EISPC
Energy Zones Discussion

New England's Path: Renewable Resource Analysis & Development

New England States Committee on Electricity
May 27, 2011

OVERVIEW

- **2007-2010**: New England Wind Studies
- **2009**: New England Governors' Renewable Blueprint & Technical/Economic Analysis
- **2010:** Report on Coordinated Procurement
- **Current:** Renewable *Request for Information*

New England Wind Studies' Context

- New England utilities have generally divested generation resources (not Vermont)
- Generation resources generally identified in competitive markets or through competitive processes (not IRP)
- What New England Wind Studies are Not:
  - ✓ Not transmission plans
  - ✓ Not a signal of preferred resource types or locations
  - ✓ Not a roadmap of what resources will be built by whom, where

New England Wind Study Series

- **2007**: **Scenario Analysis**

- **2007 & 2008**: **Technical Assessment of On-and Off-Shore Wind Generation Potential In New England (Phases I & II)**
  - http://www.iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/mtrls/2008/may202008/lai_5-20-08.pdf

- **2009**: **Governors' Blueprint/Economic Study Component**
  - 20 year horizon: 2030
  - Up to 12,000 MW of wind in New England
    - 7,500 MW onshore & 4,500 MW offshore
    - Incremental cases: 2,000 MW / 4,000 MW / 8,000 MW
    - http://www.nescoe.com/uploads/2009_Economic_Study_Final_Report.pdf

- **2010: New England Wind Integration Study (NEWIS)**
  - More detailed, operations-focused study - operational, planning and market impacts of integrating substantial wind generation resources
  - Builds on & complements Governors' Study
  - http://www.iso-ne.com/committees/comm_wkgrps/prtcpnts_comm/pac/reports/2010/newis_report.pdf

New England Wind Studies Site Screening

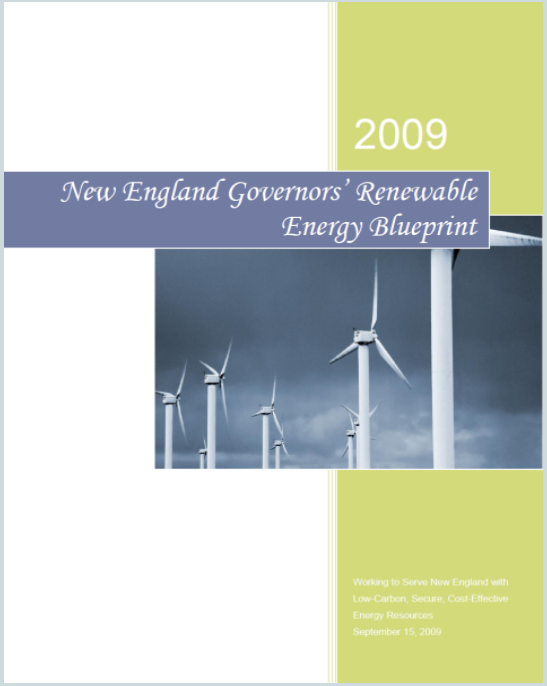
- **2008 study** applied several screens that ***eliminated potential wind sites due to high population density, low wind speeds & lack of commercial scale*** (areas with inland potential below 40 MW & offshore potential below 200 MW). It also ***eliminated potential wind sites farther than 40 miles from existing bulk transmission system & offshore sites within 3 miles of shore & in water deeper than 30 meters***.

- ISO-NE adapted wind potential for Blueprint from estimates in 2008 study.

- **Blueprint** ***screened out*** potential wind development in certain geographic locations - ***areas with high elevation or slope or in proximity to urban areas*** - where development considered infeasible for technical, other reasons. Example: study assumes a 5 mile buffer around Appalachian Trail & around Long Trail (VT), which precludes potential inland wind development in areas with some of the best wind regimes

