

The New England Energy Challenge

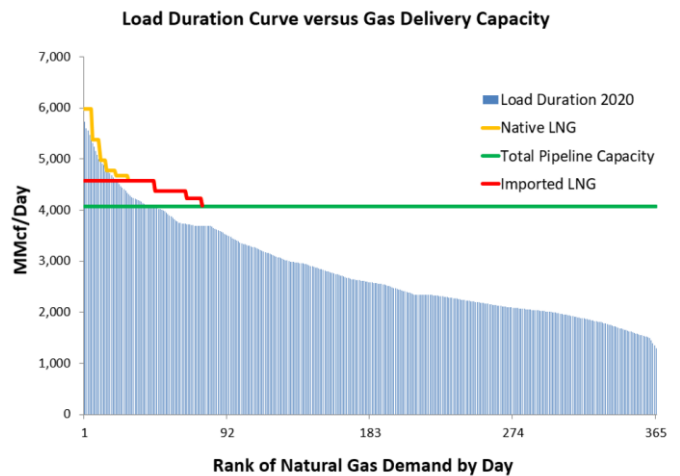
Reliability and “fuel security” are not synonymous

Reliability is the ability of the market participants to provide energy and other necessary services when needed. Fuel Security refers to the ability of power plants to have or obtain the fuel required to generate electricity. Although reliability and fuel security are related, they are really two separate issues. Natural gas-fired generating units, along with numerous other resource types, are reliability providers and several technologies like batteries and demand response foster reliability without combusting fossil fuels or emitting greenhouse gases.

Load service assurance: a fuel-neutral and precise expression of reliability needs

As the region continues to explore the extent of need for new natural gas pipeline infrastructure, the concept of “Load Service Assurance” (LSA) may be useful to bridge the gap between understanding reliability, resource adequacy and fuel security, and to foster competition among a wide variety of resources to meet the grid’s changing needs. Load Service Assurance combines an hourly understanding of natural gas usage (i.e., pipeline utilization patterns) with solutions such as battery storage, LNG, demand response, flexible fuel scheduling, and more. Load Service Assurance can be used to address the challenges of New England’s peak demand days as well as improve economic and operational efficiency of the electricity grid year-round.

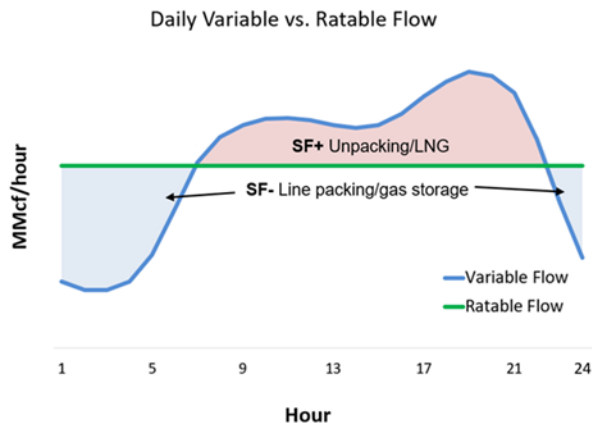
Understanding New England’s Natural Gas Consumption Patterns



*Projection for New England in 2020. Reflects pipeline capacity in 2017, increased native LNG, and 75 days/30 BCF of imported LNG

Natural gas demand in New England varies dramatically by season, and exceeds gas pipeline capacity on approximately 50-55 days of the year, as reflected in the load duration curve above. However, a deeper examination of pipeline utilization patterns shows that pipeline capacity is only fully utilized every hour of the day on only five days of the year. That is to say that on 360 days of the year there is at least some amount of unutilized pipeline capacity in New England. Examining hourly natural gas consumption patterns helps us see why.

Actual Pipeline Utilization Patterns Vary Greatly Hour by Hour



SF+ Swing flow plus: portion of the day when actual flow exceeds mean daily flow
SF- Swing flow minus: portion of the day when mean daily flow exceeds actual flow

While daily gas reservations are done on a daily basis and imply “ratable” or constant natural gas flow, in actuality, natural gas demand and flow varies over the course of the day. The graph above demonstrates this “swing flow.” The area above the mean shows “swing flow plus”, where natural gas consumption exceeds the mean, or ratable, flow. The portion below the green line, or “swing flow minus” shows slack, or underutilization of existing capacity. A wide variety of solutions can be used to improve pipeline utilization patterns, smooth out utilization swings and fill in where demand exceeds capacity.

Alternative load service assurance solutions:

Batteries – LNG - Demand Response - Pumped Storage – Oil – Energy Efficiency

Considerations for Advancing Cost Effective Solutions in New England

1. **Broaden the fuel security conversation to “Load Service Assurance”:** Examining fuel security in isolation may exclude consideration of solutions that are more cost-effective for meeting both reliability needs as well as state energy policy objectives. Stakeholders should consider Load Service Assurance, which encompasses a much broader set of solutions, to be the desired approach for ensuring reliability.
2. **Consider actual usage patterns for natural gas:** When assessing fuel security specifically, stakeholders should examine natural gas demand at the hourly, rather than daily, level to enable full utilization of the pipeline in every hour.
3. **Create markets to call forth competition between resources:** For example, a new flexible scheduling offering could allow natural gas power plants to schedule natural gas shipments at the hourly level, better matching variable generation needs. By creating a market signal where prices (for gas and capacity) vary at the hourly level, a multitude of LSA solutions will enter the market and compete. Moreover, such hourly pricing not only fosters harmonization between the gas and electric markets, but does so in a manner that would, over time, generate price signals in both the day-ahead and “within-day” or intraday markets. Together, these signals will stimulate market investments and innovations, leading to a more cost-effective and market-based solutions to long term Load Service Assurance.

For more information

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