Supporting a Clean Energy Future

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A comprehensive approach is needed to meet New England’s RPS and carbon goals

New England’s goals increase over time

Closing the gap will require a 3-part approach

1. Managing consumption
2. Importing clean, economic power
3. Building domestic renewable resources and the enabling transmission
The Northern Pass Project - Description

• Delivers enough renewable, low-carbon energy to power 1 million homes

• US segment owned jointly by NU and NSTAR

• Quebec segment owned by HQ-TransEnergie

• Transmission cost-based rates using a “participant pays” model
  – Revenue requirements paid for by Hydro-Quebec US
  – Transmission rights assigned to Hydro-Quebec US

• Operation by ISO-New England

• Target in-service date is 2016
The Northern Pass Project - Schedule

- May 2009  FERC approval of Project structure
- Dec 2009  FERC Order on rehearing requests
- Oct 2010  Executed Transmission Service Agreement with HQ Hydro Renewable Energy
- Oct 2010  DOE Presidential Permit application
- Feb 2011  FERC approves transmission service agreement
- Mar 2011  DOE holds 7 scoping meetings in NH
- Jun 2011  U.S. Forest Service application

2012-2013  DOE permitting process
2012-2013  ACOE permitting process
2012-2013  New Hampshire permitting process (Site Evaluation Committee)
2014-2016  Proposed construction

Ongoing outreach efforts

= Completed
The Northern Pass Project - Benefits

Economic Benefits

- Annual New England energy savings of $200 - $325 million
- Creates 1,200 jobs
- Provides $22 - $27 million in annual taxes

Environmental Benefits

- Reduces carbon dioxide emissions up to 5 million tons a year
- Complements the development and operation of local renewable resources

Reliability Benefits

- Provides new capacity
- Increases fuel diversity (not natural gas)
New England’s RPS gap is large and growing

Potential Gap = 12,700 GWh

**The Problem (Additional need)**

**Renewables in ISO Queue at 30%**

**Likely (Existing)**

*Based on ISO historical observation
RSP 2010, pp 132-133

**Demand** for Class I Renewables

Surplus

Gigawatt Hours (GWh)

2009 2013 2017 2020

Project Lead Time

5 - 8 years

5,000 10,000 15,000 20,000 25,000
### New England’s supply options

<table>
<thead>
<tr>
<th>Options for 12,700 GWh</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 biomass plants at 50 - MW each with an 80% capacity factor (Wood is not scalable)</td>
<td>$ 5.5 Billion plus $ T</td>
</tr>
<tr>
<td>1,074 3-MW of offshore windmills at 45% capacity</td>
<td>$22.6 Billion plus $ T</td>
</tr>
<tr>
<td>12,078 MW of solar panels at 12% capacity factor</td>
<td>$64 Billion plus $ t</td>
</tr>
<tr>
<td>1,380 3-MW of onshore windmills at 35% capacity factor</td>
<td>$9.4 Billion plus $ T</td>
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Wind Zones
Load centers

New England’s best onshore wind is remote from load centers

- Wind Power = Air Density x Rotor Area x (Wind Speed)³
- ISO-NE “Governors’ Blueprint” study verifies need for more transmission
- ME-NH and North-South interface limitations must be addressed
- NESCOE focus on regional procurement of renewable energy
Transmission to support renewables has many dimensions

We have:
- Collaborated with NE Transmission Owners
- Reached out to wind developers and regulators
- Analyzed wind sites and routing options
- Studied NE system constraints
- Assessed business structures
- Reviewed financing requirements
- Identified consumer benefits and impacts

There are many challenges:
- Changes to public policy
- Project scope, size and products
- Open access compliance
- Project creditworthiness
- Start-up process/timing
- Cost recovery and allocation
- Regional planning process
- Operations/maintenance
- Operational priority
- “Service Territory” issues
Summary

- A comprehensive approach is needed to meet New England’s clean energy goals
- Transmission infrastructure will be needed to...
  - Import clean, economic power from Canada
  - Develop domestic wind resources
- NU will continue to promote solutions to public policy goals that are best for our customers

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