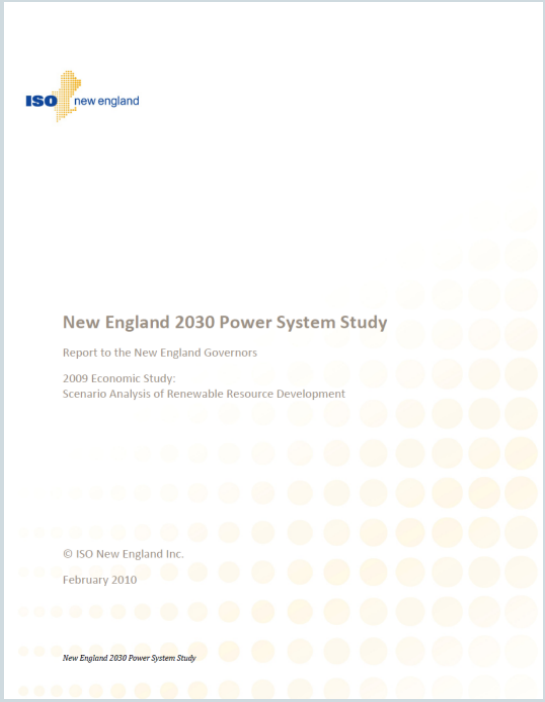
2009: Governors' Renewable Energy Blueprint

Policy



Governors' Renewable Energy Blueprint

Technical Analysis



ISO-NE Renewable Development Scenario Analysis

Connecting Wind Energy to Load Centers

Slide Courtesy ISO-NE

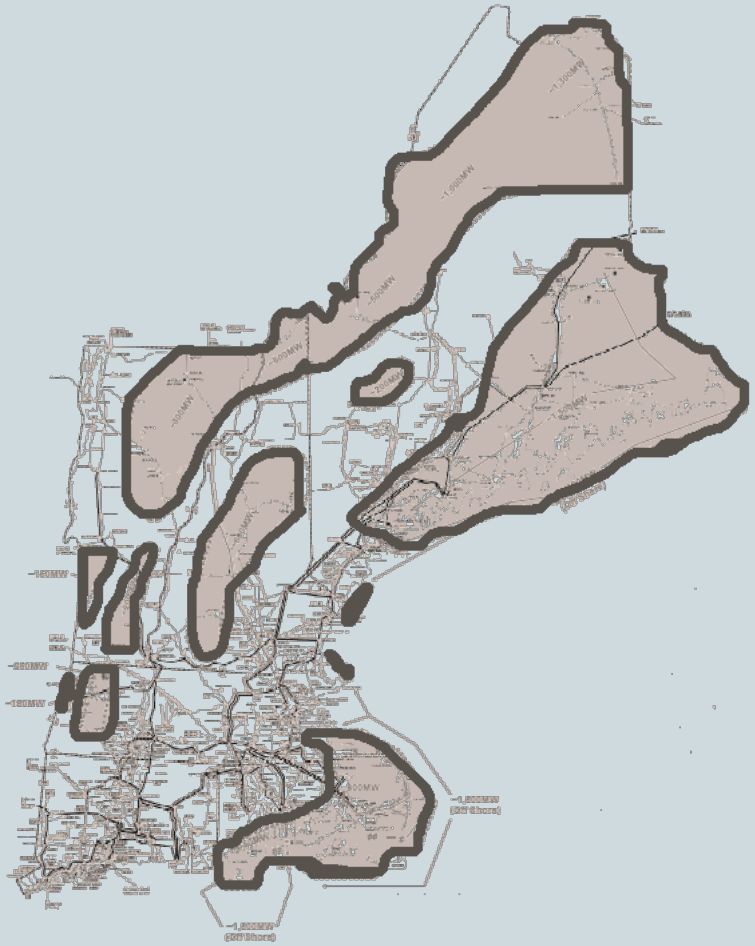
- Population & electricity demand concentrated along coast

- ISO identified 12,000 MW of on- & offshore wind potential

  Preliminary screening eliminated wind sites near urban & sensitive geographic locations

  (renewables in queue at the time of the study was approximately 3,700 MW)

- Transmission required to connect potential wind resources to load centers in New England



Blueprint Conceptual Transmission Scenarios

Slide Courtesy ISO-NE

ISO-NE developed 9 *conceptual* transmission scenarios:

- **6** scenarios to connect wind **in New England**
- **3** scenarios to expand ties **to neighboring regions**
- Transmission scenarios developed as robust, workable solutions with cost estimates based on actual project experience
- More detailed transmission studies would be required if the region pursues specific projects
- New voltage classes may be needed for higher wind penetration scenarios (345 kV is the backbone of the existing system)

