



## ***Challenges Facing the Natural Gas & Electric Power Interface in New England - and Opportunities to Improve Mutual Reliability***

**April 2012**

### KEY POINTS

- Natural gas has become the preferred power generation fuel in New England and its role is only likely to grow in coming years.
- The electric system model in New England does not appear to give electric generators the proper incentive to contract for firm pipeline gas transportation, to ensure supply availability.
- Due to the financial model under which they operate, and the design of the electric market structure in the region, most generators in New England continue to opt for non-firm gas transportation arrangements to fuel their units. This creates significant uncertainty at peak times on both the natural gas and electric grids.
- The natural gas pipeline sector has been experiencing more frequent challenges on its own systems caused in great part by market decisions in the power generation sector – lack of firm transportation contracts, higher hourly gas usage by generators exceeding pipeline tariff provisions and in some cases generators not properly scheduling and securing their gas supplies for delivery on the pipelines, etc. On the regional gas system, this is causing broader concern about resulting impacts on other shippers/customers on the gas system, such as local gas utilities. It is extremely critical that all parties comply with pipeline operating rules, as well as the pipeline’s FERC Tariff provisions, including those governing the scheduling and flow of gas, so that system integrity is maintained. Ensuring that pipelines have the tools for enforcement of flow and imbalance tolerances is essential.
- Eight years after the “cold snap” of January 2004, the New England electric market design remains fundamentally unchanged when it comes to fuel supplies and natural gas.
- The natural gas infrastructure in New England – in the form of new pipeline expansion projects – needs to be increased. But the level and timing of this increase depends upon customer commitments – and such commitment has been generally lacking from the power generation sector, which is already the largest single natural gas consuming sector in the region.
- NGA and the natural gas industry seek to work with electric market participants to review and develop options to advance – and see implemented - solutions in the regional market to address this area of growing reliability concern to the New England energy system.

## Introduction

Natural gas continues to grow in significance and value to New England's energy system. The rise in U.S. natural gas production and the decline in natural gas commodity prices offer current – and future - opportunity to the New England region. The opportunities range across multiple sectors, from home heating to transportation, from commercial and industrial applications to power generation.

Power generation is a leading natural gas consuming sector in New England. Over 12,000 megawatts of new electric generating units fueled by natural gas have been added in New England over the last 14 years. The new gas power plants added in this time have contributed to lower air emissions in New England and electric system reliability. Natural gas has greatly benefited the power sector in New England, due to its role as an efficient, reliable, and environmentally beneficial fuel source.

At the same time, the power sector has been a good demand market for natural gas in New England. The natural gas delivery system has grown over the last dozen years, with the addition of new pipeline capacity – advanced by contract commitments - and new liquefied natural gas facilities.

The future promises even greater interconnectedness of natural gas fuel supplies and electric generation in New England. Natural gas is the leading fuel (along with wind) for proposed new generating units in the regional queue administered by ISO New England. Environmental regulations at the federal and state levels are expected to lead to retirements of coal, oil and even some older natural gas power plants within the next several years. The reliance on natural gas will only grow (and as a fundamental premise, NGA members support this growth). Furthermore, even as significant new supplies of renewable energy are added to the electric grid, it is likely that natural gas will be the preferred "back-up" fuel.



At this juncture, in Spring 2012, the natural gas industry in New England is seriously concerned by a growing instability at the nexus of the power generation and natural gas markets in the region. Eight years after the "cold snap" experience in New England that underscored gaps in market structures – from communications to scheduling to supply commitments – the markets remain ever more challenged. Participants in the New England natural gas industry are increasingly concerned by detrimental reliability impacts on the natural gas system resulting in great measure from uncertainties in electric market design in New England.

The Northeast Gas Association (NGA) has prepared this paper to outline the perspective of the natural gas industry on the challenges in the current electric-gas interface in New England, and to suggest actions that could be taken to improve the situation to foster reliability on both the electric power and natural gas systems in the region.

