

Generation and Transmission Issues

NEB's Energy Futures Seminar

Ottawa

January 22, 2008

Bill Marshall

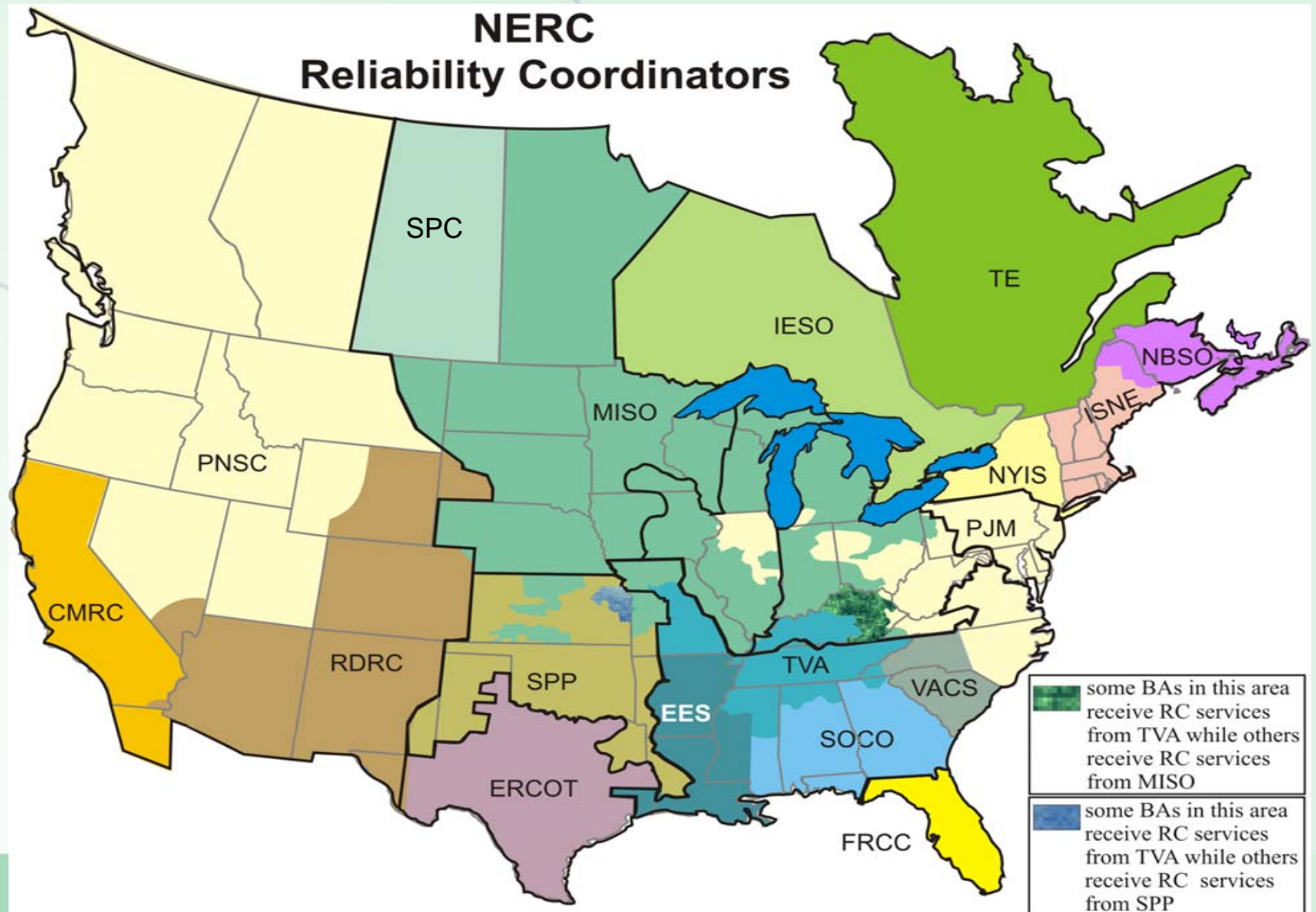
President and CEO

New Brunswick System Operator

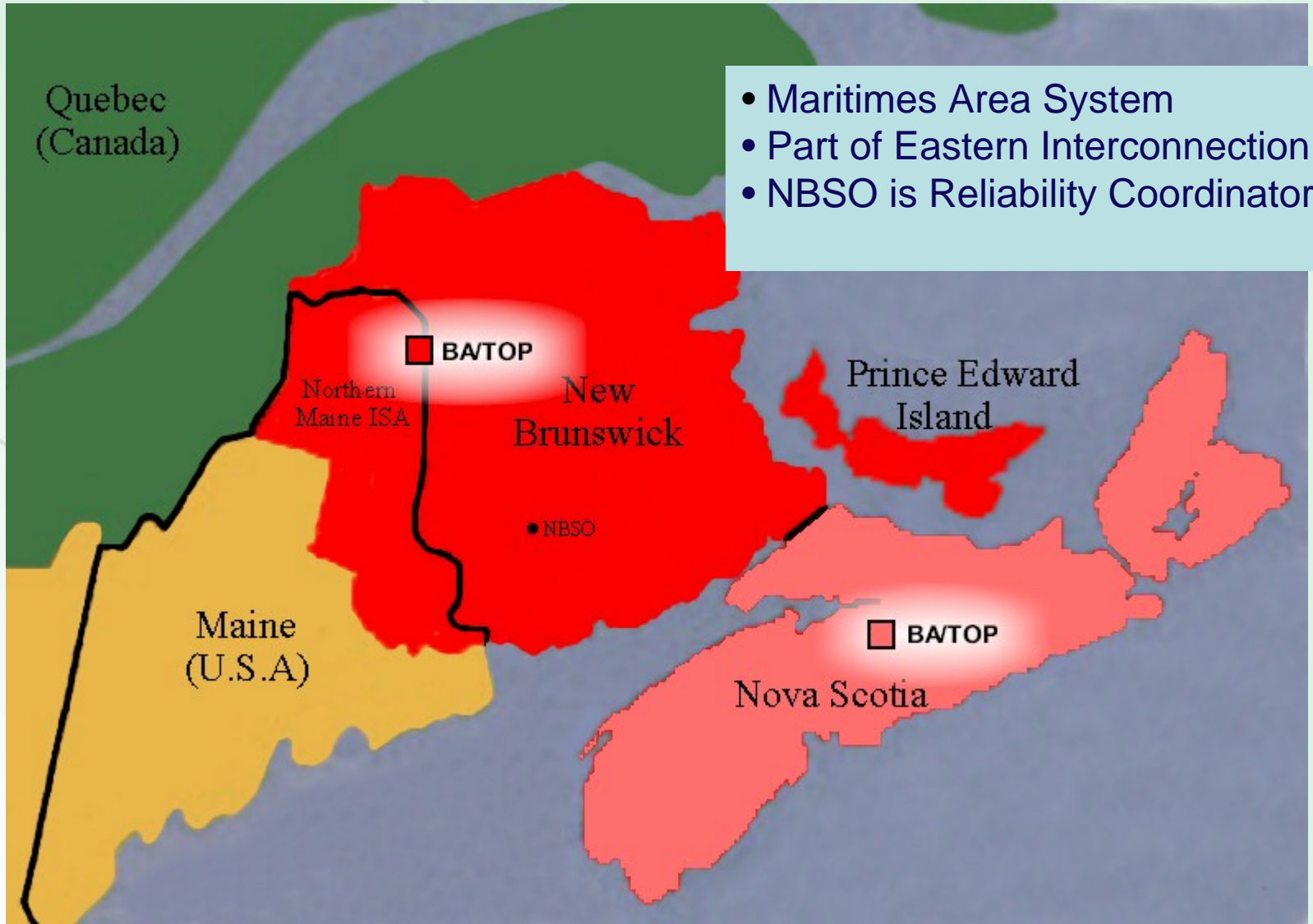


New Brunswick System Operator

- ***Independent statutory corporation (NB Electricity Act)***
- ***One of 18 Reliability Coordinators***



www.nbso.ca



- Maritimes Area System
- Part of Eastern Interconnection
- NBSO is Reliability Coordinator



"Canada's Energy Future" Findings

- **All energy prices will be higher**
 - *Especially oil and natural gas*
- **Long term future energy availability will not be an issue**
 - *Globally this may not be correct*
- **Fossil fuel will continue to be dominant source**
 - *For transportation and heat (but not electricity?)*
- **Electricity generation mix will change significantly**
 - *Nuclear, hydro and wind will grow*
 - *Clean coal with carbon capture needs development*
- **Demand is not price responsive**
- **Electricity exports increase in all scenarios**



"Canada's Energy Future" Findings

- **Definite linkage between energy, economy and environment**
- **GHG emission intensity declines in all scenarios**
 - *20% absolute reduction from 2006 by 2020 is a challenge*
- **Technology can offer solutions**
 - *Supply, efficiency, GHG emissions*
- **A cross cutting policy framework is needed**
 - *Sectors, goals and regions*
- **Major investments in infrastructure are required**
- **Greater public engagement and acceptance will be needed**
- **Long term energy vision and strategy for Canada is needed**



Electricity Sector Direction?

