Working Toward a Clean, Reliable Electric Grid

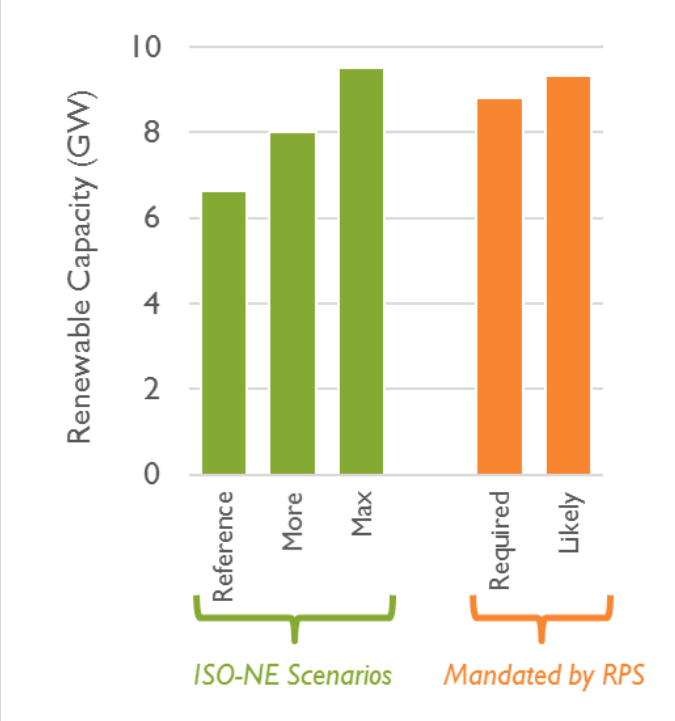
Examining ISO New England's *Operational Fuel Security Analysis*

Pat Knight, Paul Peterson, Doug Hurley, and Jamie Hall *February 2018*

On January 17, 2018, ISO New England ("ISO") released a draft of its Operational Fuel Security Analysis. This study lays out many different possibilities for a 2024/25 winter, assessing the electric grid's reliability under a varying array of assumptions. ISO's main finding is clear: adding more renewables and more imports, and increasing the availability of LNG deliveries and backup oil during supply emergencies, will all contribute to improved system reliability.

However, ISO has framed the findings pessimistically, claiming that their analysis shows that insufficient fuel for gas-fired power plants is a threat to reliability. In ISO's baseline "Reference case"—with its estimated levels of electricity and gas demand for the winter of 2024/25, and its assumed available supply from renewables, imports, and conventional resources—it projects that New England will face 14 hours in a future three-month winter during which at least some customers will face rolling blackouts. ISO also assumes, in all scenarios, that the winter of 2024/25 will bring record cold weather.

Figure 1. Expected 2024 capacity for wind, solar, and other renewables



But, ISO's modeling is based on some flawed assumptions. Despite its own assertions that higher levels of imports and renewables can minimize system stress and maintain reliability, its Reference Case unrealistically underestimates the likely future impacts of those resources, undermining their contribution to system reliability. ISO also overestimates future electric and gas needs, assuming unrealistic demands on our energy systems. .

ISO is tasked with ensuring grid reliability, and it is worthwhile to conduct a fuel security study. However, the ISO's unrealistic assumptions in the Reference case that stress the system should not be presented as realistic risks requiring drastic solutions. Instead, more reasonable projections of the future electric grid, as described below, show a reliable system even under extreme cold weather conditions.

We find:

- If the ISO correctly modeled the **renewable portfolio standard (RPS)** policies, legally mandated by all six New England states, the Reference case would contain an additional 2,200 MW of renewables (see Figure 1). When built, many of these renewables, such as onshore and offshore wind, will be available to meet winter peak demand. Some states are considering further expansions of these policies.
- If the Reference Case accounted for **new electricity imports from Canada**, as required by Massachusetts laws and regulations, imports would increase by 1,000 MW.

