

# Creating Benefits for New England Through Additional DC Transmission Connections

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Northeast Utilities

Régie de l'énergie  
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**Northeast  
Utilities System**

**Energy / Growth / Leadership**

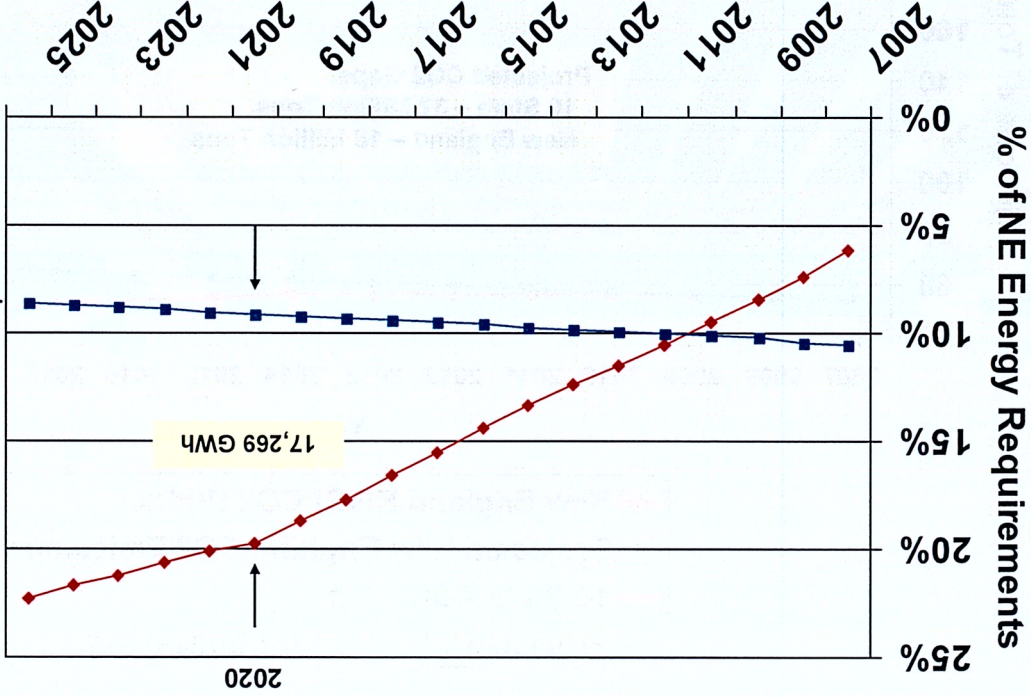
## New England Faces a Number of Significant Energy-Related Challenges

- Resource adequacy
- Energy needs
- Grid reliability
- Fuel diversity and system operability
- Price of electricity
- Environmental Requirements



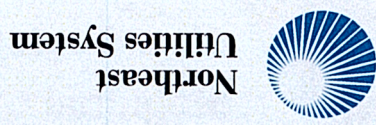
# New England's 1st Environmental Challenge: Renewable Portfolio Standards (RPS)

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



Includes existing New England Hydro Resources.  
Decrease in percentage of existing renewables is due to growth in New England energy requirements

