ISO New England Gambling with Natural Gas

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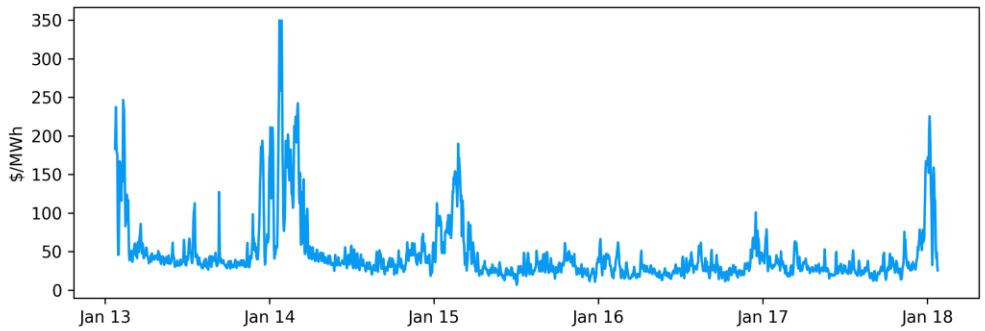
Data Sources Used in This Publication
ISO New England
Energy Information Administration
Intercontinental Exchange

Natural Gas Reliance

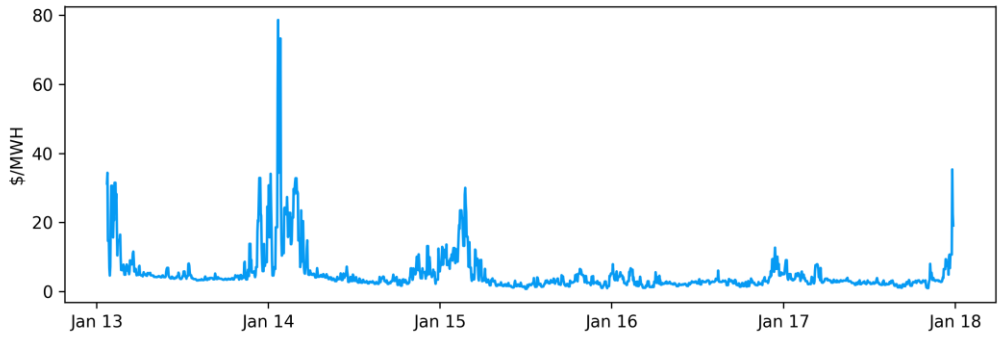
The historical correlation between ISO New England's day ahead power prices and Algonquin index natural gas prices is clear (Exhibits 1 and 2). The ISO's recent operational fuel-security analysis, published last week, shows a stack geared toward increased reliance on natural gas and highlights risks associated with access to firm supplies. Focusing on reliability, this correlation highlights the need to assess and address these risks before they become major problems down the road.

Exhibit 1 ISO New England Internal Hub Day Ahead Price (January 2013 - Present)



Source: ISO New England

Exhibit 2 Argus Algonquin CG Day Ahead Index Price (January 2013 - December 2017)



Source: intercontinental Exchange

If the region is lucky, wind may save the day in both a literal and figurative sense. Otherwise planners will need to secure adequate natural gas supplies with the help of LNG imports to ensure reliability or

call on winter reliability programs in extreme winter conditions. This option may not be the cheapest but a needed step to ensure adequate supply in winter when competing with gas heating demand.

