New England's Fuel Mix Continuum

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Data Sources Used in This Publication
EIA
ISO New England
Point Logic
SNL

To discover more about the data sources used, click here.

A New Precedent

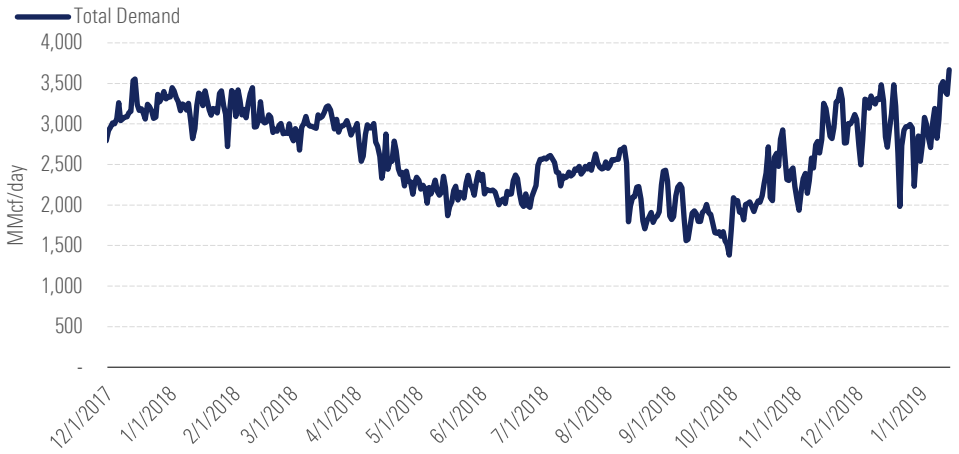
In December, FERC ruled on part of the ongoing fuel security saga in the form of accepting a cost-of-service agreement between ISO New England and Exelon Generation for the use of its gas-fired Mystic Generators 8 & 9 and the Everett LNG facility, recently purchased by Exelon, that in part supports them. While the ISO has taken a conservative approach in estimating its fuel security needs to maintain reliable generation over the next few years, without the Winter Reliability program used in the past it is on the last legs of backstop fossil fuel generation that can be switched on even during extreme cold spikes. While this ruling may provide the emergency backstop the region needs, there is hope on the horizon for the ISO to reduce its reliability and fuel security issues another way. This hope comes in the form of a recent memo outlining scenarios during last year's bomb cyclone if current offshore wind projects in the pipeline today had been online. This note looks at ISO New England's natural gas and wind outlook in response to these two measures.

Natural Gas Demand

The premise of ISO New England's request to retain the Mystic generators is tied to its Operational Fuel-Security Analysis (OFSA). The OFSA concentrated on the natural gas infrastructure constraint into the region given the large skew toward natural gas power generation. Its findings pointed to the ISO's frequent need to use emergency procedures including scenarios with Mystic on outage. The OFSA analysis assumed 3,980 MMcf/day of gas pipeline import capacity. A very small addition to its import capacity has already been added since by Portland Natural Gas of 40 MMcf/day last November. With additional pipelines unlikely, the use of LNG is the next best bet but also has practical limitations. In the analysis, the addition of LNG provides another 2,000 MMcf/day of capacity but practically speaking higher costs, and accessibility issues have reduced this availability to the less than one quarter or just a portion of the 435 MMcf/day provided through the Everett terminal.

Yet, if Exelon were to retire the Mystic generators, it stated it would close the Everett terminal since the remaining send outs would be insufficient to cover costs. With almost all LNG currently coming from that terminal, that takes out an important block of potential natural gas capacity for the winter. The ISO deal with Exelon is therefore an out of market deal that, without the Winter Reliability Program in place, provides a quick and dirty alternative to ensure at least some LNG is imported for the days of winter it is needed. Looking at the main demand, for the contributors of power, industrial, and residential and commercial (Res-Com) demand (not including pipeline losses) the range fluctuates between near 4,000 MMcf/day in the highest demand events and down to 1,500 MMcf/day in low demand periods of late spring and early fall (as seen in Exhibit 1). We see the max demand staying within the bounds of pipeline limits for the most part with minimal LNG bolstering supply only slightly for the foreseeable future.

