in certain Canadian provinces, including New Brunswick and Quebec that have signed agreements or established laws empowering NERC authority; and Nova Scotia where the UARB and NERC have two MOUs that include NERC, NPCC, and NSPI activities.

The impact of FERC Order 1000 is not known, but with the expanded emphasis on regional transmission plans and the role of public policy, its objective clearly seems to be to regulate on the basis of greater regional cooperation and cost effective solutions. Atlantic Canada's electricity systems, with its interconnections to five eastern provinces and New England, will have to take into consideration this new FERC Order and regulatory approach, especially as increased renewable energy sources and the planned interconnections of Labrador and the Island of Newfoundland are achieved in the next decade.

4. Regional System Operations Issues and Implementation Considerations

An objective of increased regional cooperation in the electricity sector is to create efficiencies and cost benefits to consumers and industry and broader economic benefits for the region and the rest of Canada.

Atlantic Canada is a relatively small electricity marketplace with approximately 8900MW of generating capacity, not counting the Upper Churchill Falls output of 5428MW, which is mostly exported to Quebec. Peak demand for the region in 2010 was approximately 6700MW or 75% of capacity. Current Atlantic regional capacity compares with approximately 42,000MW in Quebec, 40,000MW in Ontario, and 38,000MW in New England. However, even a relatively small Atlantic regional system is quite complex, spread over a large and often rural geography with broad differences in social and economic circumstances and also in environmental and clean energy policies and targets.

The regional electricity landscape and the North America world of electricity has changed significantly since 2007. The global economic downturn has resulted in an absolute drop in electricity consumption in most North America markets rendering previous growth forecasts obsolete and creating over capacity in many marketplaces. The optimism for exporting large amounts of clean renewable energy has dimmed in the near term, and the rapid growth of natural gas extracted by new technologies from shale has fundamentally changed the North America and global prices for gas for the foreseeable future, making natural gas the "power generation fuel of choice" in many markets.

These rapid industry-wide changes, together with some of the new proposed major regional projects such as Muskrat Falls and the energy and environmental policy changes in NB and NS, have created changing dynamics for the electricity sector in Atlantic Canada. Therefore, it can be argued that this same climate of change and uncertainty presents a compelling case for increased regional cooperation and improved economies though partnerships and integration that could produce efficiencies, benefits, and more stable future electric prices for customers.

The importance of open transmission access and preventing "market power" by any one or small group of utilities is at the center of any electricity transmission system that is interconnected to other jurisdictions, especially the US marketplace. These regulatory rules and standards will continue to grow in influence as the Atlantic region's system changes and expands.

Some of the regional electricity systems operations issues, factors, and planning considerations that governments and utilities may need to examine in the future are discussed below. The region

currently has both an over capacity of conventional generation and large undeveloped wind, tidal and hydropower renewable energy potential. The future impact of individual provincial and regional collaboration actions on future sources of electrical energy and prices to consumers could result in region-wide changes. However, any changes that may be agreed to in the future are more likely to occur over time as various changes, adjustments, and collaborative actions are identified, assessed, and executed.

System Operator

An example of the changing landscape is the NB policy decision to combine most of the functions and responsibilities of the current independent system operator, NBSO, into its crown utility, NB Power. This will have a number of operating consequences for both the NB electricity administrative situation as it relates to generation and transmission in New Brunswick and also for its inter-relationships with other provinces and the Northeast USA. Any plan for transferring specific NBSO functions and responsibilities into NB Power will also need to take into account those responsibilities that still require an "independent" entity, such as regional reliability coordination.

Some of the regional systems operations activities that any new regional governance model or independent entity may be required to administer include: regional operating reserves, regional systems balancing, and regional systems reliability coordination and inter-facing with the Northeast USA. In order to carry out any or all of these functions, such an entity would require some degree of system-wide modeling and access to relevant multi-utility data.

While, in the short term, enhanced coordination may be the next stage in expanding regional electricity and clean renewable energy cooperation, in the longer term there may be merit in examining potential benefits and implementation considerations for an ISA or similar administrative and system operations concept, as well as the option of a common regional market and regional ISO such as exists in New England and Ontario. Any expanded regional cooperation would require negotiations to ensure that there are benefits to all jurisdictions.

Regulation

Another area that increased regional electricity cooperation and systems operations would impact is the nature of industry regulation in the provinces and regionally. The current regulatory organizations and legislative regimes of the four Atlantic Provinces have many similarities, but also many differences in mandates and professional resources. However, in the electricity industry there are established standards of reliability, safety, cost-of-service principles, rate setting, and other key factors. None of these variances are insurmountable. To achieve greater regional collaboration and

efficiencies would require clear objectives and policies that are shared by all the major stakeholders. In some instances, it could also require coordination and alignment of provincial legislation.

USA Regulatory Interrelationships

Another major regulatory area that will require ongoing change, and in some cases expanded coordination and compliance, is the region's administrative relationship and role with the USA and specifically FERC and NERC.

Because Atlantic Canada is linked to the United States electricity transmission systems in a number of places such as New Brunswick directly and through Quebec, and Labrador through Quebec, there are a number of US regulatory policies and regulations that Canada's utilities must adhere to. For example, FERC's policy of non-discriminatory open access to transmission (OATT) is a mandatory policy for which any Canadian utility exporting to the US must meet FERC approval. As outlined previously in this Overview Paper, the rules and regulations regarding the operation and infrastructure necessary for the safe and reliable operation of the electricity generation transmission system are the responsibility of a number of organizations in the US that interact with Canada's electricity industry.

In addition to these US regulatory organizations, there is Canada's National Energy Board (NEB) and its regulatory role with respect to cross-border transmission of electricity of all Canadian utilities.

Regional Planning

Currently each regional government, regulator, and respective utilities conducts its own planning functions, analyzes, and approval processes for each of the four provincial electricity systems. The opportunity for increased regional planning may be opportune because of the short term regional electricity forecast indicating over capacity and the competitive situation for exporting electricity is more challenging due to Quebec's surplus capacity and New England's power supply, demand, and pricing situation,

Four of the major planning functions and approaches that could be part of any future cooperation considerations include:

- The role of government as developers of public policy.
- The potential for increased efficiency from broader area planning versus commercial confidentiality of individual utilities.
- Reliability standards and their application to small provincial transmission systems.

- Resource planning requirements that integrate renewable targets as set by individual provinces.

The regional electricity capacity situation will continue to change with the return to production of the Lepreau nuclear plant in 2012, the development and in-service of Muskrat Falls hydropower by 2017, and the expected addition of clean renewable energy projects. In the longer term, there are several other potential major electricity projects that could be developed in Atlantic Canada for domestic use and/or export including: 2200MW Gull Island hydropower project in Labrador; a 2nd nuclear plant in NB; large scale tidal power in NS and NB on the Bay of Fundy; additional natural gas from NS, NB, and offshore Newfoundland and Labrador; and large wind projects in PEI and elsewhere in the Atlantic Provinces.

Implementation Opportunities, Challenges, and Constraints

As previously outlined in this Overview Paper, there are many factors and forces impacting the electricity and clean renewable energy jurisdictions of the four Atlantic Provinces. The relatively small size of the regional marketplace, combined with the continuing upward pressures on power rates to all consumers, increases the need for policy makers and utilities to seek opportunities to improve operating and transmission efficiencies and create reduced costs, and to expand the development of new renewable energy resources. Existing surplus capacity and future new power developments can create economic opportunities for local economic growth and for sales to export markets.

Pursuing future regional cooperation and growth opportunities will face a number of challenges and structural constraints. It will require closer provincial policy and regulatory interaction by all of the participants. This will lead to more openness in sharing information, conducting joint analyses, and negotiating with a longer-term perspective versus a short-term "must gain" approach.

Such a regional approach to increased cooperation and integration of some of the activities of the electricity and clean renewable energy sectors could signal the beginning of developing a truly "Atlantic Canada regional power market".