Demand Future

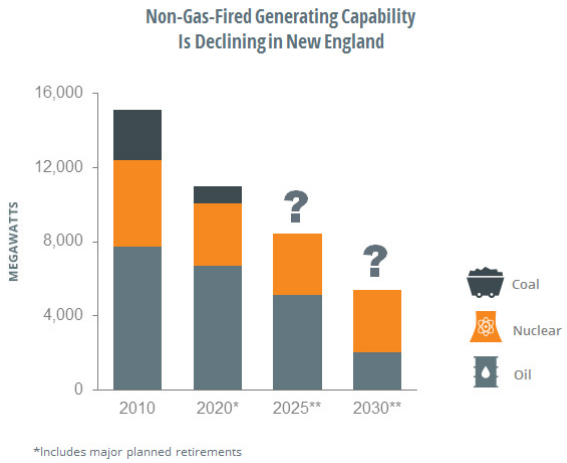
New England's two-year load forecast shows only low to moderate growth from its current summer peak coming in at 28 GW and winter peak at 22.8 GW. Base forecast has the summer peak reaching 30 GW around 2020 and winter peak rising to around 23.4 GW in the winter of 20/21. The ISO sees about a 1% increase in load per year. Yet the fact New England leads the nation in Energy Efficiency (EE) adoption should help keep load increases in check in terms of net load. The EE forecast between 2016 and 2017 was revised up with greater load reductions attributed to higher than expected adoption of efficiency efforts. Energy efficiency though is not the only tool being utilized to combat load growth. The region is also seeing growth in behind the meter photo-voltaic solar (PV) and demand response (PDR) usage. The ISO is forecasting a net load reduction of 1,600 MW rising to 2,800 MW by 2020 and 4,400 by 2026. We'll have to wait and see if PV adoption forecasts are revised downward following the introduction of a 30% solar panel import tariff, recently announced by the Trump Administration. Overall though, load should at most see a small increase in the coming years, which should help the region as its generation fleet transitions. This factor alone; however, is not enough to counteract the underlying fuel security issues the ISO is expected to see in the future.

Generation Shifts

The new plant queue currently contains 76 projects with 12,899MW additional capacity comprised of 6,427 MW natural gas, 5,397 MW wind, and 77 MW battery storage. The remaining 1,000 MW is mostly renewable/solar. In the long term the ISO sees its future eventually comprising of renewables and storage to generate power on the grid while simultaneously meeting state emission goals. In the meantime, it is hoping for mild summers and winters with lower load demand and fewer gas supply disruptions.

The ISO sees it as highly likely that by 2025 the stack will say goodbye to coal in the region (Exhibit 3). Back in 2012 they estimated that 8,300 MW of coal and oil plants were at risk of retiring. Between 2013 and 2019, 3,000 MW of coal and oil generation either retired or was set to retire. The 604 MW Vermont Yankee nuclear plant closed in 2014 and the larger 1,300 MW Pilgrim nuke is scheduled for retirement in 2019. The loss of all this fuel-secure baseload generation capacity (plants that have available fuel stored onsite) will expose the region to reliance on variable renewable generation and the risk of natural gas supply disruptions. With another 5,000 MW of coal and oil capacity at risk of retirement and the uncertain future of 3,300 MW of remaining nuclear generation, the near and mid-term outlook shows a heavy exposure to natural gas constraints.

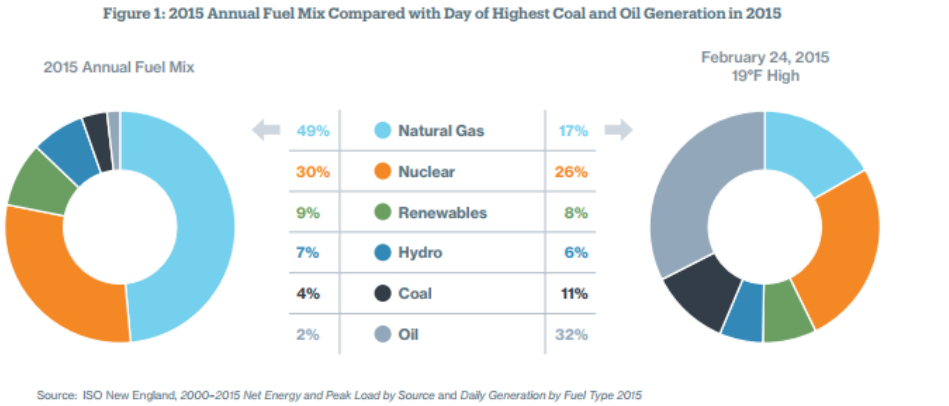
Exhibit 3 ISO New England Coal, Oil, and Nuclear Generating Capacity



Source: ISO New England

For the moment, the winter generation mix during cold snaps often meets up to half its needs with the region's coal, oil, and nuclear generation capacity (Exhibit 4). The ISO's operational fuel-security analysis showed that after the capacity reductions from retirements of the non-gas plants, all but the most optimistic scenario resulted in resorting to expensive emergency procedures from 10-minute reserve events all the way to rolling blackouts in extreme events for multiple days through the winter period. Renewables can exasperate the capacity shortfall by driving down power prices on "normal" demand days and pushing more uneconomic older plants into retirement earlier.