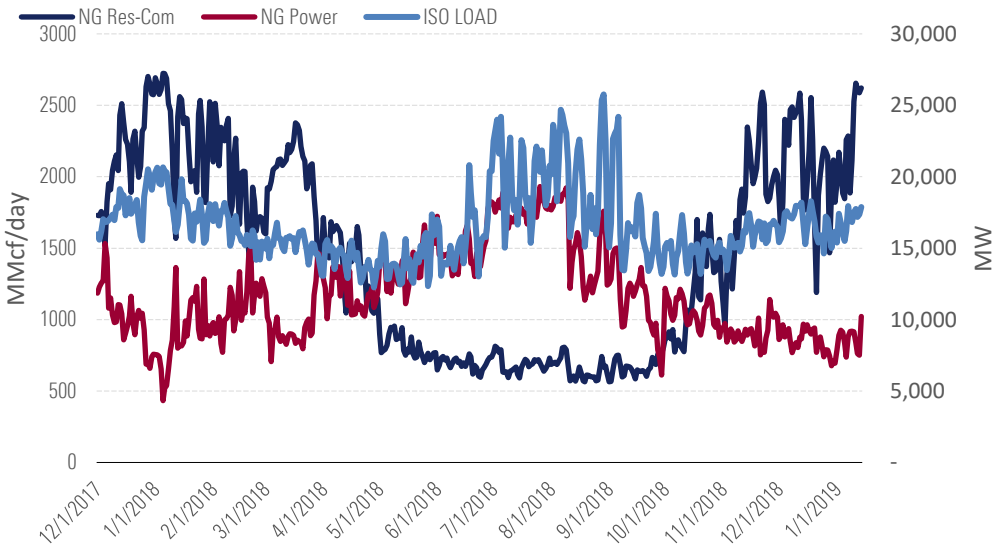
Exhibit 1 New England Natural Gas Power and Res-Com Demand



Source: Point Logic, Morningstar

Taking a look at this demand another way, Exhibit 2 shows that heating demand from Res-Com takes priority during high demand periods thus displacing power demand, while summer cooling demand has plenty of free rein and reached near 2,000 MMcf/day over July in the region. So, while consumption remains rangebound within the 4,000 MMcf/day pipeline capacity the displaced power demand must be made up from alternative fuels like oil and coal. The continuing availability of economic LNG imports is needed to ensure those reserve stockpiles are not depleted during a winter event when power demand exceeds available pipeline natural gas. This bears out in power prices, as well. A higher average natural gas generation has an inverse correlation coefficient with Masshub pricing, while coal and oil that dispatch in high winter demand periods are highly correlated with power prices.

