Offshore Wind Development in New England

May 2021 Update

Al McBride

DIRECTOR | TRANSMISSION SERVICES & RESOURCE QUALIFICATION
Presentation Overview

• State Policy Drivers
• Clean Energy Procurements
• ISO Interconnection Queue
• 2019 NESCOE Economic Study
• Cape Cod Resource Integration Studies
## States Target Increases in Renewable and Clean Energy and Deep Reductions in CO₂ Emissions

<table>
<thead>
<tr>
<th>Target Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>≥80% by 2050</td>
<td>Five states mandate greenhouse gas reductions economy wide: MA, CT, ME, RI, and VT (mostly below 1990 levels)</td>
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<td>80% by 2050 Net-Zero by 2050</td>
<td>MA statewide GHG emissions limit MA clean energy standard</td>
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<td>90% by 2050</td>
<td>VT renewable energy requirement</td>
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<tr>
<td>100% by 2050 Carbon-Neutral by 2045</td>
<td>ME renewable energy requirement ME emissions goal</td>
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<tr>
<td>100% by 2040</td>
<td>CT zero-carbon electricity goal</td>
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<tr>
<td>100% by 2030</td>
<td>RI renewable energy goal</td>
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Renewable Energy Is on the Rise

State policy requirements are a major driver

State Renewable Portfolio Standard (RPS)*
for Class I or New Renewable Energy

Notes: State RPS requirements promote the development of renewable energy resources by requiring electricity providers (electric distribution companies and competitive suppliers) to serve a minimum percentage of their retail load using renewable energy. Connecticut’s Class I RPS requirement plateaus at 40% in 2030. Maine’s Class I/IA RPS requirement increases to 50% in 2030 and remains at that level each year thereafter. Massachusetts’ Class I RPS requirement increases by 2% each year between 2020 and 2030, reverting back to 1% each year thereafter, with no stated expiration date. New Hampshire’s percentages include the requirements for both Class I and Class II resources (Class II resources are new solar technologies beginning operation after January 1, 2006). New Hampshire’s Class I and Class II RPS requirements plateau at 15.7% in 2025. Rhode Island’s requirement for ‘new’ renewable energy plateaus at 36.5% in 2035. Vermont’s ‘total renewable energy’ requirement plateaus at 75% in 2032; it recognizes all forms of new and existing renewable energy and is unique in classifying large-scale hydropower as renewable.
## States Accelerate Clean Energy Procurements (2017-2021)

<table>
<thead>
<tr>
<th>State</th>
<th>State Procurement Initiatives for Large-Scale Clean Energy Resources</th>
<th>Eligible Resources</th>
<th>RFP Target MW (nameplate)</th>
<th>Projected COD/Selected MW</th>
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<tbody>
<tr>
<td>RI</td>
<td>2021 Offshore Wind RFP (Anticipated – Q2 2021)</td>
<td>Offshore Wind</td>
<td>600 MW</td>
<td>TBD</td>
</tr>
<tr>
<td>MA</td>
<td>2021 Offshore Wind RFP (Anticipated – May 2021)</td>
<td>Offshore Wind</td>
<td>400 to 1600 MW</td>
<td>TBD</td>
</tr>
<tr>
<td>ME</td>
<td>2020-2021 RPS RFP</td>
<td>ME RPS Class IA renewables</td>
<td>1,710,000 MWh</td>
<td>2022-2024</td>
</tr>
<tr>
<td>CT</td>
<td>2019 Offshore Wind RFP</td>
<td>Offshore Wind</td>
<td>400 – 2,000 MW</td>
<td>2026 804 MW</td>
</tr>
<tr>
<td>MA</td>
<td>2019 Section 83C II Offshore Wind RFP</td>
<td>Offshore Wind</td>
<td>800 MW</td>
<td>2025 804 MW</td>
</tr>
<tr>
<td>RI</td>
<td>2018 Renewable Energy RFP</td>
<td>Solar, Wind, Biomass and Other Eligible Resources</td>
<td>400 MW</td>
<td>2023 50 MW</td>
</tr>
<tr>
<td>CT</td>
<td>2018 Zero-Carbon Resources RFP</td>
<td>Nuclear, Hydro, Class I Renewables, Energy Storage</td>
<td>Approx. 1,400 MW (12,000,000 MWh)</td>
<td>2020-2026 11,658,080 MWh</td>
</tr>
<tr>
<td>CT</td>
<td>2018 Clean Energy RFP</td>
<td>Offshore Wind, Fuel Cells, Anaerobic Digestion</td>
<td>252 MW</td>
<td>2019-2023 252 MW</td>
</tr>
<tr>
<td>MA, RI</td>
<td>2017 Section 83C I Offshore Wind RFP</td>
<td>Offshore Wind</td>
<td>800 MW (MA) 400 MW (RI)</td>
<td>2023 800 MW</td>
</tr>
<tr>
<td>MA</td>
<td>2017 Section 83D Clean Energy RFP</td>
<td>Hydro Import</td>
<td>Approx. 1,200 MW (9,554,000 MWh)</td>
<td>2022 9,554,940 MWh/year</td>
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Wind Power Comprises Two Thirds of New Resource Proposals in the ISO Interconnection Queue