Considerations

- Fossil fuel prices will continue be higher than the report
- GHG reductions by 2050 need to be 50% or more
- Electricity sector has greater flexibility to cut GHG

Consequences

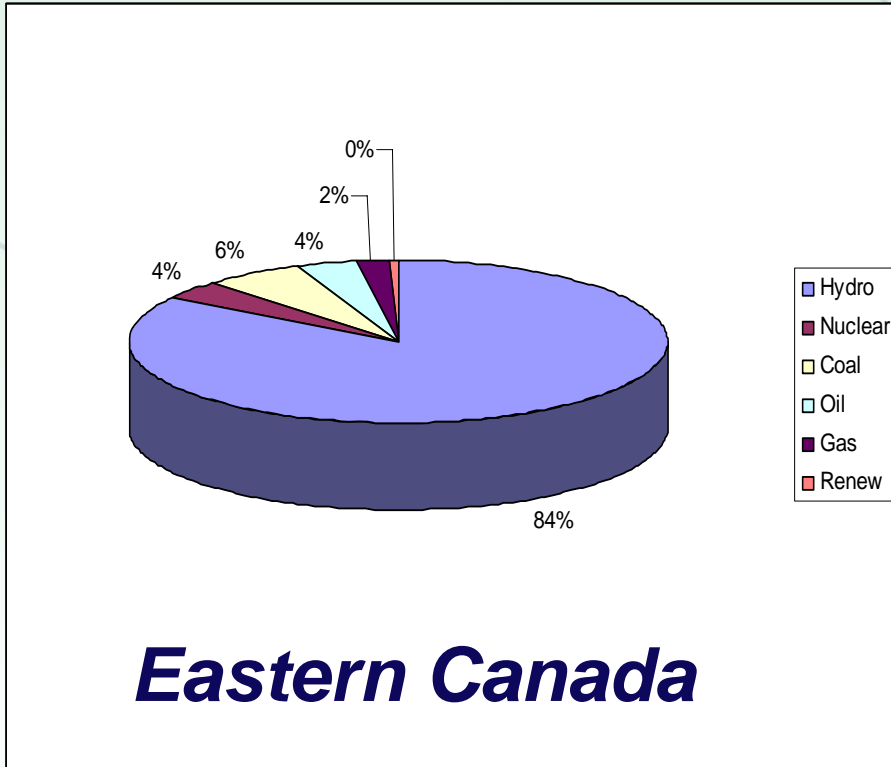
- Actions must be accelerated and amplified
 - *GHG Requirement could be 80% reduction for electricity*
 - *Efficiency is paramount & Low emission generation is essential*

Requirement

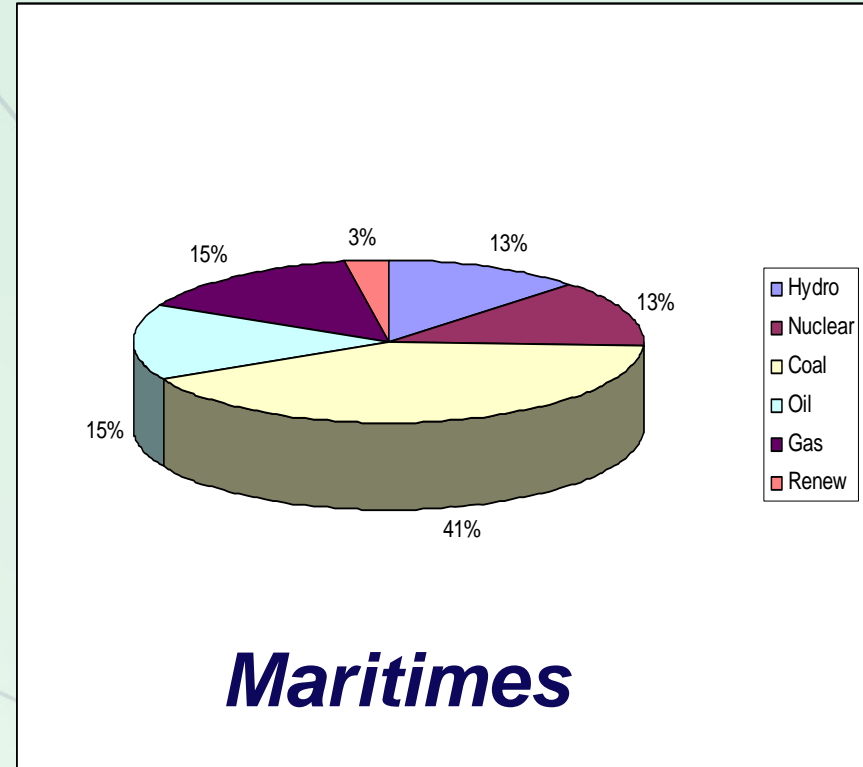
- Long term integrated Canadian strategy