Scenario Examples

Slide, Courtesy ISO-NE

Description *Partial list of scenarios*	**New Capacity** (Megawatts)	**Percent of New England Energy** (%)	**Preliminary Transmission Cost Estimates**
From New England:			
4,000 MW of offshore wind *plus* 1,500 MW of inland wind	5,500 MW	12%	$6 B
12,000 MW of wind	12,000 MW	23%	$19 B to $25 B
From New England and Eastern Canada:			
5,500 MW of wind (from above) *plus* 3,000 MW of additional imports from Québec and New Brunswick*	8,500 MW	15%	$10 B
12,000 MW of New England wind *plus* 3,000 MW of additional imports from Québec and New Brunswick*	15,000 MW	26%	$23 B to $29 B

•Estimate does not include facilities in Québec and New Brunswick; only includes cost of potential transmission in New England.

Blueprint *Technical* Conclusions: Ample Resources, Choices

The New England Region has …	If developed conservatively…	If developed aggressively…
• **vast** quantity of **untapped renewable resources:** more than 10,000 MW on & off-shore wind power potential	• there are **ample** renewable resources to enable New England **to meet renewable energy goals**	• **New England could export** renewable power to neighboring regions

Blueprint *Policy* Conclusions: Facilitation Opportunities

New England states have…

Cooperative experience, inclination to do more

Siting processes that could accommodate some degree of coordination

Long-term contract approval mechanisms

Common Contract Themes:

Competitive Processes
&
Interest In Securing
Low Cost, Cost-effective, Or Cost Stabilizing Power

In 2009, the Governors Directed Follow-Up Work in New England …

BE IT FURTHER RESOLVED that the New England Governors authorize their regulatory and policy officials to use the Blueprint as a resource to help support development of New England's renewable resources in their public advocacy, rule-making, policy development and other initiatives; and

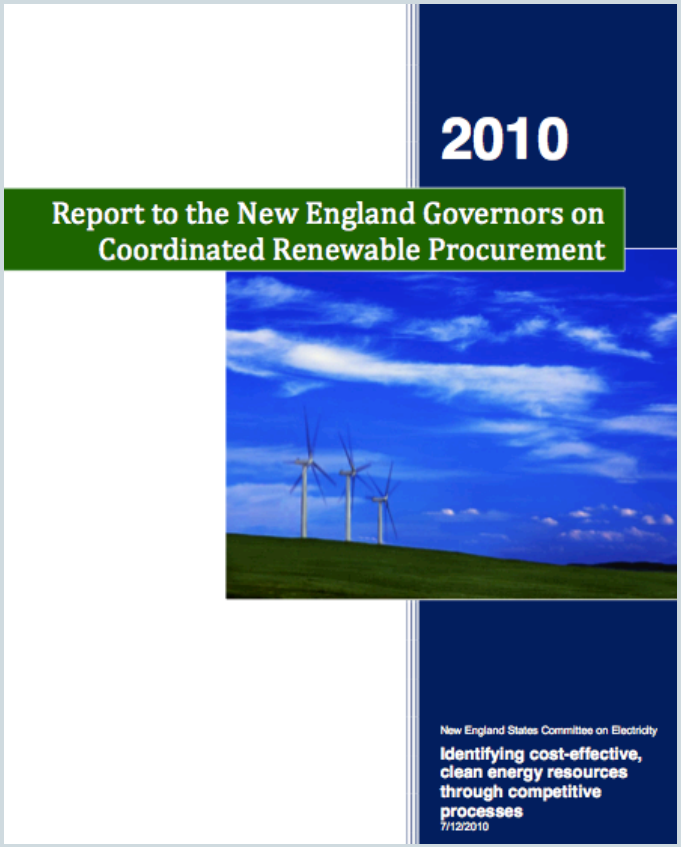
BE IT FURTHER RESOLVED that the New England Governors authorize their regulatory and policy officials to review the availability of renewable resources in the region, including those identified in the Blueprint, and to consider potential mechanisms for the joint or coordinated but separate competitive procurement of renewable resources, and to report the results of such a review to the Governors within the next twelve months.

and with the Eastern Canadian Provinces…

BE IT FURTHER RESOLVED THAT the New England Governors and Eastern Canadian Premiers wish to provide clarity to renewable energy producers and through the NICE, will initiate a meaningful dialogue between the states and provinces on the types of contract structures, pricing mechanisms and regulatory approvals that may offer the best opportunities for success in the New England and Eastern Canadian electricity marketplaces; and

BE IT FURTHER RESOLVED THAT this dialogue will consider potential terms and conditions for the procurement of regional power and a sample regional *Request for Proposal* for the procurement of renewable power (including energy, capacity, reserves, etc.) that could serve as a model for future solicitations.