- If the Reference Case correctly modeled the **current availability of LNG imports** at 1.25 Bcf/day as noted by NEPOOL stakeholders, fewer reliability issues would result from stresses on interstate pipelines during supply emergencies.

If the above factors were fully considered, the Reference case would resemble or even surpass the ISO's "High Boundary" case, a case with more renewables, more imports, and more LNG, and where New England experiences zero operational reliability issues and no rolling blackouts during the winter of 2024/25.

In all scenarios, we also find:

- ISO overestimates **demand growth for electricity** in all scenarios. Its assumption of electricity demand during the winter peak still undervalues energy efficiency measures that are in place today. Their demand estimates are superseded by ISO's own updated 2018 forecast for demand, which was not used in this analysis.
- ISO overestimates **demand growth for gas** in all scenarios. Its assumption for increases in gas use is more than double the rate of recent historical trends.

Making more reasonable assumptions

ISO New England models 23 scenarios in its Operational Fuel Security Analysis, only one of which represents a reasonable version of the future. Below, we provide details on ISO's input assumptions along with recommended changes.

Category	Draft ISO assumptions	Suggested change	Expected impact
Renewable portfolio standards	ISO does not make any assumptions regarding compliance with the six New England states' RPS policies. Instead, ISO assumes a quantity of solar will be built in line with a 2017 ISO study, but does not assume any new builds of onshore or offshore wind.	Recent Synapse studies show that New England will need to have 2200 MW more wind and solar than ISO assumes to meet current RPS requirements for 2024. Likely expansions to state RPS programs (proposed by CT DEEP and MA legislators) could increase this by another 500 MW.	ISO's scenarios explore higher levels of wind and solar—modeling the "Max Renewables" level in all scenarios would be more in line with current laws and regulations. Wind and other new renewables will help decrease outages in the winter peak.
New imports from Canada	The Reference Case assumes no increase in imports from Canada, ignoring the MA 83D law and Mass DEP's Clean Energy Standard .	Under both MA's 83D law and Mass DEP's Clean Energy Standard regulation, new clean energy imports of approximately 1,000 MW are required to be in place by 2022. These imports may be hydro or Class I renewables.	Some of ISO's other scenarios account for MA's new import requirements. These should be included in all scenarios, and will lead to increased reliability in the winter peak.
Non-electric gas demand	ISO assumes that annual demand for natural gas by non-electric consumers will increase by 1.9 percent per year, even without any new pipeline infrastructure.	Recent historical gas demand has increased by just 0.7 percent per year, less than half of the rate of increase modeled by ISO.	Lower future demand for non-electric gas will reduce winter peak demand and reliability issues in the electric system.

Category	Draft ISO assumptions	Suggested correction	Expected impact
Energy efficiency	ISO reduces demand in 2024/25 by the amount of energy efficiency it projected in its 2017 CELT forecast, published in May 2017.	ISO is making a 2018 CELT forecast, due to be released on February 9. Early workpapers indicate that ISO will increase the amount of energy efficiency in place in 2024/25 by hundreds of MW.	Updating energy efficiency levels to be in line with the ISO's own, most-recent forecasts will increase estimates of reliability.
Battery storage	The study does not make any explicit assumptions on increased levels of battery storage.	Gov. Baker has allocated funding and set a target to procure 200 MWh of battery storage by January 2020. Previously, DOER has recommended procuring 600 MW of battery storage by 2025.	Batteries help to avoid peak consumption of both natural gas and oil, resulting in increased on-peak system reliability.
Oil tank refills	In most cases, ISO assumes that on-site oil tanks at power plants which normally use natural gas can be filled two times each winter.	ISO assumes two tank fills, based on the idea that the consumption of three tanks' worth of oil would cause most plants to run afoul of their air permit allowances..	In a future in which New England faces the extreme cold it did in the 2014/15 and 2017/18 winters, it is more likely that oil would be burned up to the full extent allowable, rather than create system outages.
Demand response	ISO does not model any existing or incremental demand response (DR) resources.	ISO should model scenarios that incorporate both new and existing DR resources.	With DR, consumers are paid to reduce electricity use, or to shift it to other, non-peak hours. Proper modeling of existing and future DR resources can show how this resource can aid in system reliability.
Liquified natural gas (LNG) deliveries	In the Reference case, ISO assumes that 1.00 billion cubic feet per day (Bcf/day) of LNG is available to New England during periods of extremely high prices (i.e., emergencies).	Owners of LNG delivery facilities commented at the ISO presentation to NEPOOL stakeholders on January 24 that 1.25 Bcf/day is a more reasonable assumption.	Higher levels of LNG deliveries reduce the likelihood that the natural gas interstate pipeline system will be stressed enough to result in reliability issues.
System outages	ISO models several extremely unlikely outage scenarios. One assumes both units at Millstone nuclear power plant are offline for the entire winter, and another assumes a gas compressor station is offline for the entire winter.	It is unrealistic to assume that either all of Millstone or a significant compressor station would remain offline for 90 days, especially during an extremely cold winter.	ISO should model a wider range of potential "extreme outage" cases, ranging from possible (short-term) to unlikely (a full winter outage).