All Proposed Resources

- **Wind**: 15,133 MW (62%)
- **Solar**: 4,404 MW (18%)
- **Battery Storage**: 3,771 MW (15%)
- **Natural Gas**: 913 MW (4%)
- **Hydro**: 99 MW (<1%)
- **Nuclear Uprate**: 37 MW (<1%)
- **Fuel Cell**: 55 MW (<1%)
- **Biomass**: 8 MW (<1%)

**TOTAL**: 24,420 MW

Wind Proposals

- **CT**: Offshore Wind 5,605 MW
- **RI**: Offshore Wind 704 MW
- **MA**: Offshore Wind 8,598 MW
- **ME**: Offshore Wind 222 MW

Source: ISO Generator Interconnection Queue (February 2021)
FERC and Non-FERC Jurisdictional Proposals; Nameplate Capacity Ratings
Note: Some natural gas proposals include dual-fuel units (with oil backup). Some natural gas, wind, and solar proposals include battery storage.
CAPE COD RESOURCE INTEGRATION STUDY (CCRIS)

First CCRIS Status and Notice of Second CCRIS
QP 624 (800 MW) has a completed System Impact Study and will be interconnecting to the Barnstable 115 kV substation

QP 700 (800 MW) has a completed System Impact Study and will be interconnecting to the West Barnstable 345 kV substation and will require Network Upgrades, including the following:

- A 345 kV line from West Barnstable to Bourne
  - Converting a planned 115 kV line to 345 kV
- New Bourne 345 kV substation
- New 345/115 kV autotransformer at West Barnstable

These generators and these upgrades are assumed in the base case for the First CCRIS
The CCRIS will focus on the addition of new 345 kV transmission infrastructure between West Barnstable and Bourne.

The CCRIS will identify the quantity of megawatts that could be interconnected while also recognizing and further quantifying the overall export limitation from Cape Cod.
First CCRIS Conclusions

• With the addition of a new 345 kV line between West Barnstable and Bourne, a total of 2,800 MW of offshore wind can be connected to Cape Cod
  – Without needing additional significant new transmission infrastructure beyond Cape Cod

• The N-1 constraint and loss of right-of-way performance are the primary limiting issues

• Synchronous condensers instead of STATCOMs may be needed for some of the new wind farms
  – Will be confirmed in the Cluster System Impact study

• 1,600 MW (QP 624 & QP 700) of offshore wind projects have already completed their Interconnection Studies

• This means that up-to an additional 1,200 MW can connect after the inclusion of the additional Bourne – West Barnstable 345 kV line
Second CCRIS

• The Second CCRIS will build on the First, by addressing the issues identified for offshore wind additions greater than 2,800 MW in the Cape Cod area
  – N-1 345 kV overloads
  – Loss of right-of-way exposure
  – N-1-1 export limitation

• A remaining 1,600 MW may still be seeking to interconnect to Cape Cod

• An additional 1,200 MW is also seeking to interconnect near Pilgrim substation
Next Steps

• Initiate a Second CCRIS to consider the integration of additional resources in the Cape Cod area
• Present final results of the First CCRIS and cost estimates for the CETU
• Issue CRPS Draft Report for Comment
• After the publication of the final CRPS report, the ISO will open the window for eligible projects to proceed to the CSIS phase
  – Eligible projects must meet the CSIS entry requirements, including the submittal of a Cluster Participation Deposit, to proceed into the CSIS
    • Anticipated for July 2021
Questions