## Background on the New England Natural Gas Market

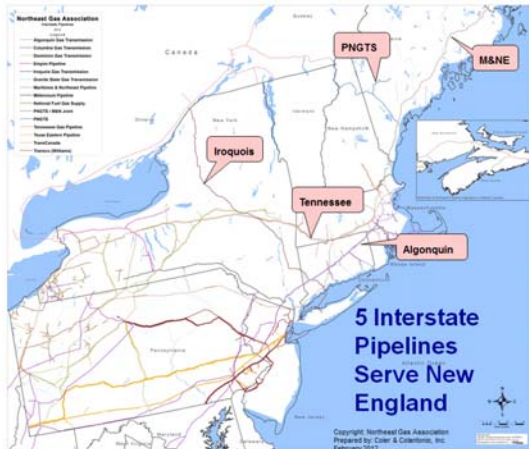
Currently, natural gas represents approximately 25% of primary energy consumption in New England, 35% of the home heating market, and about 43% of the power generating capacity.

New England is served by five interstate natural gas pipelines. Two major pipeline systems have transported gas to the region since the 1950s: Tennessee Gas Pipeline L.L.C. and Algonquin Gas Transmission (part of Spectra Energy). Iroquois Gas Transmission began operations in 1991. In the late 1990s, two new pipelines linked to Canadian supplies began operations: Portland Natural Gas Transmission (PNGTS) and Maritimes & Northeast Pipeline (M&NE).

In the last decade, there have been some major expansions in pipeline services in the larger Northeast. Iroquois and M&NE have essentially doubled their throughput capability. Both Tennessee and Algonquin have added compression and looping (additional in-ground pipe assets), and Algonquin added the Hubline system north and east of Boston. Distrigas increased the vaporization capacity at its Everett, MA liquefied natural gas (LNG) facility. Two offshore LNG facilities were constructed off Gloucester, MA. The Canaport LNG facility of Repsol and Irving Oil, based in Saint John, New Brunswick, added close to 10 Bcf of storage and the ability to transport significant gas supplies into the M&NE system for the New England market.

These system enhancements were designed to meet growing market demand in specific geographical locations as contracted by the participating firm shippers, and have supported natural gas system reliability generally.

The strong concern of NGA members is two-fold. First, the demand for natural gas within the region's electric market has not been sufficiently matched by a commitment to securing adequate reliable natural gas supplies and firm pipeline capacity contractual obligations. The electric power sector has not participated sufficiently in terms of investments in securing natural gas supplies for their generating units. Second, current electric generation dispatch protocols are not coinciding with reliable operations along the natural gas pipeline infrastructure, resulting in operational challenges at certain periods for the pipelines and potentially therefore to all pipeline customers, including local distribution companies (LDCs).



### Natural Gas is Provided on the Basis of Contracts

Natural gas service is provided solely under contractual terms between suppliers (sellers), pipelines (wholesale transporters), local distribution systems, and ultimate end-use customers. The contractual terms are considered "firm" or "non-firm"/ "interruptible." Service to residential end-users, for example, must be firm. Larger commercial or industrial customers, such as power generators, on the other hand, have the option of contracting for either firm or interruptible transportation services. Firm transportation service is not subject to prior claim by another customer and is the highest priority service offered to customers. Firm transportation is a service for which facilities have been specifically designed, installed and dedicated up to a certified volume, and at specific locations of receipt and delivery of the gas.

Primary firm transportation service (the highest possibly priority) is always achieved over all forms of interruptible service. It guarantees transportation under almost all circumstances.

Interruptible transportation service is subject to interruptions when deliveries would interfere with or restrict deliveries of transportation service having higher priority (firm service). Therefore, interruptible service (i.e., "non-firm" service) includes in its contract terms the possibility of interruption under certain operational and market conditions. Those customers who elect to take interruptible service often have alternative fuel capability for their operation, or, in some cases, may curtail their operations totally when they are interrupted. In short, it is understood clearly that parties which contract for interruptible supplies can never be assured, on any day at any time, that natural gas supplies will be available.

The Federal Energy Regulatory Commission (FERC) in a December 2003 report on New England's natural gas infrastructure noted:

*"The adequacy of the natural gas infrastructure is based on its ability to fulfill its contractual commitments. Natural gas may be contracted on a firm or interruptible basis. Interruptible contracts are typically less expensive because capacity is only paid for if used, and the supplier or transporter may interrupt service. The natural gas infrastructure is considered adequate if firm commitments are met and terms of the interruptible contract are satisfied."*

Pipeline capacity is added to meet the needs of gas customers requesting primary firm service and who are willing to execute firm transportation contracts that pay for the required capital investment and operating costs. Interstate pipelines are regulated by the FERC and have to recover their costs through regulated rates. To build capacity otherwise is not prudent or reasonable.