Current Eastern Canada Supply Mix (by Energy)



- Primarily Renewable Hydro



- Primarily Fossil
- Major CO2 Challenge



Common Canadian Goals and Actions

- ***Define and set renewable targets***
- ***Set up independent energy efficiency agencies***
 - Agence de l'efficacité énergétique du Québec
 - Efficiency New Brunswick
 - Conserve Nova Scotia
- ***Pursue aggressive energy efficiency plans***
- ***Initiate new generation plans***
 - Wind, hydro, nuclear, coal, tidal
- ***Use electricity to grow provincial economies***
 - Continue to supply electricity exports to NE



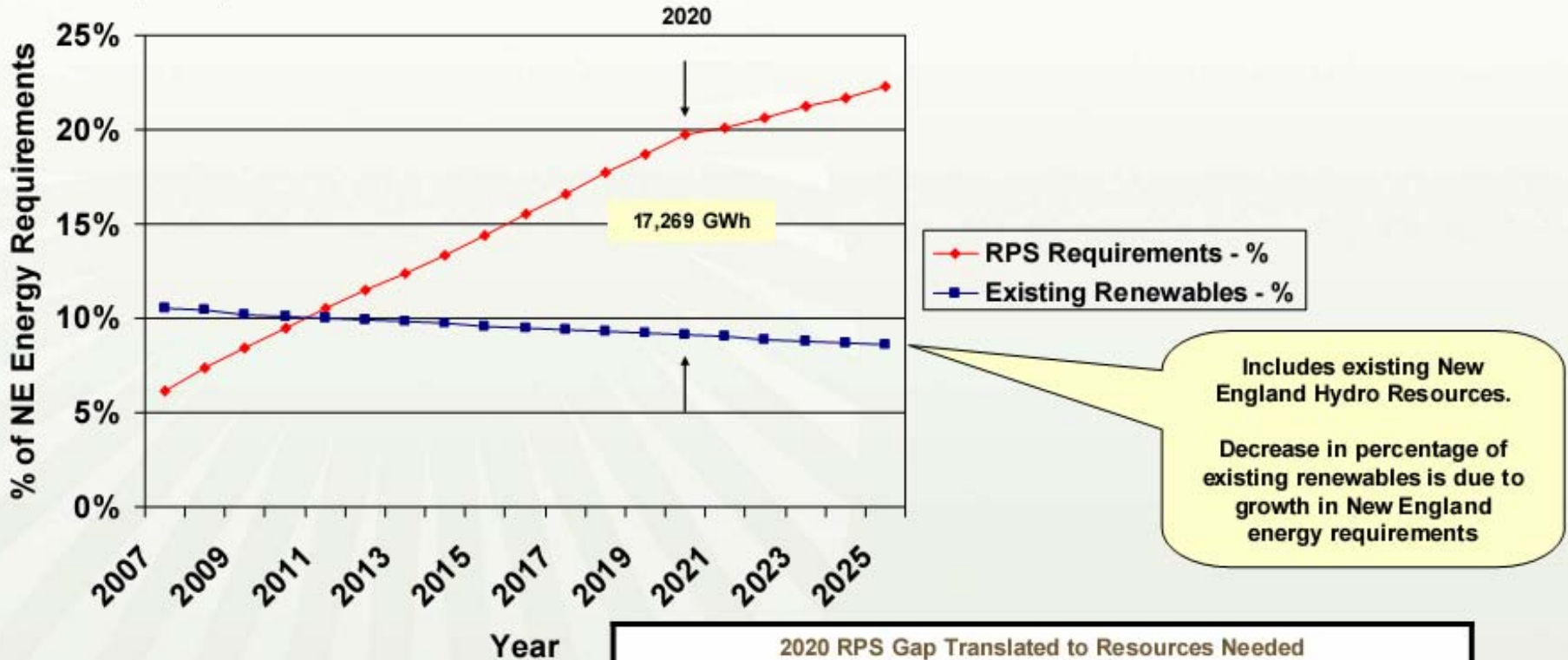
Common Canadian Challenges

- ***Continued demand growth***
- ***Unstable fuel prices***
 - Natural gas and fuel oil have tripled in last 10 years
- ***Market access to ISO-NE***
 - Transmission access and rules
- ***GHG Reduction Targets***
 - Emission intensity by 2010 and 2015 (Canada)
 - Equal to 1990 levels by 2010 (NEG/ECP)
 - 10% from 1990 levels by 2020 (NEG/ECP)
 - Hard Canadian targets????