Operational Fuel Security Analysis Timeline

What should ISO do now?

The ISO New England President and CEO said the following about its draft report:

> *"Higher levels of LNG, imports, and renewables can minimize system stress and maintain reliability; to attain these higher levels, delivery assurances for LNG and electricity imports, as well as transmission expansion, will be needed."* Gordon Van Welie, testimony before the U.S. Senate Committee on Energy & Natural Resources, January 23, 2018.

New England state governments have already committed to the assurances that ISO says it needs, with renewable portfolio standards and mandates for new imports from Canada. Current trends in energy efficiency and PV installations provide strong evidence that future consumption from the electric grid will be substantially below the 2017 ISO forecast used in the study. Meanwhile, courts, regulators, and state legislators have rejected other options to improve future reliability—such as expanding interstate natural gas pipelines—as being too costly and an inappropriate use of electric ratepayer's bills.

To better inform policymakers on the likelihood of future reliability issues, ISO should refine its study as follows:

- Create a new "Reference Case" that accurately reflects realistic electric and gas demand as well as the supply of renewable resources and imports expected to be online in 2024, under current state laws and regulations
- Examine reliability impacts under new scenarios, including futures that include even more renewables, energy efficiency, and demand response
- Develop probability assessments of "extreme outage" cases, such as ones in which the Millstone nuclear power plant or a compressor station are offline for just a few days, as well as offline for the entire winter

Although not discussed in ISO New England's report, reliability investments can also lead to lower electricity costs for consumers and emission reductions in line with state mandates like the Global Warming Solutions Act. Further investment in energy efficiency, renewables, and imports can help lower electricity and gas demand and increase generating supply at the winter peak, enhancing reliability and avoiding the purchase of natural gas and oil. Avoiding volatile oil and gas prices during periods of system stress can dramatically reduce the costs eventually passed along to electricity consumers.

ISO's conclusion that most of its scenarios have a high risk of rolling blackouts creates the illusion of need for additional infrastructure beyond what is already planned. This provides faulty evidence to those who support unnecessary and costly gas pipeline projects. Doubt cast on regulatory and legislative mandates disregards New England's decades-long and highly successful efforts to improve the efficient use of gas and electricity and develop alternative resources to reduce fossil fuel emissions. ISO must include more reasonable assumptions based on realistic expectations so that it can properly advise policymakers on the appropriate, cost-effective actions to ensure a clean and reliable future electric grid.

About Synapse

Synapse Energy Economics, Inc. is a research and consulting firm specializing in energy, economic, and environmental topics. Since its inception in 1996, Synapse has grown to become a leader in providing rigorous analysis of the electric power sector for public interest and governmental clients.

For more information, contact:

Pat Knight | pknight@synapse-energy.com | 617-453-7051

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