Exhibit 2 Power Versus Residential-Commercial Natural Gas Demand

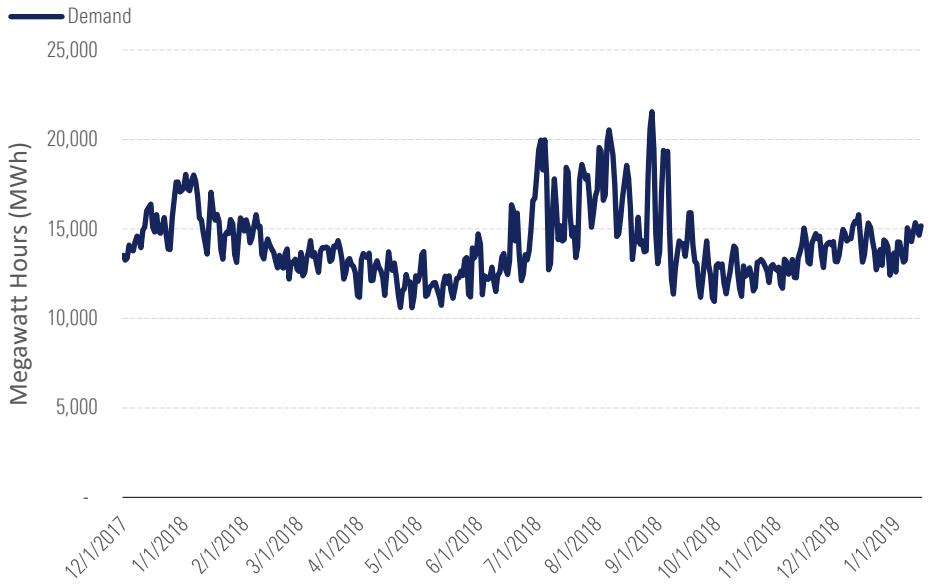


Source: Point Logic, ISO New England, Morningstar

Demand Regimes

Moving beyond natural gas import constraints, electric reliability in the region is somewhat fortuitous seasonally because much looser natural gas pipeline capacity coincides with the period of high-power demand in the summer, while home heating demand pulls more natural gas in the winter. This, in general, means lower natural gas demand for power in winter and higher natural gas demand for heating in the Res-Com sector in winter. Better demand response and efficiencies have been keeping overall demand in check and should continue to do so. That means the general demand profile only needs to watch out for one or two extreme winter weather events that may or may not show up. Exhibit 3 shows what ISO New England sees as a troubling enough scenario to seek out a cost-of-service agreement during the bomb cyclone event in December 2017 and January 2018 when demand jumped from 15,000 MW to nearly 18,000 MW. Although in the end ensuring reliability is critical, it is best not to gamble, and that is why the ISO prefers to use more conservative estimates in its projections.