Exhibit 4 ISO New England Normal vs. Constrained Generation Mix



Source: ISO New England

Natural Gas Supply

According to ISO NE's operational fuel-security analysis, available pipeline capacity for the region's total natural gas demand from Algonquin (1.9 Bcf/d), Tennessee (1.4 Bcf/d), Iroquois (0.26 Bcd/d), Portland (0.3 Bcf/d), and Maritimes & Northeast (0.83 Bcf/d) amounts to 3.86 Bcf/d. They apply a discount to the

M & N capacity because of a likelihood it would be consumed by heating demand and a long-term threat to the pipeline's supply from Sable Island and Deep Panuke in Nova Scotia that is expected to be depleted by 2025. The analysis also indicates 2.04 Bcf/d of LNG import capacity is available in New England.

Since the polar vortex in 2014 there have been expansions to Algonquin (342 MMcf/day) and Tennessee (72 MMcf/day) capacity but not enough to alleviate the region's winter constraints. This increase has not increased supply but simply supplanted LNG imports that have declined from 31.6 Bcf during the winter of 2014/15 to 11.5 Bcf in 2016/17. This shift changes the underlying cost economics but does not address the interruptible supply issues.

Going forward, with increasing opposition from environmental groups and states to new pipelines and capacity expansions, such projects are taking longer than planned. That means short-term winter pipeline shortfalls will increasingly need to be offset by LNG imports that are complicated by the need to contract out months in advance. The winter reliability program that requires fuel storage onsite at plants that can run oil or LNG is currently only being utilized by oil generators. With future winter supply risks this could be a missed opportunity with a readily available subsidy available to offset some of the LNG import costs.

With Indian Point nuclear facility closing in New York and natural gas plants looking to fill the gap, winter draws from such a shift could see New England further starved of supply. Additionally, there is a danger that shippers on M & N could bypass power generators in New England to serve heating loads in New York. Ultimately when natural gas supply priority goes to heating in a region relying on the same source for power generation, the region will be left in the dark due to lack of supply. Pipeline capacity's failure to keep up with total demand will lead to increased LNG imports or higher and faster renewable and storage adoption.