RPS Requirements - %  
Existing Renewables - %

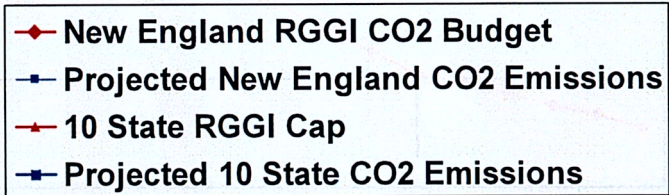
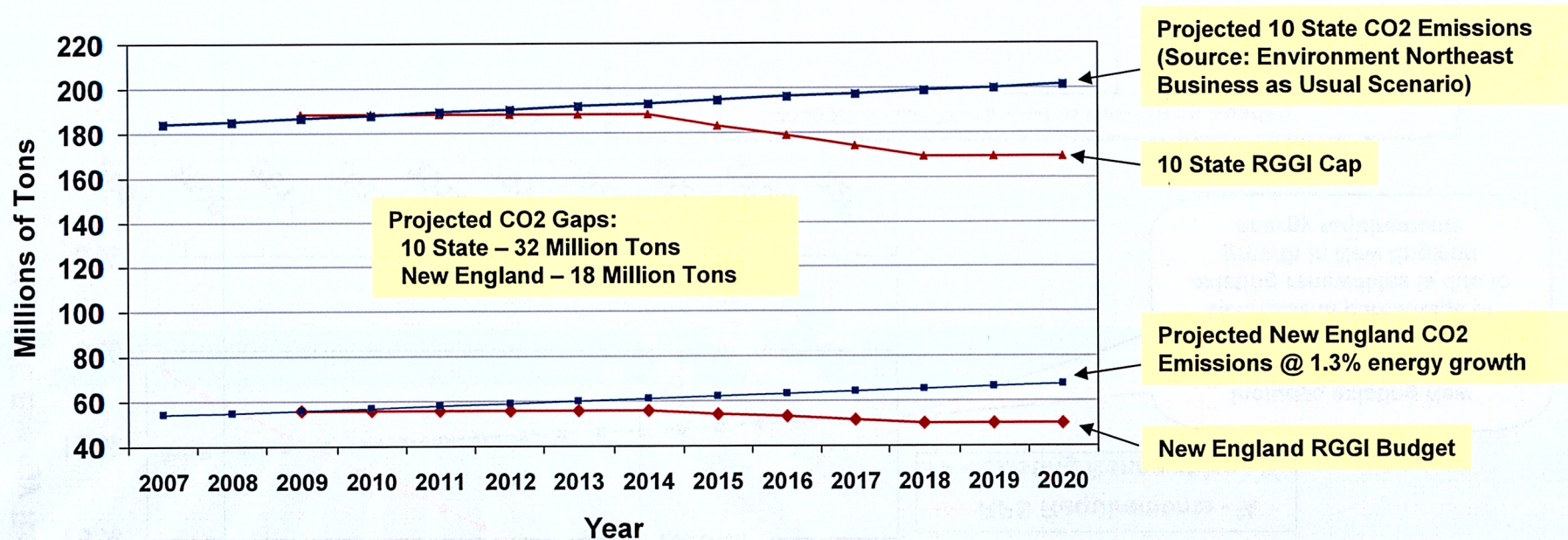


2020 RPS Gap Translated to Resources Needed

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

# New England's 2<sup>nd</sup> Environmental Challenge: Regional Greenhouse Gas Initiative (RGGI) Requirements

RGGI 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)

## A Business As Usual Approach Will Not Result in an Acceptable Outcome

- ISO-NE's Scenario Analysis showed that the gas-fired scenario would not reach the RPS and RGGI goals and results in high prices and continued heavy reliance on natural gas
- The environmental targets themselves are deterministic and may be inconsistent with a market approach to determining generation supply and dispatch
- Significant changes required include:
  - Aggressive energy efficiency programs
  - Generation Mix
  - Generation Dispatch
  - Addition of new, low-emissions resources



## A Portfolio of Energy Resources Will Be Required

- Key elements of a portfolio approach
  - Energy efficiency and demand response
  - Efficient new generation and renewable resources within New England
  - Carbon emissions policies and programs
  - Low carbon emissions resources from Canada
  - New transmission connections within New England and to Canada



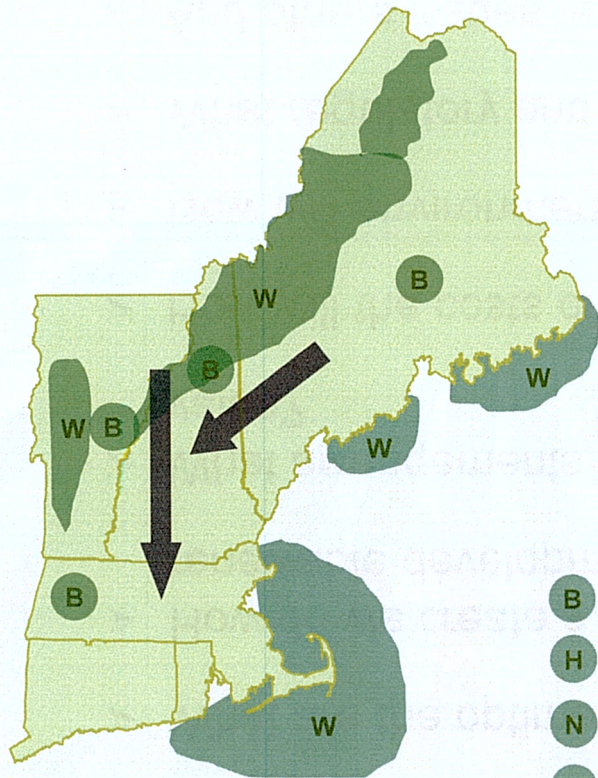
## Finding the Right New England and Canadian Solutions Will Require Solving Many Issues

