The Brattle Group

Resource Adequacy in New England

Interactions with RPS and RGGI

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Agenda

Inter-Related Policy Objectives

Resource Options

Next Steps for Policymakers

Resource Adequacy Needs

New Capacity Needed to Meet the Resource Adequacy Criterion in ISO-NE

Year	Additional Installed Capacity Possibly Needed (MW)
2010	61
2011	805
2012	1,459
2013	2,072
2014	2,606
2015	3,111
2016	3,543

Note: These figures exclude likely planned additions and potential retirements

In addition, there are local sourcing requirements for CT and Boston and Non-ME New England.

Source: "Representative Installed Capacity Requirements for RSP07" Presented by Maria Agustin, PSPC Meeting August 16, 2007

New Environmental Requirements

The Regional Greenhouse Gas Initiative (RGGI) will stabilize carbon dioxide emissions from the region's power plants at current levels from 2009 to the start of 2015, followed by a 10% reduction in emissions by 2019. In addition, federal climate legislation is likely.

Regional Portfolio Standards (RPS) will be difficult to achieve.

Projected State RPS Requirements Based on the ISO 2006 Electric Energy Use Forecast (1,000 MWh)

State	2005	2006	2010	2015
Connecticut (Class 1)	493	660	2,428	2,617
Massachusetts	1,042	1,322	2,693	5,770
Rhode Island		0	405	925
Vermont		0	225	535
Total RPS requirements	1,535	1,982	5,751	9,847
Increase above 2005 requirements [(a)]		447	4,216	8,312

Note: Requirements have been added in New Hampshire and modified in Rhode Island since this table was constructed.

Source: "Regional System Plan" Approved by the ISO New England Board of Directors, 2006, page 73.

The Importance of Fuel Diversity

ISO-NE's Scenario Analysis projects gas on margin ~90% of the time, creating major exposure to high gas prices.

However, the outcomes of alternative resource strategies differ:

- Prices & costs vary > 13%.
- Emissions vary.
- Gas reliability depends on the amount of gas used during winter peaks.

Source: ISO New England, "New England Electricity Scenario Analysis: Exploring the economic, reliability, and environmental impacts of various resource outcomes for meeting the region's future electricity needs," August 2, 2007, p. 50.

How to Achieve Simultaneously Resource Adequacy, RPS/RGGI, and Fuel Diversity?

Resource Option	Resource Adequacy	RPS/ RGGI	Fuel Diversity
Thermal Generation			
• Gas-Fired	**Yes**	**No**	**No**
• Pulverized Coal	**Yes**	**Worst**	**Yes**
• Nuclear, Coal w/CCS	**Yes**	**Yes**	**Yes**
Renewables			
• Wind/Other in S.NE	**Partial (20%)**	**Yes**	**Yes**
• Wind in N.NE & Canada Firmed up by Existing Unused Summer Peaking Capacity in Maritimes	**Yes**	**Yes**	**Yes**
Demand-Side Management (DSM)			
• Energy Efficiency	**Yes**	**RGGI Yes**	**Yes**
• Demand Response (DR)	**Yes**	**No**	**Yes**

The full set of options should be evaluated.

Conventional Fossil Generation

Gas-fired CCs and CTs

- Likely to continue to be developed by merchant developers due to relatively low capital costs and lead times.
- Does not meet RPS standards; could help to meet RGGI if old units are displaced.
- Worsens fuel diversity.

Pulverized coal

- Low cost fuel, but…
- Would substantially increase CO_2 emissions.
- Siting/permitting difficulties, climate risk, and the combination of high costs and long lead times with a lack of long-term contracts have prevented merchant development in ISO-NE.

Very Low-Carbon, Baseload Thermal Generation

Nuclear

- No new plant developed in U.S. in 20+ years.
- Renewed interest because of near-zero CO_2, fuel diversity: 21 new projects have been proposed in the U.S.
- No projects currently under consideration in New England.
- The risk of cost over-runs *potentially* mitigated
  - New designs are inherently simpler.
  - NRC is offering combined construction and operating license.
  - But Moody's projects installed costs of $5000-6000/kw.

