

2015 STATISTICAL GUIDE



NORTHEAST GAS MARKET AT-A-GLANCE

	NEW ENGLAND	NEW YORK	NEW JERSEY
<i>Gas Customers</i>	2.6 million	4.7 million	2.9 million
<i>Annual Consumption (2014)</i>	855 Bcf	1,319 Bcf	757 Bcf
<i>Interstate Pipelines</i>	5	11	5
<i>Miles of transmission pipeline</i>	2,647	4,538	1,536
<i>Underground Storage</i>	-	246 Bcf	-
<i>LNG import facilities</i>	3	-	-
<i>Gas production in-state, annual (2014)</i>	-	20 Bcf	-
<i>Gas Efficiency Program Budgets (2014)</i>	\$245 million	\$179 million	\$90 million
<i>Primary energy consumption, leading fuels, % (2013)</i>	Natural Gas, 28% Oil, 44% Nuclear, 13% Coal, 2% Renewables, 12%	Natural Gas, 36% Oil, 34% Nuclear, 13% Coal, 2% Renewables, 11%	Natural Gas, 31% Oil, 42% Nuclear, 15% Coal, 1% Renewables, 4%
<i>Gas as a share of residential home heating fuels (2014)</i>	38.5%	57%	75%
<i>Total population</i>	14.6 million	19.6 million	8.9 million
<i>Gross state domestic product (GDP, 2014)</i>	\$924 billion	\$1,405 billion	\$549 billion

Sources: NGA, NYSEERDA, NY DEC, NY PSC, NJ BPU, American Council for an Energy Efficient Economy, AGA, U.S. EIA, PHMSA, U.S. Census Bureau, U.S. BEA
Updated by NGA, October 2015

STATISTICAL GUIDE TO THE NORTHEAST U.S. NATURAL GAS INDUSTRY *2015*

*An annual review of statistics and trends
relating to the region's natural gas industry*



November 2015



The NGA *Statistical Guide* is intended as an introduction to the natural gas market in the Northeast U.S. region of New England, New York and New Jersey. Included are basic statistics on end-use markets, infrastructure, and natural gas issues and trends - from technology applications to environmental benefits.

Regional information is updated through calendar year 2014, where available. As much as possible the most recent data from other sources are presented.

NGA is grateful to its members companies for their cooperation and support in providing data and information for presentation in a regional tabulation.

Other particularly helpful sources of information are the U.S. Department of Energy/Energy Information Administration, the Federal Energy Regulatory Commission, Canada's National Energy Board, the American Gas Association, and the New York State Energy Research and Development Authority.

The Guide is prepared by Stephen Leahy of NGA. Please feel free to forward any suggestions, comments and revisions to:
leahy@northeastgas.org.

SECTIONS

	<u>Page</u>
<i>I.</i> The Year in Review	5
<i>II.</i> Regional Energy Overview	28
<i>III.</i> Supplies & Infrastructure	35
<i>IV.</i> Natural Gas Trends in the Northeast U.S.	55
<i>V.</i> Technology & Environmental Issues	73
<i>VI.</i> Distribution & Transmission Companies	84
<i>VII.</i> About NGA	89

The Year in Review

2015

The Northeast Gas Association (NGA) is pleased to present its annual overview of market characteristics and recent developments in the Northeast region of the United States. This overview summarizes key features of the natural gas system in New England, New York, and New Jersey, and then discusses current market issues including new infrastructure, new technology R&D, supply and price trends, state policies to increase access to natural gas, and environmental and greenhouse gas implications.

MARKET BACKGROUND

Population & Economy

The Northeast region comprises the eight states of Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. The composite population is 43.3 million (13.6% of the U.S.), with a civilian labor force of 22 million. Total state domestic product for the region is \$2.87 trillion (16.7% of the U.S. total).

Regional Natural Gas Market

The eight-state region has 10.3 million natural gas customers (14% of the U.S. total of 72.8 million). Total annual gas sendout on the regional gas system is 2.8 trillion cubic feet (Tcf), or 12% of U.S. total consumption (measured in volumes delivered to consumers).

Primary Energy

Natural gas represents 28% of the primary energy consumption of the six New England states, 31% of New Jersey, and 36% of New York, compared to the national average of 28% (based on U.S. EIA data, 2013). The eight-state region consumes much less coal than the national average, and, in general, more oil, nuclear, and renewables (primarily hydro and biomass) than the national average.

Gas Customers

New England has 2.6 million natural gas customers. Residential customers number 2.3 million; commercial and industrial customers number over 260,000.

New Jersey has 2.9 million natural gas customers. Residential customers number 2.6 million; commercial and industrial customers number about 244,000.

NGA “Year in Review 2015”

New York has 4.7 million natural gas customers. Residential customers number 4.3 million; commercial and industrial customers number about 400,000.

Natural gas is now the leading home heating fuel in all three subregions. In New England, natural gas is the leading home heating fuel (38.5%), with oil a close second (37.2%). In New Jersey, gas is the clear leader (75%), with oil at 10%. In New York, gas has 57% of the heating market, with fuel oil second (24%). In summary, natural gas represents 54% and heating oil 26% of the home heating market in the eight-state region.