- What are the optimal solutions and how do we reach consensus?
- How do we create a transmission pricing protocol to enable new renewable development in remote areas of New England?
- What arrangements with Canadian suppliers will result in economic value?
- How will the costs of new transmission be recovered?
- How will environmental and diversity benefits be valued?
- What regulatory and legislative changes will need to be implemented?
- And others issues, as we move forward.



# Northern New England and Eastern Canada Will Become Valuable Sources to Meet New England's Needs

## New England's Most Attractive Renewable Energy Locations



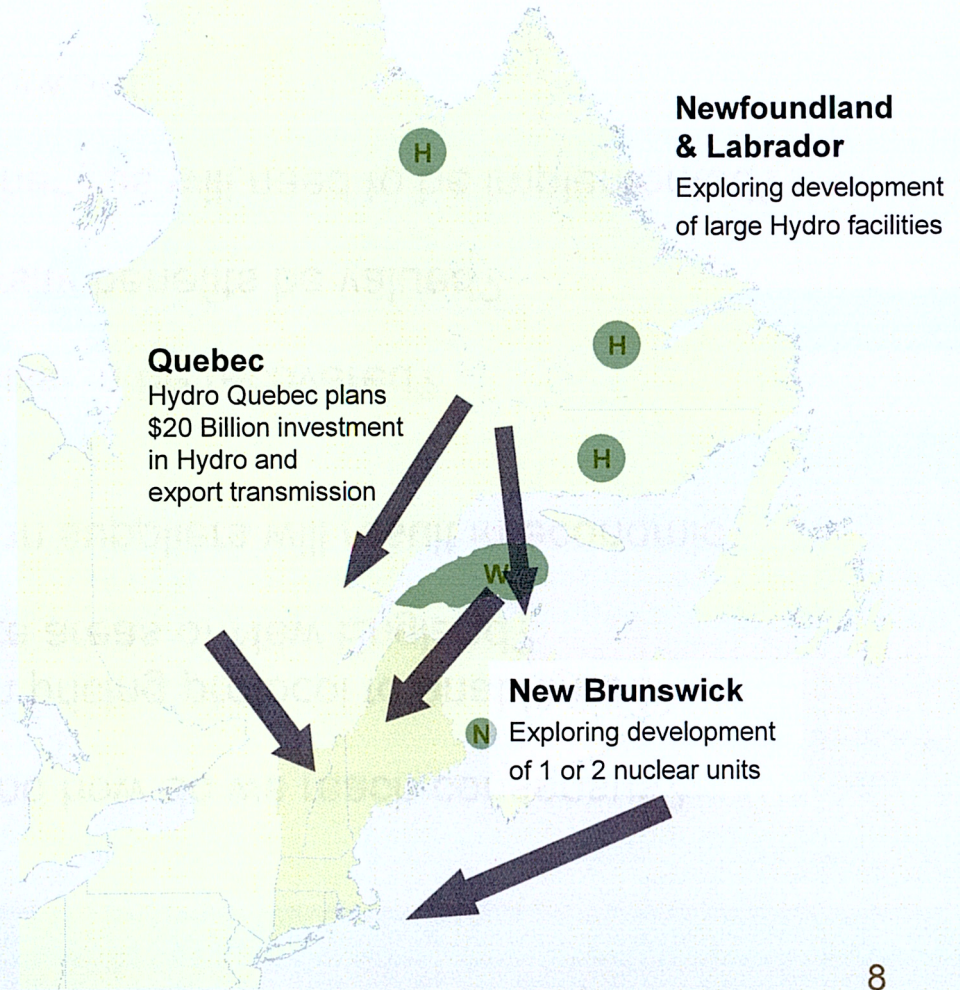
- B Biomass
- H Hydro
- N Nuclear
- W Wind