New England's 1st Environmental Challenge: Renewable Portfolio Standards (RPS)

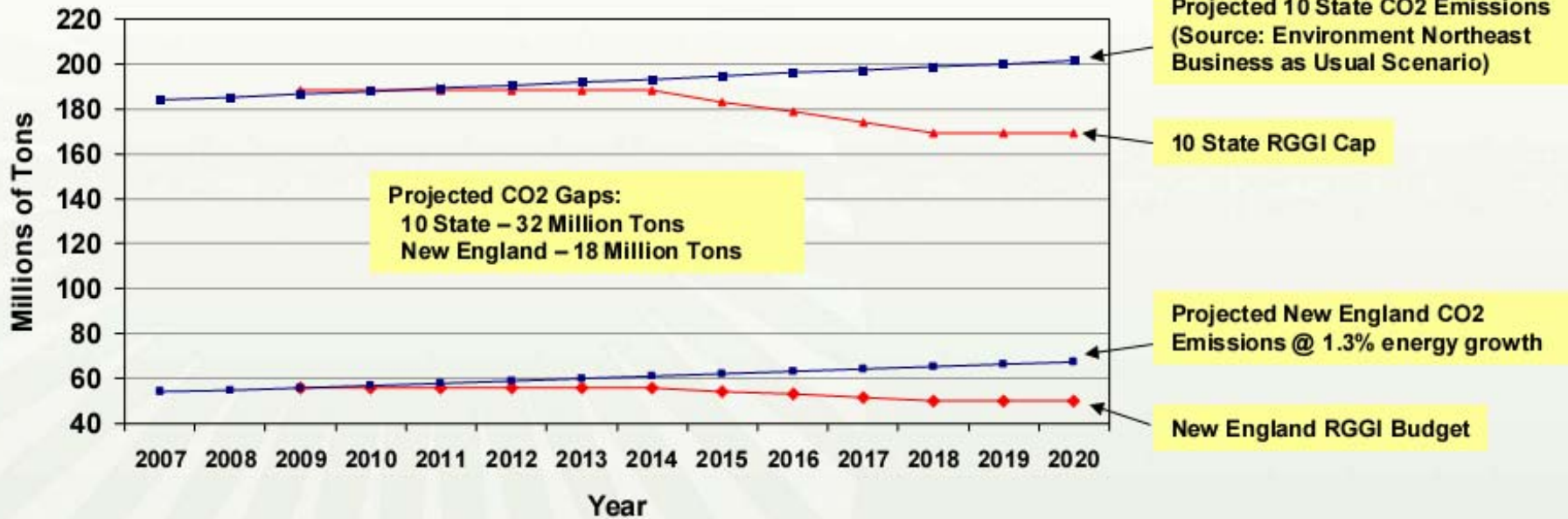
- Beyond 2010, a growing gap in meeting New England RPS is projected (could reach 17,000 GWh by 2020)



2020 RPS Gap Translated to Resources Needed				
Technology	Size	Number Required	Total MW Required	Assumed Capacity Factor
Biomass	50 MW plants	49	2,500	80%
Wind	3 MW Turbines	2,200	6,600	30%
Solar	2kW panels	8.2 million	16,400	12%

New England's 2nd Environmental Challenge: Regional Greenhouse Gas Initiative (RGGI) Requirements

RGGI CO2 Emissions



- ◆ New England RGGI CO2 Budget
- Projected New England CO2 Emissions
- ▲ 10 State RGGI Cap
- Projected 10 State CO2 Emissions

Magnitude of meeting this challenge for New England

- > 31,400 GWh fossil generation replaced with low / no emissions resources
- > Equivalent to 4,500 MW of baseload generation (80% capacity factor)

Eastern Canada Conventional Generation Potential

- **Hydro Targets**

Quebec	6500 MW
Newfoundland & Labrador	2800 MW
<u>Other Hydro</u>	<u>2000 MW</u>
Subtotal	11300 MW (78 TWh)

- **Nuclear**

New Brunswick	2200 MW (15 TWh)
---------------	------------------

- **High efficiency gas cogeneration and CO2 sequestered coal**

Nova Scotia	500 MW
<u>New Brunswick</u>	<u>1000 MW</u>
Subtotal	1500 MW (11 TWh)

- **Total potential** **13800 MW (104 TWh)**



Eastern Canada Wind/Renewable Estimate by 2020

Targets

Quebec	4,000 MW
New Brunswick	500 MW
Nova Scotia	500 MW
Prince Edward Island	300 MW
Newfoundland & Labrador	1,500 MW