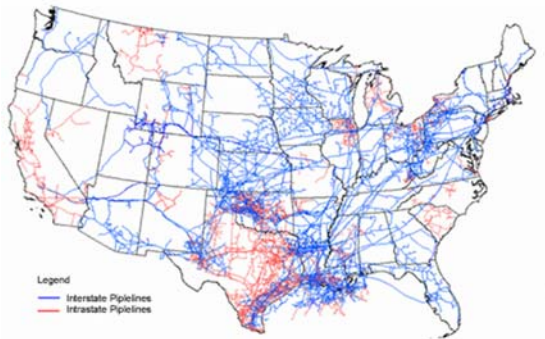
Consumption/Sendout by Sector

In New England, gas consumption by end-use sector is 25% residential, 23% commercial, 13% industrial, and 39% power generation. In New Jersey it is 33% residential, 27% commercial, 8% industrial, and 32% power generation. In New York it is 35% residential, 24% commercial, 6% industrial, and 34% power generation. Total annual sendout in New England is about 860 billion cubic feet (Bcf), in New Jersey about 760 Bcf, and in New York about 1,320 Bcf (2014 EIA annual data).

The gas distribution company, or LDC, design day demand in New England is 4.3 Bcf per day, in New Jersey over 4 Bcf/d, and in New York about 7 Bcf/d. Winter is the peak season for Northeast demand. The increasing use of gas for power generation, however, has led to an increasing use in the summer months, although summer demand is still much lower than winter demand.

Electric Generation Sector

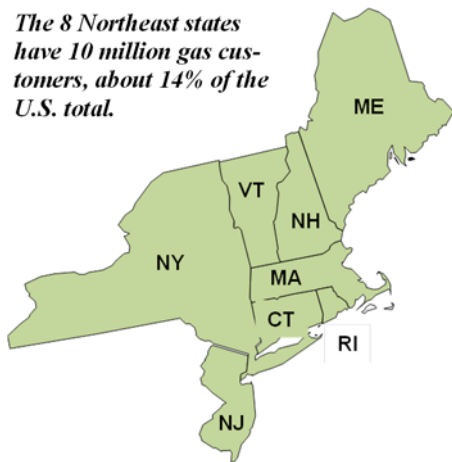
Based on annual fuel mix and generator applications in the queue at ISO-NE, NYISO and PJM (for NJ), natural gas remains one of the leading current - and projected - fuel sources for electric generation. In New England, natural gas represents 44% of regional electric capacity, in New Jersey also about 44%, and in New York 56%.



The U.S. interstate natural gas pipeline system includes 302,000 miles of transmission pipeline, according to the U.S. PHMSA. The EIA map on the left illustrates the extensive system.

NGA “Year in Review 2015”

The 8 Northeast states have 10 million gas customers, about 14% of the U.S. total.



Regional Market: Gas Supply Sources

Over 90% of the natural gas consumed in the U.S. is now produced domestically. The balance is imported from Canada, with a small share from imported liquefied natural gas (LNG).

Historically, the Northeast region relied on three main supply areas: Gulf Coast U.S., Canada, and LNG. Over the last 15 years, the supply sources expanded to include Rockies/Midcontinent gas and eastern Canada. The most significant supply change has occurred in just the last several years,

with the development of the Marcellus Shale gas basin in Appalachia.

Production from the Marcellus has completely transformed the supply dynamic into the Northeast. Marcellus production has grown from 2 Bcf/d in 2008 to over 16 Bcf/d in 2015.

As a result, the Northeast region’s imports from other U.S. supply basins, Canada, and LNG, have declined, as the new “local” production has emerged. Marcellus production is resulting in new delivery points and new pipeline infrastructure to bring this shale gas to market, as well as lower prices for consumers.

Canada remains valuable to the region, but with new Marcellus supplies so near, the level of imports fell by 55% between 2009 and 2014.

LNG imports also contribute to the regional supply mix. LNG remains critical in helping local gas utilities meet winter peak day requirements (e.g., LNG provides about 30% of New England’s utility peak day requirements). LNG imports into the U.S. were 59 Bcf in 2014, substantially lower than the high point of 771 Bcf in 2007.

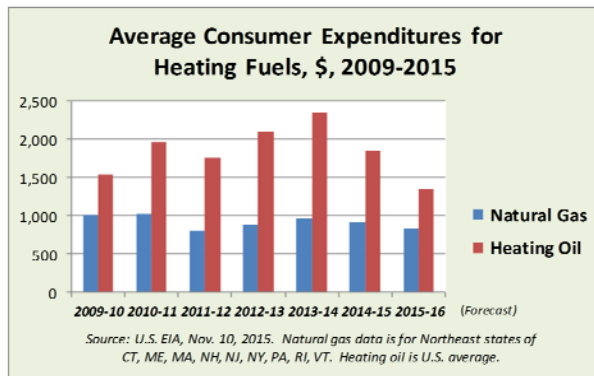
The Distrigas facility outside Boston imported 29 Bcf in 2014, which represented 49% of total U.S. imports. LNG inputs into the region are further enhanced via supplies from the Canaport LNG in New Brunswick, Canada, which delivered another 18 Bcf to the New England market in 2014.