***The role of natural gas in the New England electric market is likely only to grow in coming years, which is positive for the region, owing to the cost, unit efficiency, and air quality benefits provided by natural gas generation.***

Even with the enhancements to the pipeline system in the region over the last decade, interstate gas pipelines in the region, with few exceptions, are already fully subscribed with firm contractual commitments year-round. Those customers with firm contract arrangements can be assured of the ability to receive gas as contracted and as designed. Again, it must be underscored that the natural gas delivery system is designed to fulfill its contractual arrangements. Those willing to "play the market" or be "free riders" may – and often do – find themselves unable to secure supplies for which they did not adequately contract.

### Electric Market Design Has Resulted in Too Many Gas Generators in New England Opting for Non-Firm Gas Transportation

A key challenge for the New England energy market is that too many power generators do not hold contracts for firm gas pipeline transportation capacity under their unilateral control and instead rely on "if and as available" non-firm gas capacity, or, in some cases, capacity held and controlled by unrelated third parties.

Even since the "cold snap" episode of January 2004, which highlighted the reliance of many generators on non-firm gas supplies, the trend has not been towards securing greater reliable supply commitment.

On Tennessee Gas Pipeline, approximately two-thirds of power generator load on their system within New England is non-firm.

On Iroquois Gas Transmission, 83% of power generator load on their system within New England is non-firm.

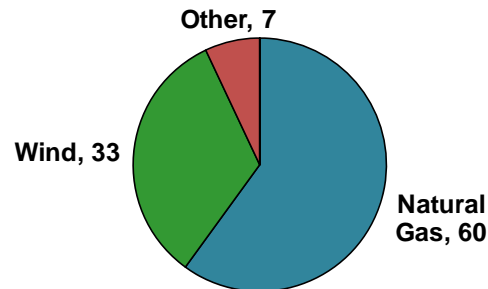
On Algonquin Gas Transmission, the level of power generator load on their system within New England with firm mainline capacity has declined by 80% in the last six years.

This trajectory, coupled with ongoing growth in natural gas-fueled generation, is reducing energy system reliability.

***The demand for natural gas within the region's electric market has not been sufficiently matched by a commitment to securing adequate reliable natural gas supplies and firm pipeline capacity contractual obligations.***

### PROPOSED GENERATOR ADDITIONS IN NEW ENGLAND BY FUEL TYPE, %

(Source: ISO-NE, 4-12)



### Operational Issues Related to the Electric Market Are Impacting the Regional Natural Gas System

In recent years, New England has been experiencing higher pipeline utilization, less interruptible availability and less year-round operational flexibility, particularly in winter periods. (Note: Pipelines continue to perform extremely reliably, as designed and in accordance with FERC-regulated contractual commitments). For these reasons, gas availability challenges exist for those gas-fired generators that have not secured firm supplies. As temperatures fall, operational flexibility also declines for those not prudently prepared under sufficient contractual arrangements. These issues are causing broader concerns about energy reliability in the region.

Several operational issues are of key concern.

#### ***Intraday Usage***

One extremely important issue concerns the manner in which gas fired generators - dispatched on short notice - seek to use natural gas on an intraday basis. Such short notice generators may have electric system obligations to the ISO to generate power quickly, but generally and apparently lack the gas supply resources necessary to turn gas supply on and off on such short notice. The practice of short notice generators (i.e., those who generate electricity "on the margin") using unscheduled gas when demand is high on the pipeline/distribution network has become a recurring problem, one threatening reliability region-wide. Dispatching natural gas fired power generators with little (or sometimes no) notice to the suppliers and transporters of that gas is a fundamental flaw which must be fixed.



### **Hourly Usage and "Overtakes"**

Another related issue is hourly usage. Natural gas pipelines are generally designed to provide hourly flows conforming to usage of traditional gas customers located within LDC territories, using gas in an operationally reasonable, consistent and predictable pattern throughout a typical day. In contrast, many gas-fired generators are often required to use 24 hours' worth of gas over a shorter span of hours (i.e., four, six, eight, twelve hours). This consumption profile is not consistent with typical and historical pipeline operational design, and – depending on the level of usage and system/weather conditions – cannot be sustained.