Power Imports

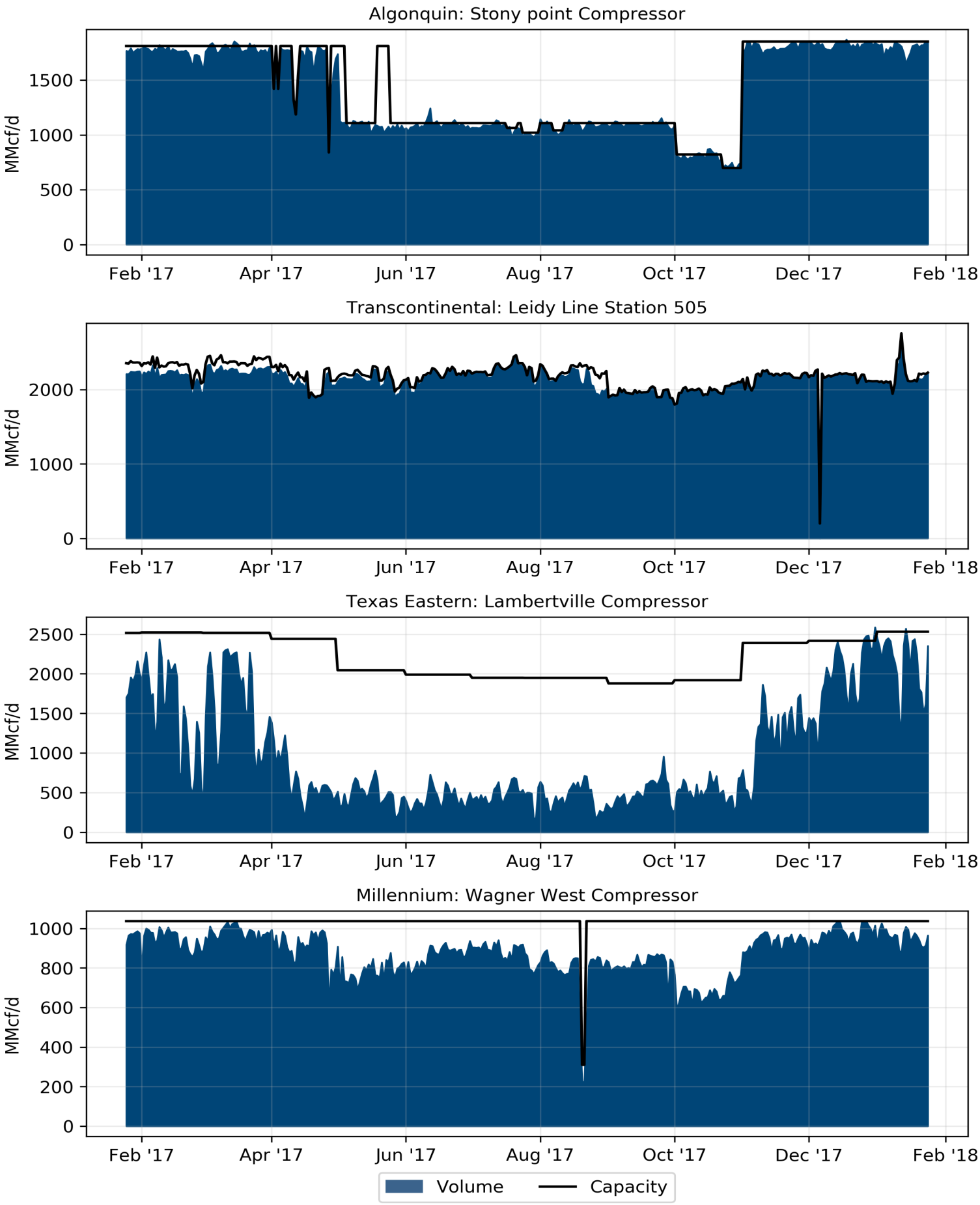
Currently the ISO imports 10-17% of its energy from neighbors - including hydropower, which helps regional states meet their renewable power standard targets. Hydro-Quebec is the primary supplier, accounting for around half of imports. Current inbound capacity limits are around 4,947 MW, and the region is planning to build out infrastructure to increase flows from neighboring entities. In 2016 Massachusetts Governor Baker signed Bill H.4568 *An Act Relative to Energy Diversity* that led to a Clean Energy RFP that has seen a number of competitive bids to build around 1,200 MW of clean renewable energy in the state. The winning announcement is expected today January 25th. This should be a perfect opportunity for Canadian power producers flowing power from cheap renewable hydro generation into a likely higher power price New England region reliant on a constrained natural gas generating fleet.