Exhibit 3 ISO New England Average Daily Demand

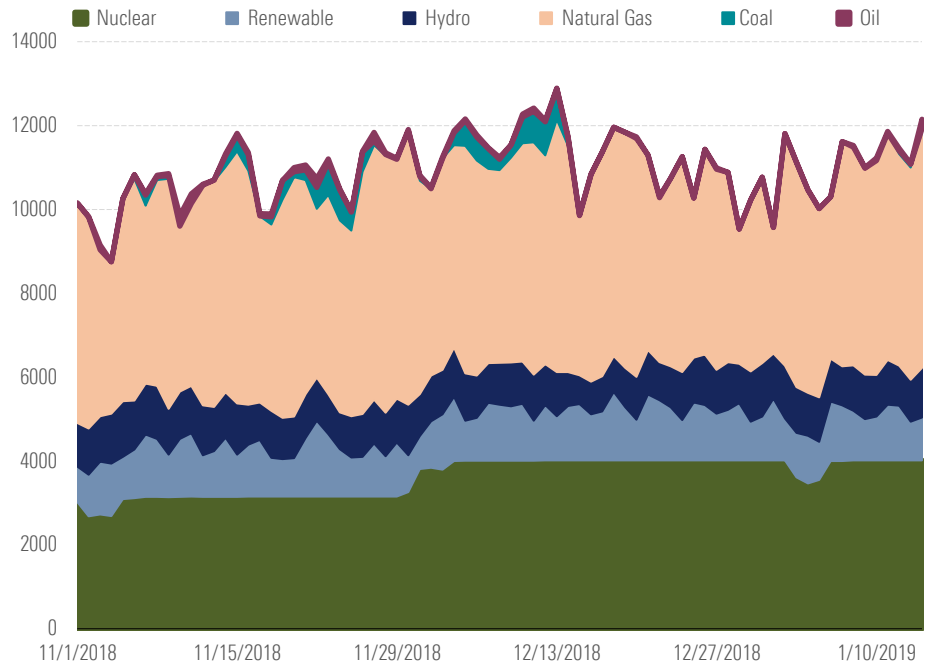


Source: ISO New England, Morningstar

Generating Patterns

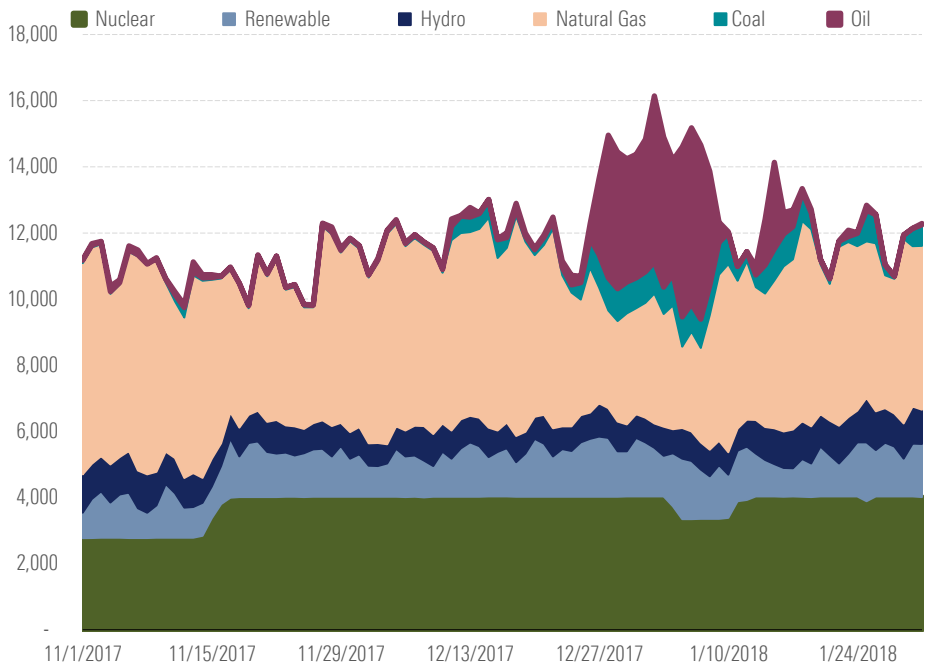
Recent forecasts in the Northeast are trending colder, but so far this winter has been mild enough that there have been little coal and oil winter peakers running—as can be seen in Exhibit 4. For reference, in Exhibit 5, last year's bomb cyclone shows how plants switched to oil and coal generation with the current generating stack available. At the same time those plants ramped up, natural gas plants switched off with no access to fuel or switched fuels if they were dual fuel. An important but seemingly benign data point is that year on year the renewable generation looks almost the same in both exhibits. If we switch gears to look at coming capacity changes, we see that wind generation is on the way to alleviate if not in whole at the very least in part the pressure valve these winter peaker units relieve

