MASSACHUSETTS CLEAN ENERGY CENTER

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Sent by email to PACMatters@ISO-NE.com

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SUBJECT: Economic Study Proposal to Evaluate the Impact of Offshore Wind Deployment on New England's Wholesale Electricity Markets and Operations

Mr. Henderson,

On behalf of the Massachusetts Clean Energy Center, I am pleased to submit a request, pursuant to Attachment K of the Open Access Transmission Tariff, for ISO New England ("ISO-NE") to conduct an economic study to evaluate the impact of offshore wind deployment on New England's wholesale electricity markets and operations.

I. BACKGROUND

Economic Study - According to Attachment K of its Open Access Transmission Tariff (OATT), ISO New England (ISO) is required to conduct economic studies arising from stakeholder requests. These requests are limited to scenarios that evaluate general locations for various types of new resources, resource retirements, and possible changes to transmission interface limits. This information can assist market participants and other stakeholders to evaluate various resource and transmission options that can affect New England's wholesale electricity markets and operations. The studies may also assist policymakers who formulate strategic visions of the future New England power system. The role of the Planning Advisory Committee (PAC) in the economic study process is to "discuss, identify, and prioritize" proposed studies.

Offshore Wind in Massachusetts - With its substantial offshore wind resource, supportive clean energy policy, key investments in infrastructure, and advanced planning for offshore wind resource areas, Massachusetts is a national leader in offshore wind energy development. Since 2009, Massachusetts public agencies have been working with the US Bureau of Ocean Energy Management (BOEM) to identify potential leasing areas in federal waters south of Massachusetts. Throughout the stages in the process, BOEM has worked closely with two Intergovernmental Renewable Energy Taskforces and has sought extensive stakeholder input and coordination. In addition to more than 100 public meetings in coastal communities, BOEM has also sought the advice

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and guidance of two working groups for fisheries and habitat convened and led by the Massachusetts Executive Office of Energy and Environmental Affairs (EEA) and MassCEC.

- In May 2012, BOEM identified the Massachusetts Wind Energy Area for potential future commercial leasing for offshore wind. The MAWEA is the largest offshore wind planning area along the East Coast, totaling approximately 742,974.

- In February 2012, BOEM identified the Rhode Island/Massachusetts WEA within the area of mutual interest identified by Rhode Island and Massachusetts in a Memorandum of Understanding between the two states in 2010. The RIMA covers approximately 164,750 acres and is located roughly 12 nautical miles south of the Rhode Island coastline

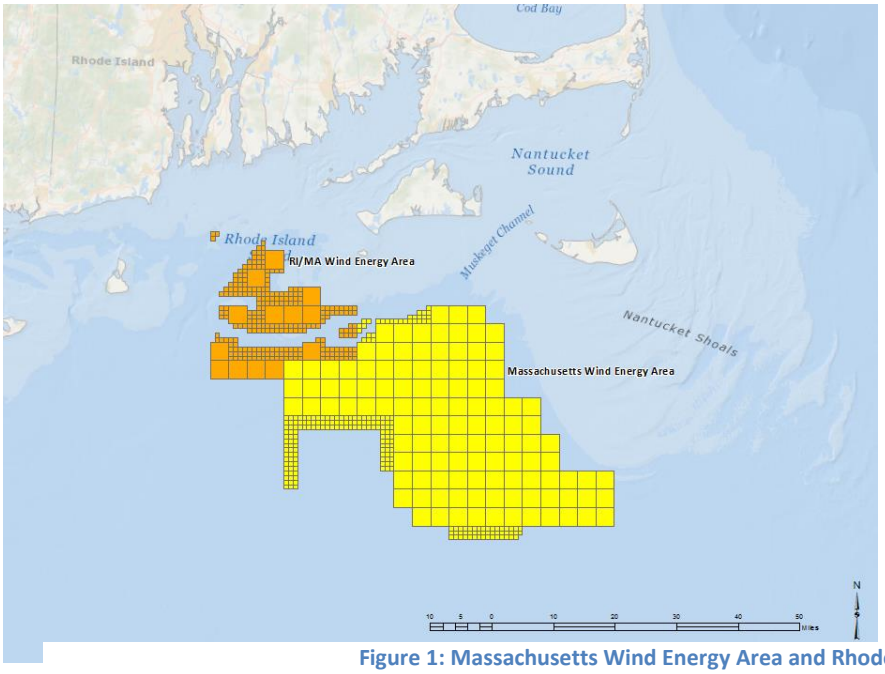

Figure 1: Massachusetts Wind Energy Area and Rhode Island/Massachusetts Wind Energy Area

II. PROPOSED METHODOLOGY

The proposed study will evaluate the impact of offshore wind deployment to New England's wholesale electricity markets and operations in 2024 as measured by system economic metrics, emission metrics, and the need for major expansion of the transmission system. The impacts of offshore wind expansion will be evaluated across multiple scenarios further detailed in table 1. Offshore wind expansion will be held consistent across all scenarios in order to assess the effects associated with varying input assumptions associated with each scenario. The analysis will identify potential transmission system bottlenecks, which would need to be addressed so that the system can fully realize the economic and environmental benefits of the offshore wind expansion scenarios.