### **Need for Compliance with FERC-Approved Pipeline Tariffs**

As many generators are more reliant on interruptible capacity (in an already fully contracted system), it is extremely critical that all parties comply with pipeline operating rules, as well as the pipeline's FERC Tariff provisions, including those governing the scheduling and flow of gas, so that system integrity is maintained. This is to ensure that those customers which do contract for firm capacity and do operate consistently with pipeline design receive adequate service as contracted. In a series of instances over the last year or so certain pipelines have indicated a growing and recurring problem where some generators, for various reasons, have not complied with operational limits. This behavior has created threats to system integrity (for example, overtaking gas on the system when not authorized to do so, using gas that had not been scheduled, and/or lacking adequate capacity/supply to meet needs while at the same time using other shippers' gas at their plant(s) which erodes system [including LDC] pressures). As a result of this type of behavior by shippers, some interstate pipelines have requested and obtained from the FERC enhanced tariff authority to protect the integrity of their systems and, at the same time, are planning to more vigilantly enforce existing tariff authorities (such as penalties) and implement direct operational actions to protect firm gas customers.

**Those customers with firm contract arrangements can be assured of the ability to receive gas as contracted and as designed...The natural gas delivery system is designed to fulfill its contractual arrangements.**

### **The Electric Market in New England Seemingly Does Not Offer Proper Valuation of Resources**

Eight years after the "cold snap" episode of 2004, the electric market in New England has made numerous advances and implemented several substantial market enhancements. Electric transmission projects have been added. Future capacity additions are being incentivized. ISO New England's "cold weather" planning and operational adjustments have been helpful to all market participants. ISO's current strategic planning initiative has identified natural gas as one of the critical issues facing the electric market in the coming decade.

In one central area however there has not been a necessary adjustment.

The electric market in the region as currently designed does not properly value resources in our view. The system as currently structured does not compensate generators for the non-peak portions of infrastructure investment or commitment.

Accordingly, there are often few incentives for natural gas power generators to contract for firm natural gas supplies and transportation.

This remains a major stumbling block in terms of greater harmonization of electric and natural gas markets in the region, and is a challenge that must be resolved soon.

*Natural gas pipeline companies continue to enhance and expand their systems to meet growing demand. Pipeline capacity is added to meet the needs of gas customers requesting primary firm service and who are willing to execute firm transportation contracts that pay for the required capital investment and operating costs.*



## Developing and Implementing Solutions

The role of natural gas in the New England electric market is likely only to grow in coming years, which is positive for the region, owing to the cost, unit efficiency, and air quality benefits provided by natural gas generation.

And yet the gas pipeline system is not currently designed to meet that growing generation demand as proposed, as most of these gas generators have not secured firm capacity on the pipeline system to gain needed supplies, and are too often apparently obligated to use natural gas in ways at odds with pipeline design.

This is a concerning trend for energy reliability.

There is substantial growth in natural gas supplies near the border of New England within the Marcellus Shale. Even so, getting these new supplies to market requires further natural gas pipeline infrastructure investments, which requires incremental contract commitments. It would be highly unfortunate if the New England market were to remain constrained from accessing these new economical supplies due to uncertainty in the power generation market.

Solutions are available. They might include the following:

- The electric cost recovery mechanism should be revised to allow for recovery of pipeline capacity costs.
- Storage service, including perhaps LNG, should be developed to provide back-up fuel supply for power generators during periods when gas infrastructure is constrained.
- The daily nomination/confirmation schedules for natural gas and power should be synchronized to close the gaps between the power day and the gas day.
- Gas pipeline companies should evaluate the feasibility of offering short-term (hourly) transportation services to power generators and other markets that fluctuate frequently throughout the day.



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There is an opportunity now to address these reliability concerns impacting both the natural gas and electric markets in New England. NGA encourages all the stakeholders to seek solutions and action on resource valuation in the electric market, infrastructure enhancements, and operational reliability on both the electric and natural gas systems. The Federal Energy Regulatory Commission (FERC) opened in early 2012 a review of the topic of electric and natural gas market coordination, which should prove illuminating and helpful to moving to needed solutions.



## ABOUT NGA

The Northeast Gas Association (NGA) is a regional trade association that focuses on education and training, technology research and development, operations, planning, and increasing public awareness of natural gas in the Northeast U.S.

NGA represents natural gas distribution companies, transmission companies, liquefied natural gas importers, and associate member companies. These companies provide natural gas to approximately 10 million customers in eight states (Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont).

For more information visit NGA's website  
[www.northeastgas.org](http://www.northeastgas.org)