Some of the factors, policies, and structural constraints that would need to be addressed are identified and briefly described below:

a. Both the proposed addition of a third sub-sea cable between PEI and NB strengthening the NB/NS interconnection, and the Muskrat Falls hydropower project's sub-sea linkage from the Island of Newfoundland to NS will involve new high-voltage transmission lines. This is

an opportunity for increased regional cooperation and for improvements to transmission capacity and reliability among the four Atlantic Provinces, and for higher export capacity to the New England market and Canadian provinces west of Quebec.

b. The goal of increasing clean renewable energy sources from PEI, NS, and NB will require additional transmission capacity and inter-ties because the total wind capacity of 774MW that is currently in-place in the three Maritime Provinces is stretching the regional system's ability to deliver this intermittent power to acceptable reliability standards. This opens up the opportunity to cooperate on integrating wind and other renewable power on a region-wide basis, thereby assisting each province and its utilities to meet the policy goals that have been set, while also pursuing new economic development potential.
c. Regional cooperation to build increased transmission capacity and to develop additional renewable energy sources such as wind demonstrates the need for some form of expanded regional regulatory coordination and governance of interprovincial power transactions. Such regulatory coordination has already been occurring on certain system reliability actions and standards in compliance with NPCC rules.
d. Developing a regional power market approach with a goal of delivering the lowest-cost and reliable power, while achieving the various clean and non-emitting energy policies and targets, will highlight the need to cooperatively assess the most economic use of various existing and future generation and transmission assets. A more efficient integrated system should lower electricity costs to all consumers.
e. A regional approach will require examination of systems operations factors such as:

    - the current transmission tariff structures and the manner in which each individual system operates its OATT;
    - the operating procedures for existing balancing and reserve capacities and whether there are savings to be achieved from integrated operations by reducing the amount of reserve capacity currently being tied up by individual systems; and
    - in light of the proposed roll-up into NB Power of the region's only independent system operator, NBSO, how will the critically important managing the operation of the transmission system to region-wide reliability standards, operational balancing requirements, and to some degree of regional resource planning be achieved?

f. Increasing regional cooperation and coordination for the electricity sector and related environmental and renewable energy policies will require an examination of existing provincial electricity, renewable energy, and regulatory legislation. Such an examination will likely result in some increase in the harmonization of such policies, regulations, and legislation.

Concluding Comments

There are opportunities for the four Atlantic Provinces to increase cooperation and coordination of their electricity sectors and to start on a path to create an Atlantic Canada power market. This course of action will be a strong signal that the region intends to improve its competitiveness for economic development, to actively pursue export markets for its power, and to achieve the lowest-cost power possible for its residential and business consumers. This road will require cooperative action and will not be without its challenges as the various opportunities are identified, assessed, and implemented in a mutually acceptable manner.

SCHEDULE 1: ATLANTIC REGION ELECTRICITY REGULATORY SYSTEMS

Each of the four Atlantic Provinces has a regulator for its electricity sector that in some cases also regulates a number of other utility-type functions. In addition, the NEB is the federal regulator and has certain functions in the interprovincial and international transmission and sale of electricity.

Newfoundland and Labrador

The PUB is an independent, quasi-judicial regulatory body appointed by the Lieutenant Governor in Council, and operates primarily under the authority of the Public Utilities Act, R.S.N. 1990. The Board was established in 1949.

The PUB is responsible for the regulation of the electric utilities in the province to ensure that the rates charged are just and reasonable, and that the service provided is safe and reliable. The PUB is responsible for the general supervision of NLH and NP, and for the electricity rates, borrowing programs, and capital programs. The basis of electricity regulation is on a cost of service methodology whereby both NLH and NP are entitled to recover through customer rates all reasonable costs incurred in providing electricity service to their customers, plus a return on rate base.

The PUB has approved a 2011 rate of return range on rate base for NP of 7.78-8.14%, and NLH has received Government approval to seek a similar rate of return range in its next general rate application.

Nova Scotia

The UARB is an independent quasi-judicial body which has both regulatory and adjudicative jurisdiction flowing from the NS Utility and Review Board Act. It was established in 1992 and has evolved to be a very diverse regulatory and supervisory organization with a Chair and nine commissioners. It is responsible to the NS Legislature through the Minister of Finance for the all public utilities including NSPI. Its jurisdiction with respect to NSPI includes setting rates, tolls and charges; regulations for provision of service; approval of capital expenditures in excess of $250,000, and any other matter the UARB feels is necessary to properly exercise its mandate.

The UARB rate-making methodology is based on a cost of service model whereby rates are to reflect the cost to the utility of providing electric services to each distinct customer class so as to

generate total revenue requirements to the utility that include a fair return. A principle of this rate-making model is to achieve price stability from year-to-year as much as possible. One recently introduced new and important component to this model, effective January 2009, is a "fuel adjustment mechanism" ("FAM") formula whereby NSPI is entitled to seek annual adjustments, either up or down, to its rates because of changes in its costs of fuel for generation. The first FAM was approved in August 2010.

NSPI has to periodically provide a comprehensive Cost of Service Study to the UARB and its stakeholders, and also to prepare a long-term Integrated Resource Plan ("ISP") which is a forecast of all of its operating and financial components and their projected impacts on the utility's revenue requirements. Under all significant assumptions, NSPI is in the late stages of regulatory and stakeholder consultations for a new IRP.

The provincial energy efficiency corporation, Efficiency Nova Scotia, had its first UARB public hearing in 2011 and in a Board Decision on June 30, 2011, the Board approved a ratepayer funded Demand Side Management program for 2012 totalling $43.7 million, which will be included in future electricity rates.

New Brunswick

The New Brunswick EUB is an independent crown agency established by the Legislature to regulate the electricity, natural gas, motor carrier industries and set maximum gasoline prices for the province.

The EUB was established in 2007 by the New Brunswick legislature with the implementation of the Energy and Utilities Board Act. The EUB is the successor to the Public Utilities Board that had operated in New Brunswick since the 1920's. The Board's duties are carried out by a staff of 16 including a full-time chair and vice-chair. There are up to eight part-time Board members who are called upon as needed to participate in hearings. The Board members are appointed by the Lieutenant Governor in-Council.

The role of the EUB is to act as an independent, quasi-judicial agency to oversee aspects of the energy sector and to regulate the charges passed on to customers by the province's various utilities, including NB Power. The EUB is required to balance consumer rights to reasonable prices with the company's right to a fair return on its investment.

The EUB has a variety of responsibilities in relation to the electricity market in NB. In terms of NB Power, only the Distribution and Customer Service, the subsidiary that delivers electricity to the homes of most New Brunswick residential customers, is under the jurisdiction of the EUB for any

changes in rates in excess of three percent. The EUB also reviews and approves an annual revenue requirement for the system operator NBSO that covers the cost of operating the transmission system, including the costs associated with the transmission subsidiary company of NB Power. Generation facilities are not the responsibility of the EUB because under the NB electricity industry restructuring in the early 2000s, it was expected that a competitive market would develop and result in open bidding for electricity supply. This has not occurred.

Prince Edward Island

The IRAC is an independent tribunal that hears appeals on issues relating to a wide range of public policy areas such as land use and certain water and wastewater utilities. It is also responsible for the regulation of electric utilities.

The IRAC was established in 1991 following the amalgamation of the former Public Utilities Commission, Land Use Commission, and the Office of the Director of Residential Rental Property (Rentalsman).

The IRAC operates at arm's-length from the Provincial Government. It has three full-time and up to five part-time Commissioners and a staff complement of 18. It reports to the Legislative Assembly of PEI through the Minister of Education.

National Energy Board

The NEB is an independent federal agency established in 1959 by the Parliament of Canada to regulate international and inter-provincial aspects of the oil, gas and electric utility industries. The purpose of the NEB is to promote safety and security, environmental protection, and efficient energy infrastructure and markets in the Canadian public interest, within the mandate set by Parliament in the regulation of pipelines, energy development and trade. The NEB is accountable to Parliament through the Minister of Natural Resources Canada.

Most electric power lines and facilities fall within provincial jurisdiction. The NEB authorizes the construction and operation of international power lines and designated inter-provincial lines under federal jurisdiction. In determining the suitability of an application, the NEB reviews, among other things, the technical feasibility of the project, its effect on adjacent provinces, and its environmental impact. Almost all Canadian provinces bordering the U.S. have interconnections with neighboring American utilities.

Typically, permits are issued to export electricity without a public hearing unless the Governor in Council, after recommendation by the NEB, designates a particular application for licensing or

certification. The NEB does not regulate electricity imports. Issues that the NEB considers when making its decisions may include the effect of exports on adjacent provinces, the environment, and fair market access for Canadians.

SCHEDULE 2: REGIONAL ENVIRONMENTAL AND RENEWABLE POLICIES, RULES, AND TARGETS

The Atlantic Provinces electricity industry, like other electricity sectors in Canada, North America, and in many parts of the world, have undergone a significant shift in public policy and regulation in recent years as it relates to cleaner sources of energy and reduced impacts on air emissions.