Potential

Northern Maine	800 MW
<u>Export</u>	<u>?? MW</u>
Totals	10,000+ MW



Most except Newfoundland & Labrador prior to 2015

Delivery Challenges

- ***Transmission is an issue***
 - Robust Canadian systems will need reinforcement to accommodate the amount of generation considered
 - Some is local and some is long distance
- ***Interconnection capacity to NE is an issue***
 - Current transfer capability from Canada is derated
 - 3600 MW operates at 2400 MW due to US limitations
 - What actions are needed in NE? In US?
- ***Operation of intermittent wind power is an issue***
 - Especially in Maritimes
 - Regional cooperation is needed



Wind Generation Challenge

- ***Benefits have increasing value***
 - Renewable source with low emissions
 - Public support and reasonable economics
- ***Operational issues are major concern for SOs***
 - Intermittent non dispatchable output
 - Low inertia and Voltage support limitations
- ***“How do we accommodate as much wind as possible at least economic and reliability cost?”***
- ***What actions? What costs? Who pays?***

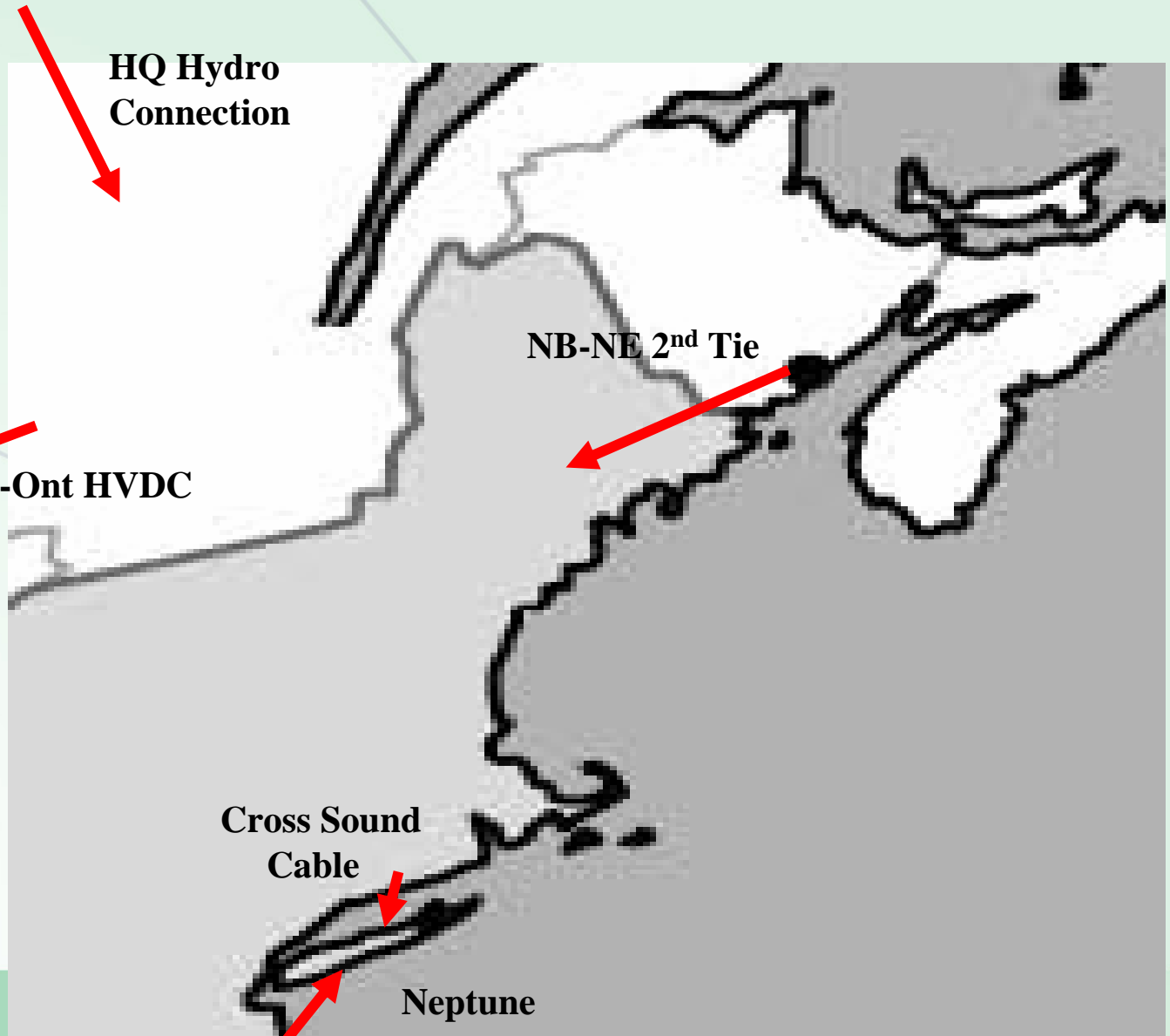


Wind Integration Cooperation

- ***NEG/ECP direction to support renewables***
 - NICE committee work
 - System operator wind seminar Feb 12-13
 - NB-NE joint studies and pilot project
- ***Regional solution is possible***
 - More efficient operation
 - Shared reserves
 - Shared balancing
 - Shorter interchange schedules (1 hr reduced to 15 min)
 - Larger balancing areas
- ***NBSO initiating a regional wind integration study***
 - Regional cooperation is appreciated