Exhibit 4 ISO New England Daily Generation Mix (Winter 2018-19) MW



Source: ISO New England, Morningstar

Exhibit 5 ISO New England Daily Generation Mix (Winter 2017-18) MW

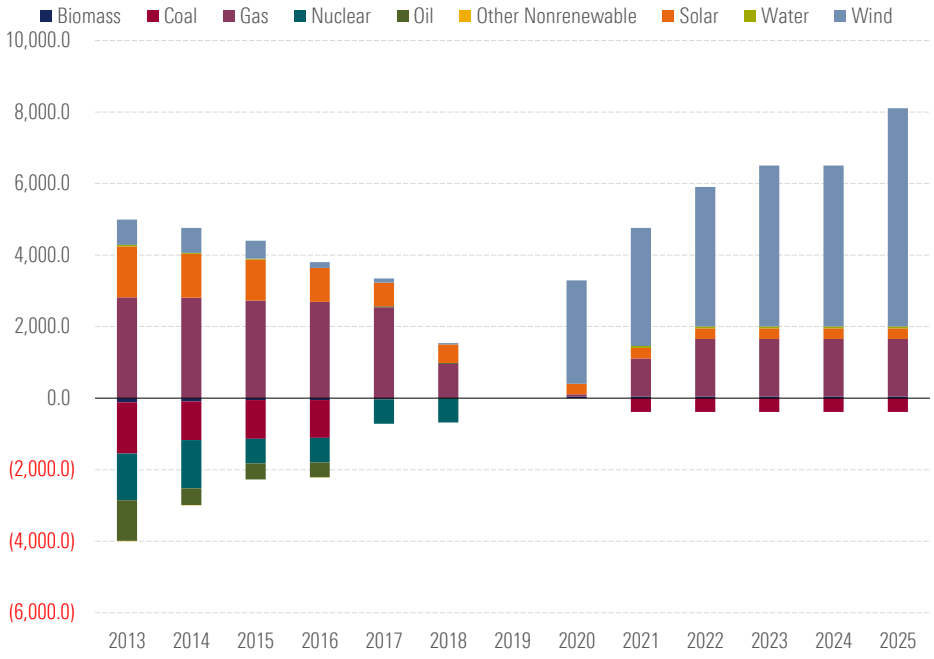


Source: ISO New England, Morningstar

Capacity Replacements

The Vinyard 800 megawatt offshore wind farm is still hoping to start construction this year, and may play a role in helping to replace legacy fossil fuel capacity. Despite some setbacks being incurred by the U.S. government shutdown, there may be a reprieve to ensure the Mystic plant agreement is short lived. Beyond this project there is plenty more wind on the way as can be seen in Exhibit 6. While winter storms still require coal and oil units to meet power demand due to natural gas displacement, the retirement of these units continues and the biggest generation addition looking forward at this point is going to be both onshore and offshore wind.

Exhibit 6 Cumulative Generation Capacity Change Relative to 2019



Source: SNL, Morningstar

Additional Offshore Wind

The wind assessment memo published for ISO New England Stakeholders (referenced in our introduction) outlined the effects of 400 MW, 800MW, and 1,600 MW projects and their likely generation from Dec. 24, 2017, through Jan. 8, 2018, for the 16 days that composed the bomb cyclone event. It showed that wind generation would have achieved about a 70% capacity factor. The 800 MW project would achieve 215,569 MWh over the time frame, displacing an estimated 9,500 coal MWh or 4,700 short tons of coal, 114,600 MWh of natural gas reduction or 830 MMcf/day, and 56,000 MWh of oil or 102,300 barrels of oil. Using the given bids would have resulted in locational marginal price (LMP) reduction between $6 to $8 per MWh. With just 800 MW of wind, there would be less need for fossil fuel backstop generation and the shelf life of the oil and coal reserves on hand would be extended. If the ISO had published last year its 21-day fuel assessment that it started publishing earlier this winter, it would have nearly depleted its 21-day fuel reserves by day 16 of the bomb cyclone. With the more

diverse generation mix including wind, the reduction in stores would have been much less significant and brought about better fuel security not with more fuel but with less need.

Additional Transmission

As a side note, not only is there additional wind capacity coming online that should reduce oil and coal demand in winter peaks and prolong the 21 days of reserves, but help is also coming from outside the region. The Clean Energy Connect project—a 1,200 MW transmission project—is still progressing and looking to start construction later this year and be in service by 2022, which should further help reduce the region's dependence on fossil fuels.

Brighter Future

ISO New England is still not done with the fuel security debate. While the ISO may or may not have truly needed to pursue a cost-of-service agreement with Exelon for its Mystic power plant, it is hard to blame them because of the need to ensure reliability and dependence on needed projects still in process. Before the ISO can reclaim some room to maneuver in terms of handling reliability assessments, these projects will need to progress a bit further. Yet, with additional electrons on the way from both wind generation resources that are spinning even during winter storms and new transmission bringing electrons generated from outside the region, the ISO looks to be in shape to ensure that the Mystic cost-of-service agreement will be a one-off two-year agreement.

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