The Atlantic region's electricity industry has a variety of Greenhouse Gas ("GHG") policies, both provincial and federal, and also a variety of renewable energy portfolio goals or targets, some set in legislation.

Provincial Policies and Air Emission Targets

Nova Scotia

NSPI is required to operate under the Nova Scotia Public Utilities Act and must comply with the NS Renewable Electricity Regulations and the NS Air Emissions Act that include the only hard caps for CO2 emissions in Canada. Specifically, the NS requirements cover and mandate that a portion of electricity is to come from NS sources; state air quality requirements with respect to NS facilities, and state hard caps on GHG's.

The major environmental and clean renewable energy policies that apply to NSPI are:

- 25% Renewable Electricity by 2015- The NS plan commits the 2015 target of 25% renewable electricity to law.
- 40% Renewable Electricity by 2020- By 2020, this goal means more than 500,000 homes will be running on renewable power, more than enough energy for every residential customer in Nova Scotia. This has recently been put into law, and draft regulations are receiving public comment.
- Community Projects- This plan establishes a community-based feed-in tariff for municipalities, First Nations, co-operatives and non-profit groups.
- Renewable Energy Competition- Half of all large and medium-scale renewable energy projects will be set aside for Independent Power Producers, with bidding to take place under a competitive system. All bid processes will be managed by a new authority, the Renewable Electricity Administrator. NSPI will be responsible for the other half, with projects evaluated and approved by the UARB.

The GHG targets are contained in the NS Environmental Goals and Sustainable Prosperity Act ("EGSPA") established in 2007. This Act set targets for the following GHGs: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride These GHGs and Mercury targets will have a significant impact on the power generation and operations of NSP because they are 'hard caps' that must be met by reducing or "scrubbing" fossil fuels such as coal and oil, and/or replacing them with clean energy sources. The overriding target of the EGSPA is that by 2020 Nova Scotia will have 10% less greenhouse gas emissions than 1990 levels.

New Brunswick

The NB Electricity Act also includes the electricity from Renewable Resources Regulations, which requires NB Power to procure 10% of its energy requirement from new renewable energy sources by 2016. There is no provision in the regulation that the energy be sourced in New Brunswick, although government policy to date has been to include this requirement in the requests for proposals for new wind capacity.

NB introduced its Climate Change Action Plan in 2007 that established a target for reducing GHGs to 1990 levels by 2012, and by 10% below 1990's level by 2020. In addition, a long-term goal of a total reduction of 65% by 2050 was set. These GHG goals are broken down by sectors and summarize what each sector is expected to contribute to achieving these GHG reduction goals. In addition, the provincial government provided funding to the NB Energy Efficiency and Conservation Agency ("Efficiency NB") to develop and implement Demand Side Management programs to assist in achieving these environmental and air emission policies and goals.

Prince Edward Island

PEI has a Renewable Energy Act that was introduced in March 2011 and operates together with the provincial Electric Power Act. PEI's original Renewable Portfolio Standard ("RPS") was introduced in 2003 and set a target that 10% of energy used would come from renewable energy sources by 2010. Wind power was expected to account for most of that 10%, or about 35-40MW of capacity. A later RPS set a target for renewable energy of 15% by January 1, 2010; however, this target was reached in 2007.

PEI has a diverse portfolio of renewable energy sources that include wind power, solar, biomass, biogas, and biofuels, geothermal, and a wind/hydrogen demonstration project. The Province also has an energy efficiency and conservation program delivered through the Office of Energy Efficiency that was established in 2008.

PEI's 2008 Climate Change Strategy established a goal of reducing 2001 levels of GHGs by 75-85% by 2050, and also committed to reducing carbon dioxide ("CO2") levels per megawatt of electricity by 20% by 2020. The core programs to achieve the Province's climate change goals are adaption

and public education and awareness. While the electricity sector only generates 30% of PEI's air emissions, compared to an average of 56% nationally, the sector will achieve its reduction goals by a significant increase in wind power generation.

Newfoundland and Labrador

NL generates approximately 85% of its electricity from clean renewable hydropower and a small amount (51MW) from wind. As a result, only 12% of the total provincial per capita GHGs come from the electricity sector. However, the annual percentages can be as high as 35% on the Island because of the 490MW oil-fired (Bunker C) thermal plant at Holyrood, 30 miles outside of St. John's, which accounts for 1.3 million tonnes of GHGs and other pollutants annually. The proposed 824MW hydro plant on the Lower Churchill River in Labrador will increase the Island to almost 100% clean renewable energy and also contribute annual reductions of approximately 5 million tonnes of GHGs, equivalent to an estimated 900,000 car emissions.

The development of Muskrat Falls will also permit an increase in wind power generation over the current system's constrained limit of 80MW, because the system will be able to "balance and integrate" larger amounts of wind due to water storage capabilities and the new transmission interconnection with Labrador and expanded Island transmission.

NL has an Office of Climate Change, Energy Efficiency, and Emission Trading, and introduced a new Climate Change Action Plan in August 2011. The Plan reaffirmed the provincial goal on GHGs to achieve a 10% reduction over 1990 levels by 2020, and an overall reduction of 75-85% reduction by 2050. In addition, NL has policies in place that will reduce sulphur dioxide (SO2) levels by 50% and particulate pollutants by 40%. Currently NL's per capita GHGs are 15% lower than the national average. The existing 51MW of wind power have reduced NL's GHGs by 15%.

The Climate Change Action Plan has a number of industry-wide and societal goals and programs to achieve a broad improvement in environmental and air emission standards. The government's initial funding for energy efficiency was $5 million, and it is committed to increased investment. An important element of this Plan is a short- and long-term commitment to adaption, education and awareness programs in all sectors of the economy and for individuals.

Federal Government Coal Regulations

In August 2011, the federal government published proposed regulations for coal-fired electricity generation units. Quoting from the federal Release: "The proposed '*Reduction of Carbon Dioxide Emissions from Coal-Fired Generation of Electricity Regulations*' will set a stringent performance standard for new coal-fired units and for those that have reached the end of their useful life. This will phase out high-emitting coal-fired generation and promote a transition towards lower or non-

emitting types of generation such as high-efficiency natural gas, renewable energy, or fossil fuel-fired power with carbon capture and storage." The regulations set individual retirement dates for Canada's 21 coal plants.**

The central action in the proposed regulations is to limit each unit's emissions to 375 tonnes of carbon dioxide for each gigawatt-hour (GWh) of electricity produced from all fossil fuel sources in a calendar year. These regulations would apply only to coal-fired units commissioned after July 1, 2015, and to those that have reached the end of their useful lives. In most cases, a unit has reached the end of its useful life on the later of 45 years from its commissioning, or 2020.

The federal government stated that its approach to addressing climate change is based on the principle of balancing environmental and economic considerations while recognizing the electricity industry requires significant capital expenditures and that regulatory uncertainty could impede investments in new generation capacity.

NB has one coal-fired plant, while NS has three coal generation plants that, together with petroleum-coke, produce approximately 75% of its annual energy.

The proposed regulations were open for comment until October 26, 2011. Final regulations are expected to be published in 2012 and come into effect on July 1, 2015.

* The Federal Government and some of the provinces and utilities have been holding discussions to find alternate methods of achieving these environmental and emission goals.

SCHEDULE 3: SUMMARY OF NOVA SCOTIA ELECTRICITY REGULATORY RELATIONSHIPS, AUTHORITIES, AND RESPONSIBILITIES IN THE MARITIME PROVINCES AND NORTHEAST USA (*)

Introduction

The electricity system transmission grid is connected throughout all jurisdictions in North America including cross-border interconnections between Canada and the United States. Due to the nature of electricity, transmission and generation operational outage occurrences in one jurisdiction may have a significant impact on the operation of connected jurisdictions. This was clearly evident in 2003 when a major substation outage occurred in Ohio resulting in a cascading effect throughout the Northeastern region of the United States and Canada. The Maritime region was fortunate during that major outage only because the system operator for the region (New Brunswick System Operator) was able to disconnect from the Northeast before the Maritime region was affected.

The rules and regulations regarding the operation and infrastructure necessary for the safe and reliable operation of the electricity generation transmission system are the responsibility of a number of organizations. These organizations include the United States Federal Energy Regulatory Commission (FERC), the North American Electric Reliability Corporation (NERC), the Electric Reliability Organization (ERO), the Northeast Power Coordinating Council (NPCC), the National Energy Board (NEB), the Competition Bureau (Canada), and in the Maritimes, the New Brunswick System Operator, the Nova Scotia Power System Operator, and the Nova Scotia Utility and Review Board (UARB). Each of these organizations has a role and responsibility regarding the safe and reliable operation of the generation and transmission system.