2010: Report to the New England Governors Coordinated Renewable Procurement



- Assessed New England states' power procurement practices, processes, looked for coordination opportunities
- Preliminary information about potential mechanisms to coordinate competitive procurement of renewable resources
- Identifies some potential terms & conditions & possible regulatory approval process approaches concerning renewable procurement
- http://www.nescoe.com/uploads/Report_to_the_Governors_July_2010.pdf

2011: Renewable *Request for Information*

RFI: Market inquiry about resources with potential to help meet renewable energy goals at lowest 'all-in' delivered cost & for which a coordinated competitive procurement process could facilitate commercial development
http://www.nescoe.com/Coordinated_Procurement.html

Criteria:

- *New* resources
- *Deliverable* to New England loads
- Operational by *2016 and*
- *Eligible* for *all* 5 New England states' RPS *and* VT's renewable goals (wind, solar, landfill gas, small hydro & biomass)
- Other: sought information from transmission developers on transmission that could facilitate delivery

Renewable RFI: Generation Responses

Highlights:

- 4,700 MW by 2016
- 90% wind on & off shore
- 50+% Maine on-shore wind

Technology	Within New England						Outside of New England	Total
	CT	MA	ME	NH	RI	VT		
Biomass	82.0	137.3	30.0					249.3
Landfill gas		1.6					1.6	3.2
Small Hydro			3.0					3.0
Solar	4.0	27.0						31.0
Wind - on-shore		4.0	2519.3	351.0			584.5	3458.8
Wind - off-shore			30.0		1000.0			1030.0
Total	86.0	169.9	2582.3	351.0	1000.0		586.1	4775.2

Technology	Year of initial commercial operation						Total
	2011	2012	2013	2014	2015	2016	
Biomass	46.4	0.9	77.0	30.0	55.0	40.0	249.3
Landfill gas	1.6		1.6				3.2
Small Hydro	3.0						3.0
Solar		17.0			14.0		31.0
Wind - on-shore	20.0	586.3	413.5	481.0	1643.0	315.0	3458.8
Wind - off-shore					1030.0		1030.0
Total	71.0	604.2	492.1	511.0	2742.0	355.0	4775.2

Renewable RFI: Transmission Responses

Highlights:

- 1 off-shore
- 1 NY-VT upgrade
- 5 Maine to load, generally consistent with generator submissions

Project Number	Description	Miles of New Transmission	Technology	Capacity (MWs)
1	Off-shore transmission system to deliver energy from off-shore wind turbines to loads in southern New England	Not specified	Not specified	Up to 4000 MW, in 1000 MW increments
2	Interconnection between upstate NY and northern VT	Not specified	230 or 345 kV interconnection points	600
3	Connection from Maine Public Service Company transmission system to CMP transmission system	~26	345 kV AC line within Maine	200+ (at least 200 MW of wind projects have been identified)
4	HVDC link between northern Maine and downtown Boston	~300	HVDC overhead line and submarine cable	800
5	Transmission upgrades in western Maine	Not specified	115 and/or 345 kV AC lines	Up to 1100
6	HVDC link between central Maine and northern Massachusetts	230	HVDC underground line	1100 (with potential for some additional increase on existing lines)
7	AC transmission upgrades between Maine and southern New England	Unknown	Unknown	1000-2000

NEXT STEPS

- Assessing RFI Responses

- Discussing with ISO-NE tariff mechanisms that could help support transmission development potentially required for coordinated competitive procurement effort

- If New England decides to proceed with coordinated renewable procurement, further work on coordination mechanics, model terms & conditions, etc.

- Continue assessing significant ongoing renewable resource development activity in & around New England