

**To:** NEPOOL and ISO New England  
**From:** NESCOE (*contact: Ben D'Antonio*)  
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**Subject:** Future Grid Analysis Submission - Pathway Scenario: 2035 and 2040

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Through the Transition to the Future Grid initiative, NEPOOL is planning to conduct analysis of a hypothetical future New England system that accounts for the requirements of state laws. ISO-NE has agreed to conduct this analysis, subject to its information policy obligations, of state and stakeholder requested scenarios.

NESCOE submits the following information that represents one plausible vision of a future system that contemplates the requirements of state laws. This scenario is just that, a scenario. It is not a projection, prediction or statement of preference.

## **I. NESCOE Pathway Scenario**

The Pathway Scenario presents one hypothetical approach to achieving economy-wide carbon reduction. Northeastern States for Coordinated Air Use Management (NESCAUM) describes this strategy in greater detail in a white paper.<sup>1</sup> The Pathway Scenario assumes that an increasing amount of homes and businesses will, over time, replace their used cars with newer and cleaner alternatives like plug-in hybrid cars and trucks. It also assumes that more buildings and homes will continue to make energy efficiency improvements and use cleaner energy sources for space and water heating, like air- and ground-source heat pumps. To serve these new and existing demands for electricity, the power sector grows in size over time in the Pathways Scenario. Despite the load growth, the resource mix continues to transition towards a cleaner emissions profile. For example, the Pathways Scenario assumes that resource additions are at least 1,000 MW of incremental clean energy per year for the next several decades.<sup>2</sup> The combined effect of these measures is assumed, for purposes of study, to result in economy-wide carbon reduction that would put New England on a pathway to compliance with state law requirements.

### **A. Pathway Scenario Assumptions**

To serve the demand for electricity on a carbon compliant pathway, the Pathway Scenario assumes that the resource mix in New England will change over time. For example, coal, oil, and natural gas usage declines over time in the Pathway Scenario while increasing amounts of incremental solar and wind resources are added to the system.

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<sup>1</sup> The [NESCAUM White Paper](#) from September 2018 provided high-level insights about the magnitude of actions needed to achieve New England's ambitious climate goals.

<sup>2</sup> The Pathway Scenario uses the term "clean" to mean zero- or low-carbon resources, which may nor may not be renewable as defined in various states' laws.

The Pathways Scenario focuses only on two years:

- 2035 – This year is just far enough into the future that it (a) has not yet been studied closely and (b) is plausibly within a timeframe by which reforms could be implemented.
- 2040 – This year is far enough into the future that it includes significant amounts of new loads and changes in the resource mix. The degree of change would stress the model, and in combination with 2035 provide contrast through a range of values.

## II. Pathway Scenario Assumptions

The proposed Pathways Scenario could be included in the Future Grid Analysis in several ways. As described at the May MC/RC meeting, the Pathways Scenario could be included in energy market modeling to get an hour-by-hour dispatch pattern for the system. These results could then be mapped to an ancillary services model for a minute-by-minute examination of system operating characteristics and requirements. The Pathways Scenario – and any related energy market results - could also be incorporated into analyses of transmission. For example, two types of transmission analyses described in May were a high-level feasibility (steady-state thermal and voltage) and dynamic stability. The Pathways Scenario details also include detailed electricity demand information – hourly, zonal electricity demand by sub-sector.

Year	Electricity Demand and Electrification			General System Description	
	Traditional Electricity Demand	Transportation	Space & Water Heating	Net Energy For Load	Capacity
2035	105 TWh	21 TWh	28 TWh	155 TWh	55 GW
2040	109 TWh	37 TWh	39 TWh	185 TWh	70 GW

<b>Pathways Scenario: Resource Mix (MW)</b>	<b>2035</b>	<b>2040</b>
Combustion Turbine	1,150	1,500
Combined Cycle Gas Turbine	13,750	15,000
Biomass	Same as Today	
Nuclear		
Hydro		
Onshore Wind	1,750	1,300
Rooftop PV	11,500	12,500
Ground-mounted PV	9,000	15,000
Offshore Wind Fixed	7,000	8,000
Offshore Wind Floating	2,500	8,500

NESCOE appreciates the opportunity to advance this scenario and looks forward to discussing this and other scenario assumptions as the process moves forward.