Federal Energy Regulatory Commission (FERC)[2]

The US Department of Energy Organization Act established the US Federal Energy Regulatory Commission (FERC) in 1977. FERC has no direct authority in Canada. FERC is an independent agency that regulates, and has jurisdiction over, interstate electricity sales, wholesale electric rates,

*-Source-Memo for AEG by Richard Penney, Nova Scotia Department of Energy,2010

[2] http://www.ferc.gov/about/about.asp

hydroelectric licensing, natural gas pricing, and oil pipeline rates. FERC also reviews and authorizes liquefied natural gas (LNG) terminals, interstate natural gas pipelines and non-federal hydropower projects. In 2005 the Energy Policy Act gave FERC additional responsibilities. Those additional responsibilities relating to the electricity sector include:

- The review of mergers and acquisitions and corporate transactions by electricity companies.
- The review of siting applications for electric transmission projects.
- Protecting the reliability of the high voltage interstate transmission system through mandatory standards.
- Monitoring and investigations of energy markets.
- Oversight for environmental issues relating to electricity projects.
- The ability to enforce FERC regulatory requirements through civil penalties.

Figure 1

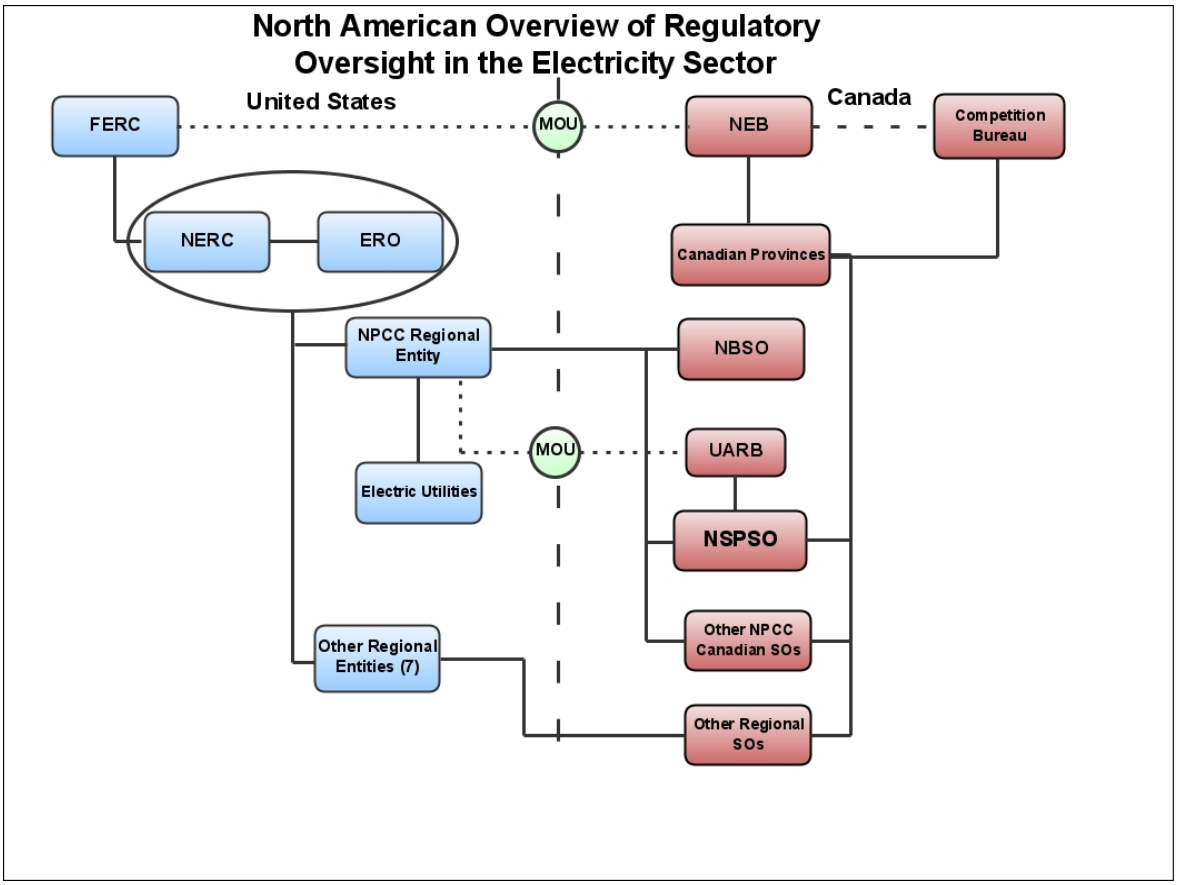

Figure 1 shows a high level North American overview of regulatory oversight for the electricity sector.

FERC's mission is to assist consumers in obtaining reliable, efficient and sustainable energy services at a reasonable cost through appropriate regulatory and market means. FERC is the umbrella under which most other energy organizations operate, and its mission involves two primary goals:

- Ensure that energy rates, terms, and conditions are just, reasonable, and not unduly discriminatory or preferential
- Promote the development of safe, reliable, and efficient energy infrastructure that serves the public interest.

In September 2003, a trilateral agreement was signed between the NEB, the Comision Reguladora de Energia , (CRE, Mexico) and FERC in which the three agencies agreed to regularly share perspectives on regulatory approaches and to work on eliminating inconsistencies in regulation to the extent possible. The NEB, CRE and FERC have been meeting three times a year to pursue these objectives.

It was at the trilateral meeting in May 2004 that the NEB and FERC signed a Memorandum of Understanding (MOU) to enhance inter-agency coordination. This agreement reinforces the existing cooperative relationship and further commits each agency to work together to the extent possible within our respective legal mandates to harmonize our regulatory approaches to cross-border projects.

From time to time, when there is a demand for regulatory guidance relating to the electricity industry issues, FERC establishes regulations and orders to address the situation. Orders 888 and 889 are of particular interest to the industry because they address the promotion of wholesale market competition through open access non-discriminatory transmission tariffs and services (OATT), standards of conduct, and open access same-time information systems (OASIS).

North American Electric Reliability Corporation (NERC)[3]

The NERC is a non-profit corporation with a responsibility to ensure the reliability of the bulk power system in North America. NERC operates under the rules and regulations established by FERC, and in 2008 FERC certified NERC as the *Electric Reliability Organization*[4] (ERO), a self-regulating reliability organization with the authority to establish and enforce reliability standards for the bulk power system in North America

The investigation report into the 2003 North American Eastern Seaboard blackout recommended that mandatory and enforceable reliability standards were the key to improving the reliability of the North American bulk power system. In 2006, NERC filed the first set of enforceable standards with FERC and FERC approved 83 of the 102 proposed standards.

NERC has no authority in Canada. However, NERC currently has signed memorandums of understanding (MOU) with provincial authorities in New Brunswick, Quebec, Ontario, Saskatchewan, and the Canadian National Energy Board (NEB). Both Ontario and New Brunswick have established provincial law that makes NERC standards mandatory and enforceable within their jurisdiction. Manitoba and NERC have a signed agreement that reliability standards mandatory for Manitoba Hydro, and Manitoba has recently adopted legislation setting out a framework for

[3] http://www.nerc.com/

[4] http://www.nerc.com/files/NERC_Rules_of_Procedure_EFFECTIVE_20080321.pdf

reliability standards to become mandatory for all electricity users, owners, providers and operators in Manitoba. Under Alberta's Transportation Regulation, NERC is designated as the ERO in that province. Alberta has approved a number of NERC's reliability standards and a number are pending approval. In Quebec, the Regie de l'energie of Quebec has recognized NERC and the Northeast Power Coordinating Council (NPCC) as standards-setting organizations. Quebec has also put the necessary legislative framework in place to make reliability standards mandatory within Quebec's jurisdiction.

British Columbia and Nova Scotia are also developing the necessary framework to make NERC's and NPCC's reliability standards mandatory and enforceable. In Nova Scotia, NERC and NPCC are working with the Nova Scotia Utility and Review Board (UARB) to adopt reliability standards, although the Nova Scotia Power System Operator (NSSO) has adopted and maintains compliance with the NERC standards. NERC is working with the remaining Canadian governmental authorities to establish equivalent recognition.