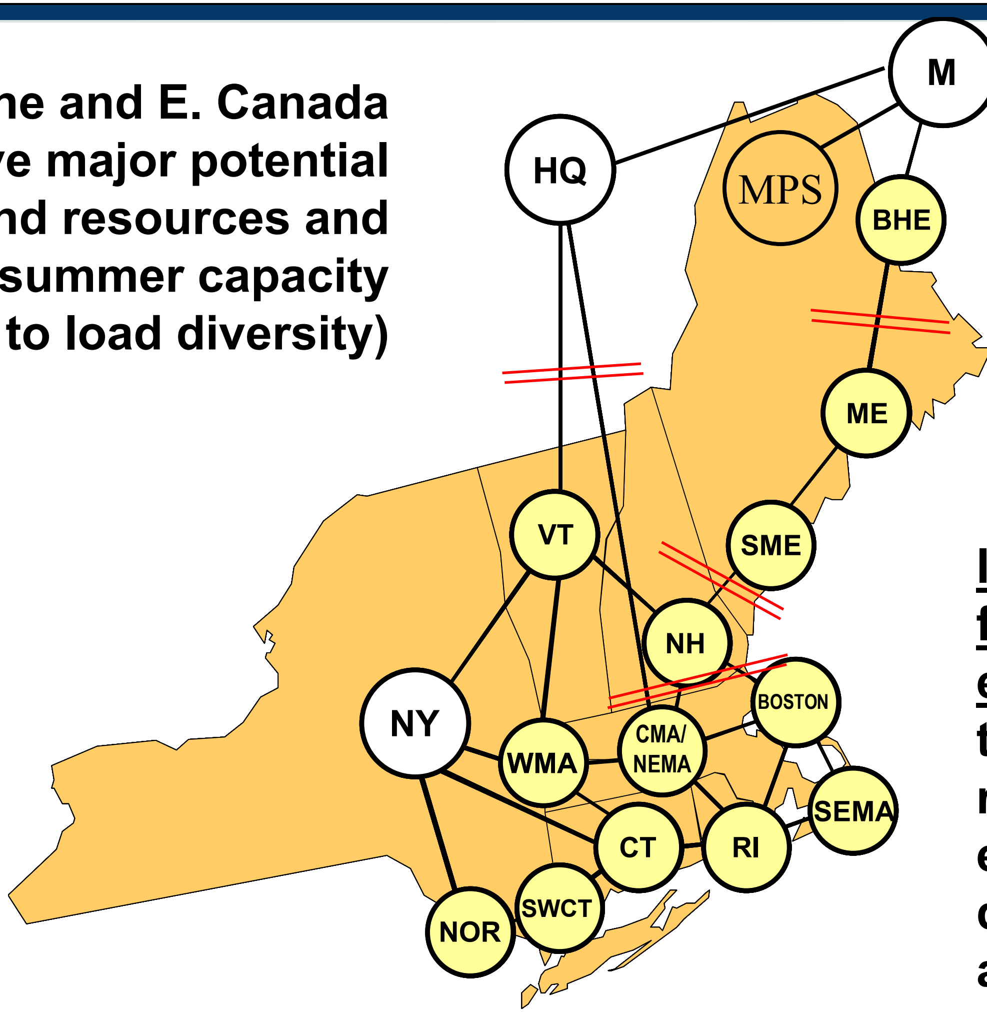
Coal with Carbon Capture and Sequestration (CCS)

- CCS might be cheaper than conventional coal if CO_2 costs $30/ton.
- Not yet commercially proven; major technical challenges exist.
- There are federal programs to subsidize pilot projects.
- No projects currently under consideration in New England.

Sources: Nuclear Energy Institute. http://www.nei.org.; "Cost of new nuclear plants may double," *MW daily* 10-11-07.
The Future of Coal, MIT, 2007, http://web.mit.edu/coal/The_Future_of_Coal.pdf

New Transmission Would be Needed to Exploit Wind Resources in N.NE & Canada, Firmed up by Existing Unused Peaking Capacity in Maritimes

N. Maine and E. Canada have major potential wind resources and excess summer capacity (due to load diversity)



Key:

= Transmission Constraints

<u>ISO-NE needs a framework to evaluate economic transmission</u> that could make available resources which meet environmental, fuel diversity and resource adequacy objectives.

Source: "2006 Regional System Plan," ISO New England, Inc., p. 16. October 26, 2006; with modifications in red and blue/green.

Demand-Side Management (DSM) Potential Depends Largely on State Programs

High prices stimulate efficiency and the emergence of curtailment service providers, particularly among large commercial and industrial customers.

However, residential and small commercial customers tend to do much less without utility programs to help identify and finance DSM.

- Energy efficiency: most small customers lack the expertise and/or the time to identify and implement cost-effective efficiency improvements.
- Demand response: DR is an option only with advanced metering infrastructure (or remote controls) and rate structures that reward load reductions during critical peak periods.

Announced Initiatives and Goals

- MA governor Deval Patrick has proposed a goal of stimulating enough efficiency to offset load growth by 2010.
- CT is pursuing efficiency.
- Utilities, ISOs, and states throughout the U.S. are evaluating DSM.

Next Steps for Policymakers

Promote cost-effective DSM

- Sponsor studies to identify the cost-effective amount of DSM.
- Remove caps on DSM expenditure.
- Remove utilities' disincentive to pursue DSM by decoupling T&D revenues from volumetric sales.

Put transmission-enabled renewables on the table

- Encourage ISO-NE to develop a framework that recognizes the value.

Engage in resource planning studies

- Determine whether policy measures are needed to achieve outcomes consistent with objectives.