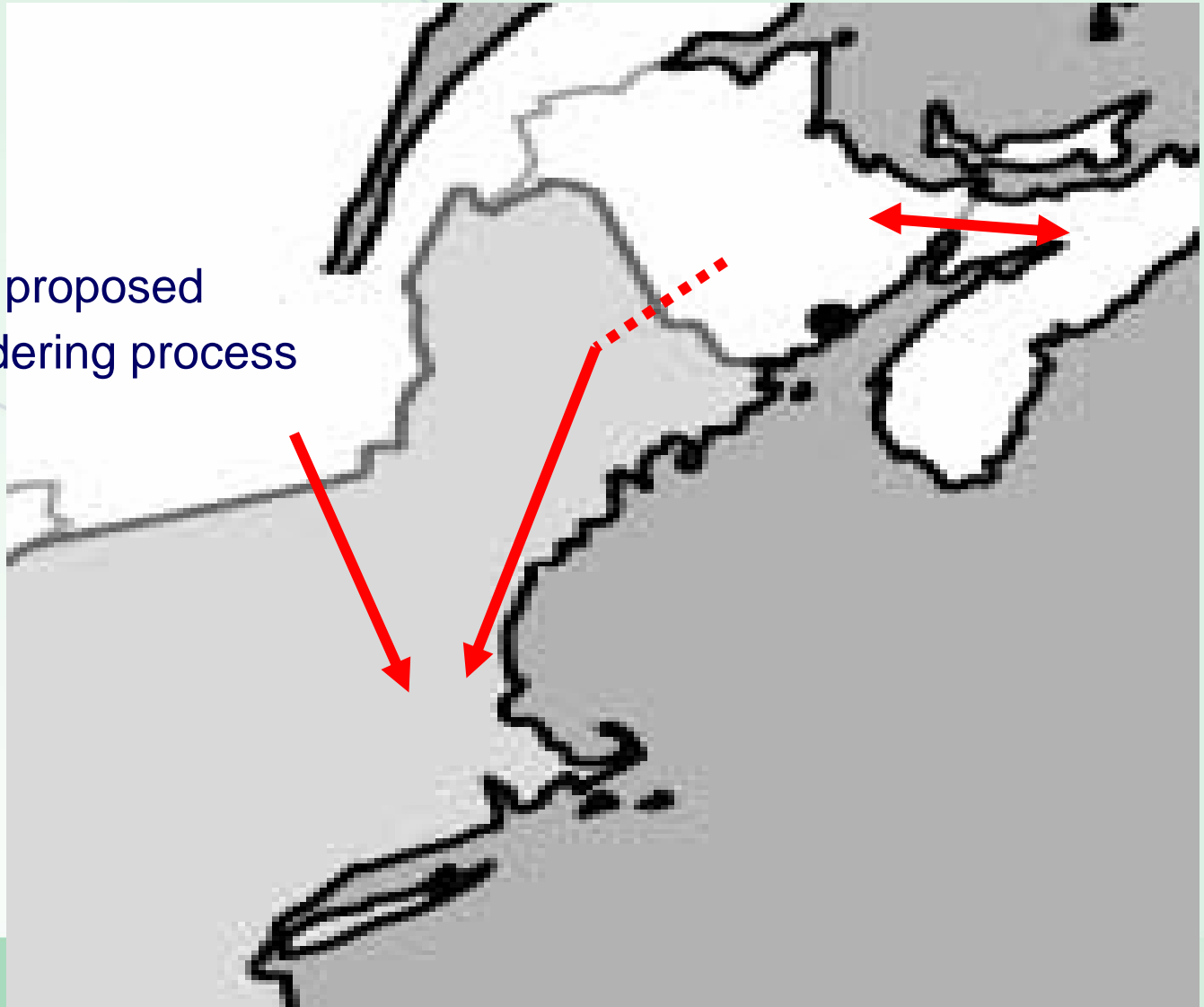


Transmission - Recently Committed/Completed Projects

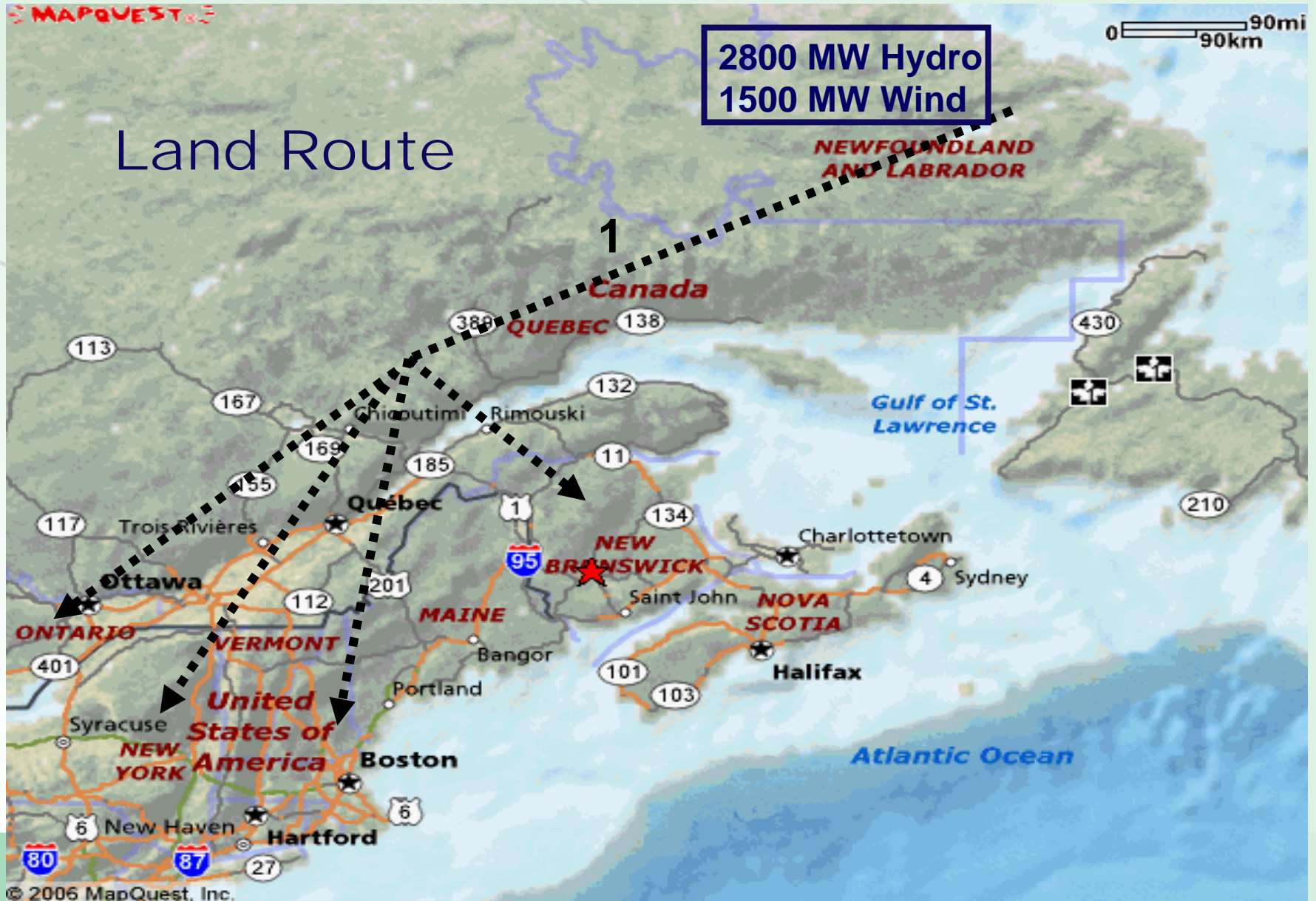


Required New Projects

Many projects proposed
ISO-NE considering process



Lower Churchill Transmission Options



Lower Churchill Transmission Options



Transmission Benefits

- ***Benefits identified at recent workshop***
 - Increased Reliability
 - Lower system losses
 - Lower rates for end use customers
 - Reduced congestion
 - Improved competition
 - Greater supply diversity
 - Lower emissions
 - Environment siting of generation
 - National security



Outstanding Transmission Issues

- ***Transmission cost allocation***
 - Within jurisdiction (State & load pocket concerns)
 - Between jurisdictions (State and RTO interaction)
- ***Future is in inter-regional projects***
 - Who pays and who builds?
- ***Canada has no FERC rule***



First Step Toward a National Strategy

- ***Lower Churchill must go forward***
 - Lowest cost project in North America
 - Benefits for Eastern Canada and Northeast US
 - Transmission is the issue
- ***Canada should support East-West Grid***
 - Needed as Canadian climate change project
 - Provincial jurisdiction and tariffs respected
 - Simple federal cost share like TransCanada Highway
 - Let market transactions happen



Questions?