Northeast Power Coordinating Council (NPCC)[5]

NPCC is one of 8 regional entities under the NERC umbrella. NPCC is a not-for-profit corporation in the state of New York. It is responsible for promoting and improving the reliability of the international, interconnected bulk power systems in the northeastern region of North America. Responsibilities include:

- Development of regional reliability standards
- Reliability standards compliance assessment
- Enforcement of continent-wide and regional reliability standards
- Coordination of system planning, design and operations
- Assessment of regional reliability
- Establishment of regional specific reliability criteria
- Monitoring and enforcement of compliance with reliability criteria

NPCC provides its member jurisdictions with the functions and services of a cross-border regional entity through a regional entity division, along with regionally specific criteria services through a criteria services division.

The NPCC region covers nearly 1.2 million square miles, populated with more than 55 million people. The NPCC region includes the state of New York and all six New England states in the US, and the provinces of Quebec, Ontario, New Brunswick and Nova Scotia. Prince Edward Island is represented by New Brunswick and is part of the Maritime area. From a net energy for load

[5] http://www.npcc.org/

perspective, NPCC is 45% US and 55% Canadian. The NPCC Canada region represents nearly 70% of the net energy-for-load in all of Canada.

Although Nova Scotia's electric utility, Nova Scotia Power, is a member of NPCC, it does not have any direct international cross-border interconnection with the US. Nova Scotia is interconnected to the US via New Brunswick and the New Brunswick System Operator.

National Energy Board (NEB)[6]

The NEB is an independent federal agency established in 1959 by the Parliament of Canada to regulate international and inter-provincial aspects of the oil, gas and electric utility industries. The purpose of the NEB is to promote safety and security, environmental protection and efficient energy infrastructure and markets in the Canadian public interest within the mandate set by Parliament in the regulation of pipelines, energy development and trade. The NEB is accountable to Parliament through the Minister of Natural Resources Canada.

Most electric power lines and facilities fall within provincial jurisdiction. The Board authorizes the construction and operation of international power lines and designated inter-provincial lines under federal jurisdiction. In determining the suitability of an application, the NEB reviews, among other things, the technical feasibility of the project, its effect on adjacent provinces, and its environmental impact. Almost all Canadian provinces bordering the U.S. have interconnections with neighboring American utilities.

Typically, permits are issued to export electricity without a public hearing unless the Governor in Council, after recommendation by the NEB, designates a particular application for licensing or certification. The NEB does not regulate electricity imports. Issues that the NEB considers when making its decisions may include the effect of exports on adjacent provinces, the environment, and fair market access for Canadians.

The amount of electricity exported is influenced by several factors. First, the amount exported cannot exceed the limits set by the NEB. Secondly, the weather plays an important role because approximately 70 per cent of exports are generated by hydro-electric facilities; low water levels in Canada reduce the amount of power generated and the amount available for export. Strong domestic demand can also reduce quantities available for export. Finally, the economics of export transactions influence the amount sold.

[6] http://www.neb.gc.ca/clf-nsi/rcmmn/hm-eng.html

The NEB, when required, conducts studies or research into energy matters to meet its regulatory responsibilities. The NEB may also hold inquiries on its own initiative, when appropriate. With this knowledge and expertise, the NEB reports to and advises the Minister of Natural Resources on energy issues

Competition Bureau (CB)[7]

The Competition Bureau is an independent law enforcement agency that contributes to the prosperity of Canadians by protecting and promoting competitive markets and enabling informed consumer choice in Canada. The Competition Bureau is responsible for the administration and enforcement of the Competition Act (among other acts) that is a federal law governing most business conduct in Canada. The Act contains both criminal and civil provisions aimed at preventing anti-competitive practices in the marketplace. Its purpose is to maintain and encourage competition in Canada in order to:

- Promote the efficiency and adaptability of the Canadian economy
- Expand opportunities for Canadian participation in world markets while at the same time recognizing the role of foreign competition in Canada
- Ensure that small and medium-sized enterprises have an equitable opportunity to participate in the Canadian economy
- Provide consumers with competitive prices and product choices.

The Competition Bureau's primary operating principles are confidentiality, fairness, predictability, timeliness and transparency.

New Brunswick System Operator (NBSO)[8]

The NBSO is a not-for-profit independent corporation with the responsibility to ensure the reliability of the bulk power system and to facilitate the continued development and safe and reliable operation of a competitive electricity market in New Brunswick. The NBSO is one of 17 Reliability Coordinators in North America and is designated as the Reliability Coordinator for the Maritime area. The NBSO is the authority responsible for the operation of the bulk power in New Brunswick, Nova Scotia, Prince Edward Island and a small portion of Northern Maine.

The NBSO is also the Balancing Authority for New Brunswick, Prince Edward Island and Northern Maine. The NBSO provides load following and regulation service to the electrical system in order

[7] http://competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/home

[8] http://www.nbso.ca/Public/en/docs-EN/NBSO%20Annual%20Report%202007-2008%20(en).pdf

to provide in-province customer load, while maintaining scheduled flows on interconnections within the established limits set out in interconnection agreements with neighbouring system operators. Neighbouring system operators include Nova Scotia, New England and Quebec.

Nova Scotia Power System Operator (NSPSO)[9]

The NSPSO is owned and operated under the umbrella of Nova Scotia Power. The NSSO is considered to be functionally independent from all other Nova Scotia Power operations under a Standards of Conduct that was approved by the Nova Scotia Utility and Review Board (UARB). The NSSO is responsible for the safe, reliable and efficient operation of Nova Scotia's bulk power system.

Nova Scotia has more than 5,200 kilometers of bulk transmission lines and about 25,000 kilometers of distribution transmission lines that are operated by the NSPSO. Nova Scotia has one major 345 kv transmission interconnection with New Brunswick and the rest of North America. Nova Scotia's transmission system is part of the Maritime regional transmission area within the NPCC that is part of the NERC. NSPSO must maintain reliability compliance with the NPCC and NERC reliability standards.

The NSPSO operates by remaining functionally independent from NSPI's generation and marketing functions. Standards of Conduct and the organizational structure for the various functions help the NSPSO operate a reliable and safe system and provide non-discriminatory access to the transmission system and transmission system information, without advantage to any power producer, including NSPI.

NSPI's Control Centre Operations (NSPSO) is the Balancing Authority for NS; NBSO is the Reliability Coordinator for the Maritimes Region. The Interconnection Agreement (a confidential contract between NSPI and NBSO) establishes a framework for the following functions related to the Reliability of interconnected operations between the Parties:

- Establishing the NBSO as the Reliability Coordinator for the Maritimes Area
- Coordinating operation of the New Brunswick and NSPI Transmission Systems
- Developing and issuing Operating Instructions and Security Limits

[9] http://www.nspower.ca/

- Implementing the respective requirements of each of NERC and NPCC in respect to the operation of the NSPI Transmission System and the New Brunswick Transmission System
- Developing and adopting Operating Instructions
- Conducting operating performance reviews of the Interconnection Facilities
- Considering matters of transmission service priority and access
- Providing assistance in an Emergency and system restoration
- Developing procedures to notify adjacent areas of new or modified facilities and their expected impact on the interconnected transmission systems.

The Nova Scotia Power Open Access Transmission Tariff (OATT)[10] came into effect on November 1st, 2005. NSPI applied to the Nova Scotia Utility and Review Board for an OATT on May 12, 2004, and the tariff was approved on May 31, 2005. Subsequently, Market Rules were developed for the operation of the NS wholesale market. Government approved the Market Rules and issued regulations and the wholesale market officially opened on February 1, 2007.

Nova Scotia Power has contracted the New Brunswick System Operator (NBSO) to manage its Open Access Same-Time Information System (OASIS) reservation web site for transmission services. The OATT provides equal and fair opportunity to access the transmission system to all market participants. .Since the NSPI electrical system is integrated with the bulk power system across North America, NSPI is required to comply with standards and codes as governed by the NERC and the NPCC. This obligation to comply extends to market participants and generators interconnected with the Nova Scotia Power grid.

Nova Scotia Utility and Review Board (UARB)[11]

The Nova Scotia Utility and Review Board (UARB) is an independent quasi-judicial body which has both regulatory and adjudicative jurisdiction flowing from the Utility and Review Board Act. It reports to government through the Minister of Finance. The UARB was established on December 14, 1992 under the Utility and Review Board Act. The UARB exercises general supervision over all electric utilities operating as public utilities within the Province. This jurisdiction includes setting rates, tolls and charges; regulations for provision of service; approval of capital expenditures in

[10] http://oasis.nspower.ca/en/home/oasis/default.aspx

[11] http://www.nsuarb.ca/index.php?option=com_frontpage&Itemid=1

excess of $25,000 and any other matter the Board feels is necessary to properly exercise its mandate.