General Movement Of Power



**Northeast Utilities System**

## Eastern Canadian Development

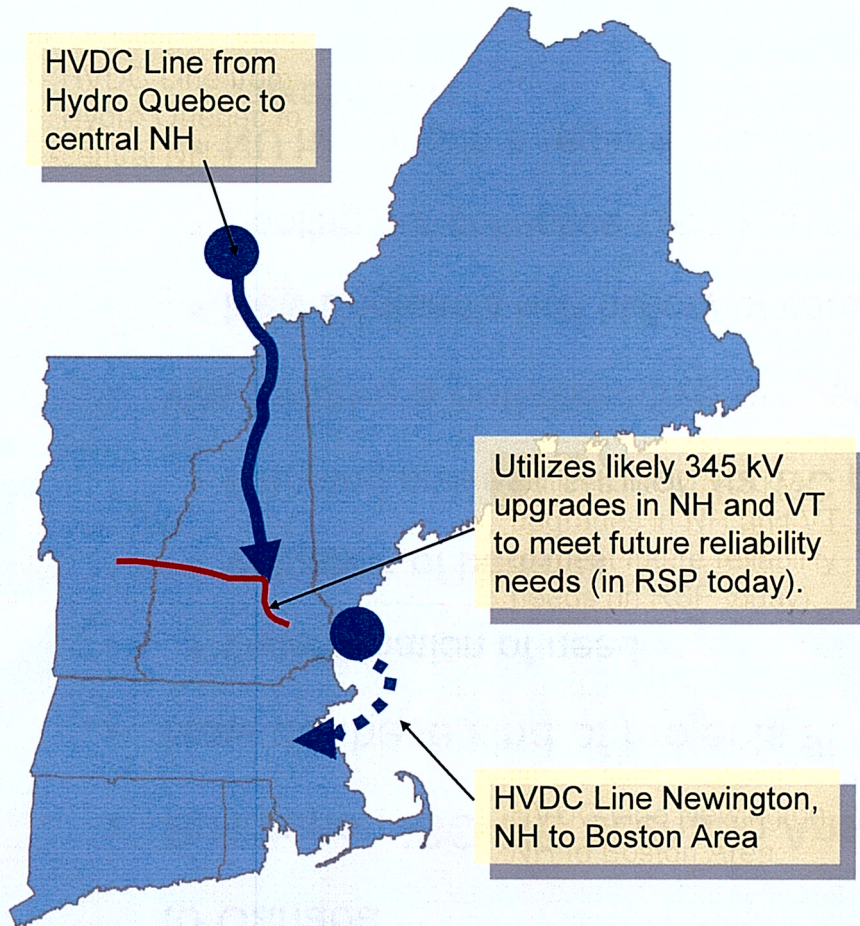


**Newfoundland & Labrador**  
Exploring development of large Hydro facilities

**Quebec**  
Hydro Quebec plans \$20 Billion investment in Hydro and export transmission

**New Brunswick**  
Exploring development of 1 or 2 nuclear units

## A Set of Complementary Projects with Tangible Benefits for New England



### Benefits

- A solution with real benefits for the region
  - Economic value
  - CO<sub>2</sub> reduction
  - Renewable resource additions
  - Fuel diversity
- HVDC tie line with Hydro Quebec allows for large import capability into New England
- Optimizes use of existing and planned bulk power grid -- connects the DC tie line from Hydro Quebec at a good location on the New England AC system
- Provides a new, strong and separate reliability path from HQ
- Addition of north-south DC connection allows for enhanced power flows to southern New England load centers



## Thoughts on a Going Forward Process

- One project like this may not be enough -- may need multiple new lines to Canada
- Build upon ISO-NE Scenario Analysis key themes and results
- How do these kind of projects fit with “Market Efficiency Upgrades?”
  - Determination of need
  - Valuation of benefits
  - Planning process support for DC projects?
- We believe a collaborative process will work best
  - New England’s rich history of cooperative bulk power system planning
  - Pooling our collective capabilities will result in a better solution
  - NU has begun a regional dialogue with transmission owners and other stakeholders