Consequences

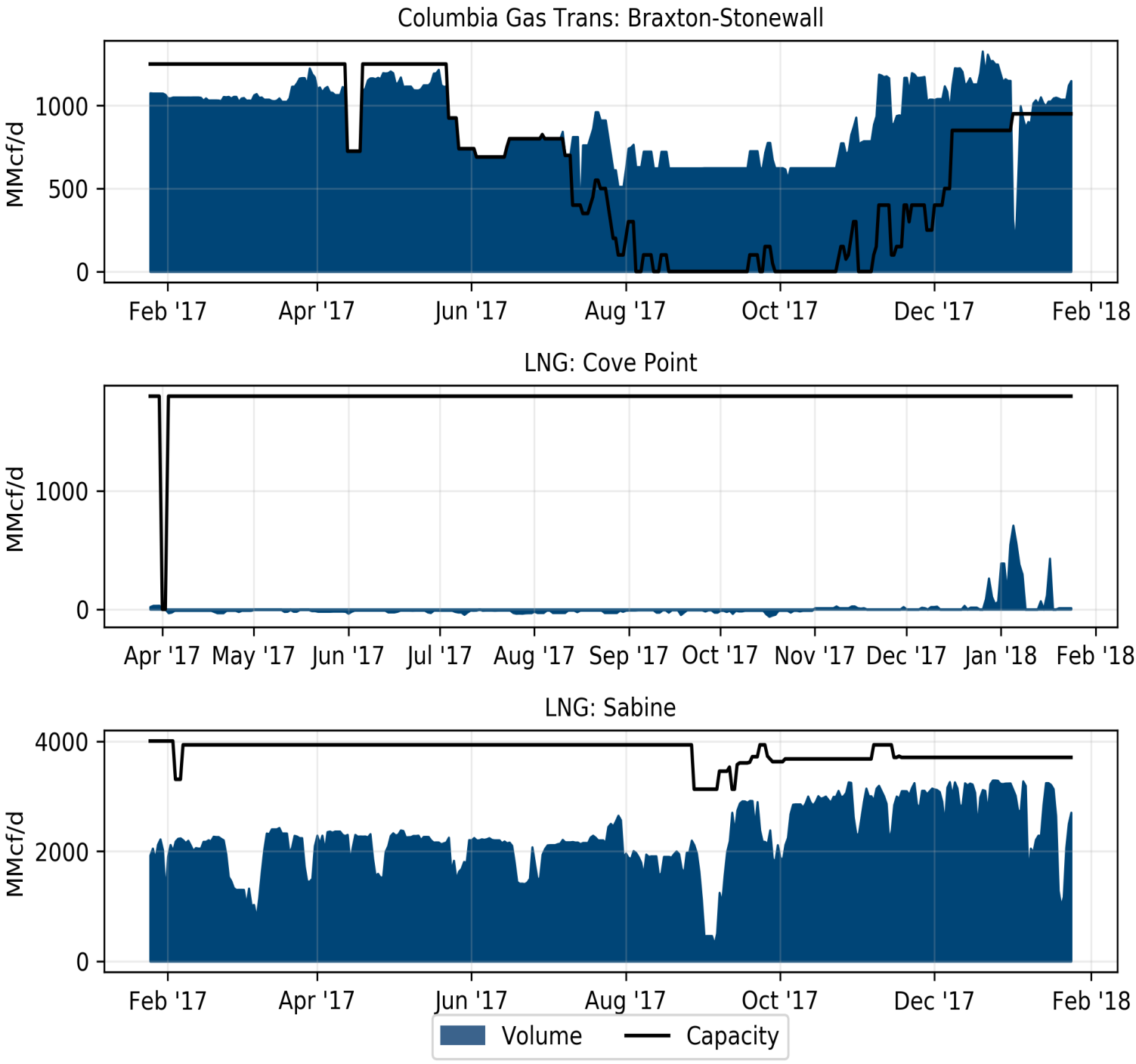
ISO New England's current outlook leaves them open to a big winter gamble each year and they are on track to increase the odds of price spikes as their reliance on natural gas grows. While they self-

acknowledge this reality, it could prove to be a dangerous line to walk. On the surface ISO forward reserve capacity is maintained at around 15% on an annual forecast level, but the devil is in the details and those high-level assumptions do not align with a typical daily winter constraint profile - leading to price spikes and emergency procedures. The operational fuel analysis sees emergency procedures needing to be used in almost all scenarios explored. The consequences if a pipeline compressor station fails are not good. While 2016 was a banner year for low cost generation it only takes a little bit of freezing weather to move a winter monthly price tag per MW from $60 to triple digits. The volatility is there and is not going anywhere anytime soon which presents some interesting opportunities in this market.

Natural Gas Important Points



Source: Pointlogic Energy



Source: Pointlogic Energy

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