Nova Scotia Power Inc. (NSPI), an investor owned utility, is the largest public utility regulated by the UARB. NSPI is a fully-integrated public utility incorporated under the Nova Scotia Companies Act.

In 2004, the Nova Scotia Government passed the Electricity Act that, among other things, gave the Nova Scotia wholesale customers the right to purchase electricity from competitive suppliers. Nova Scotia Power Inc. (NSPI) was directed to apply to the UARB for an Open Access Transmission Tariff (OATT).

Under the Market Rules, the role of Market Monitoring is assigned to the UARB. The Nova Scotia System Operator provides the UARB with a report on the past year's activities. Parties can also appeal to the UARB for resolution of items covered under the Market Rules.

The government Regulations includes:

- *Marketing monitoring* – The market rules must provide for collecting, maintaining, reporting on and analyzing information and data required for the operation of the market.
- *Market surveillance* – NSPSO must provide the Board with the information and data that the UARB requests for market surveillance and for any investigation directed by the UARB.

In November, 2009, NSPI and NPCC met to draft an MOU to implement NERC standards with a target of submitting the agreement to the NSUARB in the next few months. NSPI are actively reviewing all the NERC standards to ensure compliance. NSPI has undergone several compliance audits from NPCC

SCHEDULE 4: PROFILES OF ATLANTIC, QUEBEC, AND NORTHEAST USA REGIONAL SYSTEM OPERATIONS

New Brunswick

NB established the Electricity Act (2004) which created a transmission operating system based on an independent system operator, NBSO, as a not-for-profit independent corporation whose primary responsibilities are to ensure the reliability of the electrical system and to facilitate the development and operation of a competitive electricity market in New Brunswick. NBSO ensures transmission system reliability; access to and use of the transmission grid (the high voltage wires); and administers the Open Access Transmission Tariff (OATT), the Market Rules, and also the "Open Access Same Time Information System ("OASIS") which is a secure, web-based interface to each transmission system's market offerings and transmission availability announcements. NBSO makes its OSASIS system available to NSPI, NSPSO and other market participants.

NBSO is also the Balancing Authority for NB, PEI and Northern Maine ("N.ME"), and has responsibilities for integrating resource plans, maintaining generation-load interchange balance, and conducting interconnection frequency in real-time.

NBSO is the Reliability Coordinator for NB, NS, PEI, and N.ME, and has responsibilities for maintaining the real-time operating reliability of the bulk electrical system within the reliability coordination footprint.

Nova Scotia

Nova Scotia's major utility, NSPI, has a "functionally unbundled" system operations entity, Nova Scotia Power System Operator ("NSPSO") which is a non-legal entity but with a clearly defined set of independent responsibilities and staff resources that provide the Wholesale Electric Transmission Services within Nova Scotia, and certain other functions and services to Independent Power Producers and Municipal Utilities. NSPSO's functions are administered using a FERC compliant Standards of Conduct. This specific code of conduct was established to govern NSPI's relationships with its transmission customers and potential customers, including the behaviour of employees of Nova Scotia Power and its Affiliates. These Standards of Conduct are based on FERC Order 2004 and earlier Orders 889 and Order 888 regarding non-discriminatory transmission open access, i.e. OATT.

Prince Edward Island

PEI has an operating system for the provision of transmission service based within Maritime using a Standard of Conduct similar to the approach followed in Nova Scotia. The Standard of

Conduct allows for the servicing of the independent municipal utility of Summerside and independent wind power generators.

Northern Maine

N. ME. is overseen by the Northern Maine Independent Administrator Inc. (NMISA), which is a non-profit entity responsible for the administration of N.ME's transmission system and electric power markets in Aroostook and Washington counties. This system has a load of approximately 130 MW. The NMISA is responsible for providing an independent, objective and non-discriminatory administration of all transmission access, transmission information access, and related functions. It also monitors and operates the markets in Northern Maine for energy, ancillary, and other services. NMISA administers the transmission systems of the investor-owned and cooperatively-owned utilities in N. ME. Its members include all municipally-owned utilities, generators, suppliers of energy, and large retail customers operating in the service area. Individual utilities continue to operate their section of the transmission system, subject to established agreements with the NMISA. NBSO serves as the balancing authority and reliability coordinator for N. ME.

Island of Newfoundland

The Island of Newfoundland has an isolated system with NLH as the provider of bulk transmission services and the primary supplier of generation for the isolated interconnected island electrical system. Reliable operation of the Island system whether for energy delivery, response to contingencies, performance of maintenance, or system restoratio is achieved through adherence to operating standards developed by NLH, and administered by its system operations personnel within the NLH Energy Control Centre. NLH acts as the province's balancing and control authority as well as its reliability coordinator.

Labrador

NLH coordinates operations with Churchill Falls Labrador Corporation (CFLCo) for all of Labrador retail, industrial and export power. CFLCo operates a 735KV system for deliveries to Hydro Quebec for the bulk of its 5428MW generation capacity with the remainder being delivered to the mining industry in Labrador City and the town of Happy Valley-Goose Bay. There are many small diesel systems in isolated communities along the coastline.

Quebec

Quebec's crown-owned utility, Hydro Quebec, has one of the largest electricity systems in North America and is an integral part of the NERC and NPCC's transmission oversight system. Hydro Quebec has an established Standard of Conduct to establish the protocols required by the various international agencies. The role of the provincial regulator, the Regie de l'energie, includes watchdog powers over the application of mandatory transmission system reliability standards.

New England

The various states in the New England area operate their transmission systems under an organization they set up as an "independent system operator (ISO). It is known as ISO-New England (ISO-NE) which is a regional transmission organization (RTO), serving Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont. ISO-NE is an independent, not-for-profit corporation. ISO-NE meets the electricity demands of the region's economy and people by fulfilling three primary responsibilities to ensure minute-to-minute reliable operation of New England's bulk electric power system:

- Provision of centrally dispatched direction for the generation and flow of electricity across the region's interstate high-voltage transmission lines;
- Development, oversight and fair administration of New England's wholesale electricity marketplace; and
- Management of comprehensive bulk electric power system and wholesale markets' planning processes that address New England's electricity needs well into the future.

SCHEDULE 5: MATRIX OF REGIONAL ELECTRICITY SYSTEMS OPERATIONS OPTIONS

This matrix is intended to outline the issues and considerations facing Atlantic Canada public policy makers when they consider the options for structuring the future of the bulk transmission system operations in the region. The current system will change assuming the New Brunswick Energy Blueprint stated policy of returning many of the New Brunswick System Operator ("NBSO") functions to NB Power is implemented. The NBSO currently performs services for the Maritime Provinces area and Northern Maine, and the proposed changes will require utilities, governments, and regulators to consider how these and possibly other system operations services can be best managed in the future.

This considerations and options matrix provides an overview of the current situation, the identified options for possible future consideration, and describes some of the factors and issues that might face regional system operations under each of these options. The matrix is a summary, and there is a great deal more information available concerning each of the options and related topics.

The regional system operations options are more completely explained in the AEG "Overview Paper on Regional Electricity System Operations." A brief definition of each of the identified Options follows:

Enhanced Regional Systems Coordination allows cooperating on policy and limited technical coordination without having direct involvement in the operations of the individual utility transmission systems. Coordination could be through separate bilateral agreements between pairs of utilities (like the coordination agreement between NBSO and NS Power), or could be a multiparty agreement. Such an arrangement could also provide governments and utilities with an approach to producing common research papers on policy initiatives, and technical and R&D reviews focused on topics such as improving the performance of the region's electricity market, and on some degree of regional planning, standards development, and compliance enforcement.

Independent System Administrator ("ISA") structure allows individual system owners/operators to maintain operating control of their transmission systems while entering into a multilateral agreement that establishes an administrator (i.e. an ISA) to oversee agreements that establish rules agreed upon by participants in the system, including operators, utilities, governments and regulators. These agreements establish the rules, penalties, and roles of participants and other key elements of operating a system within the region. The structure and the operating functions that are to be coordinated by an ISA are determined by negotiations among the

affected utilities, regulators, and governments. An ISA can take a role extending from administration, through to hands-on system involvement. A hands-on role would require "tools" to carry out this role. There are no defined restrictions on what can be included in an ISA structure, including possibly incorporating an independent system operator role.