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Representative transmission expansion scenarios and generic costs will be developed to provide representative information on the order of magnitude of required transmission improvements.

Assumptions – Perform simulations of the New England system for resource expansion and retirement scenarios under various constraints. Important assumptions are:

- Offshore Wind Expansion
  - 1000-2000 MW
  - Interconnected by 2024
- Interconnection Locations
  - 50% of offshore wind capacity will be assumed interconnected to the area near Brayton Point, 25% near Kent, and 25% near Barnstable.
- New England loads
  - Standard net forecast reflecting gross load, minus energy efficiency (EE), minus behind the meter solar photovoltaics (PV) not otherwise captured in the gross load forecast.
- System capacity based on FCA9 commitments
  - Retirements based on Non-Price Retirements known as of Forward Capacity Auction (FCA) #9
  - Assume system reserve margin used in the Regional System Plan will meet Installed Capacity Requirements (ICR) and make up any shortfalls with natural gas combined cycle units and quick start simple cycle units electrically connected to the Hub.
    - First reflect PV resources not otherwise modeled as part of the load (both FCM and Settlement Only Resources)
- If additional capacity is required, add natural gas combined cycle (NGCC) units or simple cycle units connected to the Hub. For example, if there is a 600 MW shortfall, add 500 MW of NGCC generation and 100 MW of simple cycle units. This is most significant in the retirement sensitivity cases.
- Fuel
  - EIA estimated fuel cost forecasts for the New England region
  - Fuel cost sensitivity cases (pending further specification)
- Environmental emissions
  - Assume SO_2 and NO_x allowance values are negligible for dispatch purposes
  - Sensitivity to CO_2 allowance prices (pending further specification)
- Interchange with neighboring systems[1]
  - Reflect current interchange amounts and schedules over existing ties with neighboring systems.
  - NYISO
  - NB
  - Quebec Phase II and Highgate

[1] As noted, assume scenarios with higher or lower imports from both Quebec (perhaps similar to Northern Pass) and the Maritimes with additional transfers over the existing ties to the New England. Similarly, assume a scenario with transfers varied to NYISO.

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III. Scenarios

SCENARIO	Natural Gas	Imports and Exports		Retirements		Load Growth	CO_2 allowance costs
		Exports	Imports	Pilgrim, Seabrook, Millstone	Other oil/coal		
Business as Usual	Unconstrained	NYISO transfers assumed at current levels	Increased energy from Quebec, Increased imports from the Maritimes	None	Known as of FCA#9. Shortfall made up with NGCC and quick start simple cycle units.	Assumed ISO net load forecast for 2024	Base
Most Favorable Economic Case	Constrained	Exports to NYISO	Lower imports from both Quebec and the Maritimes	Some	Known as of FCA#9 Capacity shortfall made up by quick start simple cycle units	Assume net energy growth and peak load growth of last year of 2024 forecast grows for 10 years at rate of last year of 2024 forecast	High
Least Favorable Economic Case	Unconstrained		Increased energy from Quebec, Increased imports from the Maritimes, more imports from New York	None	8,300 MW of retirements of old oil and coal units and replacement with efficient NGCC units	Negative peak load and negative energy growth; PV grows at rapid rate beyond last year of the PV forecast	Low
Sensitivity Cases 1	*Pending Further Specification*						
Sensitivity Cases 2							
Sensitivity Cases 3							

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IV. RESULTS

Scenarios will be evaluated based on the following metrics:

- Economic Metrics
  - Regional production costs
  - Load Serving Entity (LSE) Energy Expense
  - Unhedged congestion costs
  - Revenue to resources by type
    - Total revenue to offshore wind expansion resources
    - Total revenue to other types of resources, such as nuclear, natural gas, etc.
  - Locational Marginal Price (at select locations TBD)

- Reserve costs

- Transmission System Metrics
  - Interface MW flows
  - Percent of time interface (of individual branch) at limit

- Comparative transmission build-outs (as needed)

- Show transmission system limitations and the effect of relieving those limitations
  - Change in expected value un-hedged congestion
  - Representative transmission cost estimates

- Fuel Consumption
  - Gas consumption of electric generating units
  - Fuel oil inventories (and rates of depletion during high utilization periods)
  - Coal inventories (and rates of depletion)

- Emissions
  - CO2
  - NOx
  - SO2
  - Some additional detailed emission results may be provided, such as ozone and non-ozone season emissions

- Cost of operating reserve

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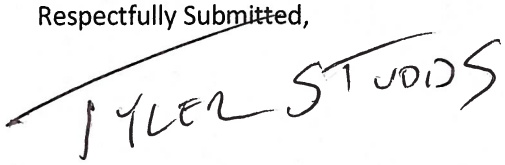
Respectfully Submitted,



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