Independent System Operator ("ISO") is an organization formed to coordinate, control, and monitor the operation of the bulk transmission system for a defined region. An ISO operates a region's electricity grid (either directly through a central control centre or through satellite centres, or through both); develops and administers the region's transmission tariffs and wholesale electricity markets, and provides reliability planning for the jurisdiction's bulk electricity system. The extent of an ISO's role is established through multilateral agreements among the participants that are approved by regulators, or more likely in the case of Atlantic Canada, through legislation.

System Operations Considerations and Issues	Current Situation (NB Energy Blueprint ("NBEB") impact is assumed)	Enhanced Regional System Coordination ("ERSC")	Independent System Administrator (ISA)	Independent System Operator (ISO)
1. General	Current	ERSC	ISA	ISO
a. Regional Operations	Currently overall regional responsibilities are not addressed collectively which raises the risk that beneficial issues and opportunities are overlooked or understated.	Agreements once struck leads to a level of certainty, but the concern is conflicting individual priorities could prevent agreement.	Independent oversight of agreements would allow specific areas of cooperation to be defined and coordinated toward established objectives	When mandates are clearly defined in policy, and stakeholders accept and adhere to those mandates, ISO reduces the risk of regional issues and opportunities being overlooked
b. Efficiency	Currently certain roles performed in each jurisdiction could be more efficiently performed by a single identity , leading to greater efficiencies due to economies of scale.(NBEP ends role of NBSO).	Coordination agreements that lead to greater cooperation, or sharing, of functions could lead to greater efficiency (reserve sharing as done today is an example),	Independent oversight of areas of greatest opportunity could be established by agreements and operating plans to achieve benefits through coordinated efforts	Potential for greater efficiencies due to economies of scale with respect to the functions that are performed centrally for the region.

2.	System Planning Requirements	Current	ERSC	ISA	ISO
a.	Planning Reliability Coordinator * (the functional entity that coordinates, facilitates, integrates and evaluates (generally one year and beyond) transmission facility and service plans)	Provincial approach with individual utilities and NBSO responsible in their province (NB Power takes over in NBEB)	As a planning function This function could be carried on by way of agreement which would require the sharing of relevant information, Currently NBSO files with NPCC , Maritimes Area Adequacy reports	Independent planning function could be carried on by way of agreement which would require the sharing of information. The function would not affect the operation of individual systems.	Identified in the NERC Version 5 Reliability Functional Model as function for an ISO to undertake
b.	Resource Planner* (the functional entity that develops a long term (generally one year and beyond) plan for the resource adequacy of specific loads (customer demand and energy requirements) within a resource planning area)	Individual utilities undertake. (No change in NBEB)	As a planning function could be carried on by way of agreement which would require the sharing of relevant information	As a planning function could be carried on by way of agreement which would require the sharing of information. The function would not affect the operation of individual systems.	See comment in 2 a. ISO
c.	Transmission Planner* (the functional entity that develops a long term (generally one year and beyond) plan for the reliability (adequacy) of the interconnected bulk electric transmission systems within a Transmission Planner area) **Function that could be affected by FERC Order 1000 (see Sec 3)f)*	Individual utilities and NBSO each responsible in their province (NB Power takes over in NBEP)	As a planning function could be carried on by way of agreement which would require the sharing of relevant information	As a planning function could be carried on by way of agreement which would require the sharing of information. The function would not affect the operation of individual systems.	See comment in 2 a. ISO

3. Regulatory Requirements	Current	ERSC	ISA	ISO
Provincial				
a. Transmission Rate Structuring (all provinces operate an OATT in order to sell into the US market)	Each province establishes policy and provides direction to the provincial regulator who establishes rate structure	Coordination of OATT and other tariffs policy could allow a reduction in system costs, and common regulatory approach could be defined where needed	Independent oversight of common operating agreements could lead to efficiency in costs and approaches to sharing costs rather than duplication	An ISO with a regional dispatch could create transparent, competitive costs which could be used by any of the provinces to establish innovative rate structures (eg real-time pricing).
b. Environmental Standards	Each province establishes targets and develops strategies for their own jurisdiction	Regional approach by agreement could allow environmental targets for the generation sector to be reached regionally with maximum efficiency	Independent oversight of regional system agreements could allow for a cost/benefit formula to establish dispatch on a regional approach	ISO would be responsible for implementing established targets that if not coordinated could add emissions and costs
Federal				
c. National Energy Board ("NEB")	Utilities seek their own permits, if needed, for particular projects	Project specific agreements could allow for a regional approach to multi province actions	Not an ongoing requirement as permitting is project specific	Not an ongoing requirement as permitting is project specific
d. Environmental Legislation(ie coal generation regulations)	Each province manages it own implementation and relationship with the federal government	Agreement could allow a regional approach to federal requirements resulting in a more efficient and timely approach.	Oversight of the electricity role in agreement implementation could be undertaken. Advice on regional approaches would be available.	An ISO structure could take direction on environmental emission reduction as a determining element in system operation.
International				
e. International Standards (FERC, NERC etc.)	NBSO manages many aspects of the standards and provincial regulators with individual agreements address others (NBEB will affect region's approach)	Regional approach by agreement would provide efficient approach to regulatory requirements as noted in System Operation requirements below (see Sec.	Agreements on regional approach, monitoring and reporting could reduce cost and improve efficiency as noted in System Operations requirements below. (see Sec.	Identified in the NERC Version 5 Reliability Functional Model as a function for an ISO to undertake

f.	FERC Order 1000 (see System Planning Requirements Sec 2)	Final FERC Order just established and no application experience to determine cost or role requirement	4) As a planning function could be accomplished by agreement and the sharing of necessary information.	4) As a planning function could be carried on by way of agreement which would require the sharing of information. The function would not affect the operation of individual systems.	See comment in 3 e. ISO

	4. System Operation Considerations	Current	ERSC	ISA	ISO
a.	Reliability Coordination (Transmission owners are obligated to provide real-time information and equipment limitations to the Reliability Coordinator.)	NBSO undertakes this role for the Maritime Provinces Area and Northern Maine, subject to an agreement(NBEB eliminates current NBSO role)	Coordination agreements existed pre NBSO and are needed to meet regulatory requirements. Post Muskrat Falls NL may need to be added.	A technical operation if undertaken regionally requiring "tools" to undertake monitoring and enforcement of coordination agreement but would not conduct system operation as utilities would be bound to follow direction.	A typical ISO performs the Reliability Coordination function. A typical ISO has the tools and information about the system which it operates (and its neighbours system) to allow it to perform this function.
b.	Balancing (Supply and Demand)	NBSO balances with NB P resources supply and demand for NB/PEI/N.ME. NSPSO balances for NS. NALCOR balances for the island of NL. resources.(NBEB change could affect the current arrangement)	A regional balancing agreement (similar to NB/PEI/NME)would require mandatory participation and provision of regional balancing information about the real-time supply and demand, the availability and cost of balancing resources to a selected utility to conduct the balancing dispatch.	A coordination agreement would require mandatory participation and provision of necessary information and the ISA would do the balancing dispatch and direct the utilities to follow . It would not have any real time control unless the necessary tools are provided.	A typical ISO would assess the need for balancing resources outside bilateral agreements and have adequate information about availability and cost of balancing resources. The ISO would select the optimum combination of resources to be ready to provide the service and then dispatch energy from those resources as required. . It would have real time control of many resources and directional control of others.
c.	Resource Adequacy	Each province's utility or SO assesses the ability of resources to meet the	Current coordination agreements would be replaced and could expand to	Agreement could allow for the development of a regional resource adequacy plan based	A typical ISO would set resource adequacy criteria for the region served (or zonal as

		respective provincial peak demands. The onus to procure adequate electricity is on the respective load-serving utility and the regulatory regime. NBSO conducts Maritimes Area Resource Adequacy analysis as part of its reliability coordinator role and files it with NPCC. (Under NBEB utilities will need new agreements)	include NL It may be possible to plan to meet a regional peak need, but a fair and deterministic method of allocating the needs to the respective provinces would be required. A robust agreement would be required on how to establish and allocate the regional requirement including taking into account transmission constraints.	on a pre determined criteria. An ISA could do everything for resource adequacy that an ISO would do.	dictated by transmission congestion) subject to mandatory reliability standards. An ISO would typically have the data to perform this assessment and would be doing so from an independent perspective. Transparent process, stakeholder and regulatory oversight bolster the robustness and integrity of the process.
d.	Operating Reserves	A negotiated resource sharing in the Maritime Provinces Region currently reduces total requirements, but there is no dynamic optimization of the sharing. (NBEB could affect the current arrangement)	Coordinated dynamic optimization may be possible by agreement, but would require at least one entity to have all of the relevant information including costs.	A regional agreement would require mandatory participation and provision of necessary information to the ISA which would do the scheduling (and possibly dynamic optimization) and direct the utilities to follow it. It would not have any real time control unless the tools were provided.	A typical ISO would establish regional (and zonal as required) reserve requirements and dynamically optimize the selection of resources to meet those requirements. . It would have real time control of many resources and directional control of others.
e.	Tariff Design	Each province has a separate tariff designed by the utility and approved by the provincial regulator. (Design by NBSO will pass to NB Power under NBEB)	A single coordinated tariff is unlikely through utility agreement. Also, any cost allocation on a regional basis would require local regulatory approvals which may not have authority to make such decisions and furthermore would require	An ISA could independently develop a regional tariff design but would need legislative changes for regulatory approvals.	An ISO, similar to an ISA, could independently develop a regional tariff design but would need legislative changes for regulatory approvals.

			unanimous approvals from each jurisdiction. Legislation is required.		
f.	Tariff Management	Utilities under Codes of Conduct implement the tariff through OASIS's. Discounting between areas to reduce pancaking is possible but rarely implemented. (Management by NBSO will pass to NB Power under NBEB)	Coordination of a discount mechanism, bilaterally between utilities or multilaterally across the region, is possible and could get regulatory approval. It could be, either in combination with a regional dispatch, or as an attempt to move toward more regional interchanges.	An ISA could independently develop a regional discounting mechanism and obtain regulatory approvals. (A regional tariff is not required for a regional market)	An ISO, similar to an ISA, could independently develop a regional discounting mechanism and obtain regulatory approvals. (A regional tariff is not required for a regional market)
g.	New energy sources entering Atlantic regional market (Muskrat Falls, Lepreau II, tidal, wind)	Current approach is relatively individual other than NPCC reliability requirements.	A regional committee (like the Maritimes Area Technical Planning Committee organized by NBSO) could be formed. Without NBSO the future of MATC is unknown and possibly there will be no one entity having an explicit and exclusive mandate to perform coordination of the necessary work.	A regional ISA could, as a minimum, provide overview coordination in Atlantic Canada and with adjoining Planning Coordinator areas, or be empowered, in addition, to facilitate, integrate and evaluate transmission facility and service plans, and resource plans. Dependent on the "tools" available agreements could establish a mechanism for the ISA to follow in establishing the requirements for the introduction of new capacity based on individual utility strategies.	A regional ISO would be empowered to coordinate, facilitate, integrate and evaluate transmission facility and service plans, and resource plans within Atlantic Canada and coordinates those plans with adjoining Planning Coordinator areas.

h.	Loss Optimization	Loss optimization is part of the dispatch strategy in each area but there is no regional loss optimization in the scheduling of energy by market participants or in the real-time dispatch of resources.	While not impossible, it is improbable that coordination agreements would allow for a regional optimization of losses. It would require a coordinated "central dispatch", but would also require that the one entity that is performing the dispatch also performs the loss optimization.	An ISA could perform loss optimization within the optimized dispatch function. This could be done within a physical bilateral market with resulting schedules communicated to separate utility SO's to implement or dependent on "tools" available the ISA could be charged through agreements to manage the system to minimize the loss dependent on the framework established for system operation.	An ISO would be expected to perform a loss optimization within the optimized dispatch function. In the case of a physical bilateral market, similar to an ISA the economic dispatch would take losses into account and have minimum total costs as the objective function.
i.	Central Dispatch	There is currently no centralized regional optimization of energy dispatch. NBSO performs a centralized security constrained economic dispatch of resources in NB and has the ability to economically dispatch resources that are registered in the NB market but are located outside of NB. (With NBEB separate dispatches would continue.)	Coordinated regional optimization of energy dispatch could be established by agreement but would require at least one entity to have all of the current relevant information including confidential costs and capabilities in order to make a determination of the optimum dispatch of resources. One entity would need to have exclusive legal authority through a multilateral coordination agreement to dispatch resources in each utility.	An ISA could perform an independent regional/zonal energy dispatch similar to an ISO and communicate hourly schedules to each utility. Real time dispatch and control is dependent on "tools" available to ISA. There could be agreement on a dispatch criteria to maximize the benefit for all utilities dependent on the agreement dispatch criteria	An ISO would perform a regional (and zonal as required) energy dispatch taking into account total needs and cost information for all resources. An ISO would typically have the data(and control capability) to perform security-constrained economic dispatch , both hourly and in real time, and would be doing so from an independent perspective.
j.	Unit Commitment	There is no centralized	Coordinated unit	Agreement could establish	A typical ISO would perform

		regional optimization of unit commitment. Bilateral market transactions can result in reduced unit commitment costs but are impeded by incomplete resource information and marketers' transaction costs.	commitment could be established by agreement, but would require at least one entity to have all of the relevant information including costs in order to make a determination of the optimum commitment of resources.	the responsibility in the ISA, dependent on the "tools" available, to direct the agreed criteria upon which the generation units would be dispatched to meet the agreement objectives	a regional (and zonal as required) unit commitment taking into account total needs and cost information for all resources. An ISO would typically have the data to perform unit commitment and would be doing so from an independent perspective.
k.	Operational Efficiencies	In addition to performing the Reliability Coordinator function for the Maritime Provinces and Northern Maine, , NBSO has also taken on OASIS hosting for NSPI and E-Tagging for other entities. (NBEB eliminates NBSO which would require a new approach).	Some additional system operator activities could be centralized or coordinated through agreements.	An ISA could perform most of the necessary functions with a clear exception being real time operations without the necessary "tools". Dependent on the "tools' available, the agreements could establish a criteria to direct the operation of the system to achieve efficiencies without interfering with individual utilities operating strategies	A typical ISO performs many functions for the region served including the following functions from the NERC functional model: Planning Reliability, Resource Planning, Transmission Planning, Operating Reliability, Interchange, Balancing, Market Operations, Transmission Service.

5. ***Public Policy Elements***	Current	ERSC	ISA	ISO
a. Coordination of regulatory requirements respecting system operating principles	Limited discussion among provinces	As a government policy function the task could be accomplished by regional agreement	Once government agreements have been developed establishing operating principles could be a primary responsibility for an ISA	A region approach could mandate a common and legislated approach to system operations for the ISO to use in operating practises
b. Regional emission management approaches	Limited discussion among provinces	As a policy planning or coordination function the task could be accomplished by agreement and the sharing of information.	Agreement could allow for ISA to assist in policy development and have responsibility for independent oversight of electricity sector implementation	ISO role focus would be on implementation of regional policies directed toward the electricity sector using tools including dispatch, balancing etc.
c. Public Policy Developer role in FERC Order 1000	New FERC Order requiring interpretation	As a government function the task could be accomplished by agreement among provinces and the sharing of necessary information.	A role clearly established to be responsibility of government. Implementation and verification could be an agreed upon task of ISA	A role clearly established to be responsibility of government. Implementation and verification would be a direct responsibility of ISO.
d. Consumer Awareness and Education	Each jurisdiction seeks to better educate consumers (eg. see NBEB).	Agreements involving the provinces and/or utilities for education and awareness programs (e.g. an "Atlantic Electricity Working Group") could be structured to increase reach and frequency of information.	Regional Agreements could assign responsibility to ISO to implement the agreed upon messages .	A regional ISO would be providing transparency and interpretation of information related to the region's bulk power system (e.g. real-time marginal energy and ancillaries' prices, locational constraints). Limited role in direct consumer contact but

					could be added if parties directed.
e.	Smart Grid (including load control, customer participation, electric vehicles, R&D, renewables integration.)	Atlantic Powershift is an example of how regional collaboration can be achieved through agreement. Future development has not been determined.	Regional agreements could allow for implementation of cooperative approach to smart grid applications with individual system, operators responsible for application.	An ISO could over see a regional agreement to ensure costs and benefits are identified for the utilities" but would need utilities to implement real time controls if tools were not in their control.	A regional ISO could be integral to the bulk power system aspects of smart grid (e.g. realtime price signals). Additional Smart Grid functions could be asked of the ISO by policy-makers (e.g. R&D).