Pipeline and LNG Deliverability into the Region

New England

New England has 2,647 miles of gas transmission pipeline, according to the U.S. Department of Transportation/ Pipeline and Hazardous Materials Safety Administration (PHMSA).

NGA “Year in Review 2015”



As illustrated in the chart, natural gas in the Northeast (shown in blue) has had a price advantage over heating oil for the last several years. Natural gas conversions are on the rise for the price factor among others.

Source: U.S. Energy Information Administration, Nov. 2015

The pipeline companies serving New England, interstate and intrastate, are: Algonquin Gas Transmission, Granite State Gas Transmission, Iroquois Gas Transmission System, Maritimes & Northeast Pipeline, Portland Natural Gas Transmission System, and Tennessee Gas Pipeline Co.

In addition, New England is the site of three import terminals for liquefied natural gas (LNG). The onshore terminal is owned by GDF SUEZ NA and operated by its subsidiary, Distrigas of Massachusetts Corp. (DOMAC). The LNG is delivered by tanker to the Distrigas terminal at Everett, MA, where there is storage capacity of 3.4 Bcf. The terminal has pipeline interconnections as well as connections with a major gas utility and a major power plant. LNG is also transported to multiple LDCs' satellite storage tanks from trucks that fuel at the DOMAC terminal. The vaporization capability at its terminal is 715 MMcf/d; it also has daily sendout by truck of another 100 MMcf/day.

The Northeast Gateway facility offshore Cape Ann, MA is capable of receiving LNG cargoes and injecting the revaporized gas into the HubLine pipeline system of Spectra Energy. The offshore LNG facility, owned by Excelebrate Energy, became fully operational in early 2008. It had several shipments in its early years but none from 2011 to 2014. After a long absence it did bring offshore gas (about 2.6 Bcf) into the market in early 2015 at a time of very cold regional weather.

In 2010 another offshore LNG facility near Cape Ann, MA was completed – the Neptune LNG facility of GDF SUEZ. It is designed to inject an average of 400 million cubic feet per day into Spectra's HubLine. However, it has been inactive since its start-up, reflecting the changing market dynamics.

A fourth facility, Canaport LNG, is located just over the Maine border in Saint John, New Brunswick, Canada. Owned and operated by Repsol and Irving Oil, it became operational in June 2009. It can deliver up to 1 Bcf of gas a day into the Brunswick Pipeline, which connects with the Maritimes & Northeast Pipeline, which then can transport the volumes into the New England market. Since its inception, it has delivered about 360 Bcf into the regional market.

NGA “Year in Review 2015”



Photo: Spectra Energy

New Jersey

New Jersey has 1,536 miles of gas transmission pipeline.

The interstate pipeline companies serving New Jersey are: Algonquin Gas Transmission, Columbia Gas Transmission, Tennessee Gas Pipeline Co., Texas Eastern Pipeline Co., and Transcontinental Gas Pipe Line Corp.

The LDCs utilize local LNG storage for peak day support.

New York

New York has 4,538 miles of gas transmission pipeline. The pipeline companies serving New York State, interstate and intrastate, are: Algonquin Gas Transmission, Columbia Gas Transmission, Dominion Transmission, Empire State Pipeline Co., Iroquois Gas Transmission System, Millennium Pipeline Company, National Fuel Gas Supply Co., North Country Pipeline, Tennessee Gas Pipeline Co., Texas Eastern Pipeline Co., and Transcontinental Gas Pipe Line Corp. New York also has gathering systems such as Laser Pipeline.

LNG is utilized by two local utilities in the New York City and Long Island areas. The LNG is received from the pipeline in vapor form and then liquefied. New York has no LNG import facility.

Regional Production

The Northeast region, a major consumer of natural gas and a high-priced energy market, is an increasingly significant locus for natural gas production.

The region traditionally had only limited natural gas production, in New York and Pennsylvania. (There is no gas resource production base in New Jersey or New England.) As mentioned, in recent years, with the advent of hydraulic fracturing and the development of the Marcellus resource base, the Northeast has developed into a significant domestic natural gas production area.

Estimates are that the Marcellus area alone may hold as much as 500 Tcf of natural gas.

Marcellus production, centered in Pennsylvania and West Virginia, reached over 16 Bcf/d in 2015. It is anticipated that Northeast production could exceed 25 Bcf/d or more in the coming years.

NGA “Year in Review 2015”

The interstate pipeline companies serving the Appalachian region continue to add interconnects from area producers. Several projects have been completed and others are in development to bring this gas to market. The primary permitting agency for interstate pipeline infrastructure is the Federal Energy Regulatory Commission (FERC). State environmental agencies among other entities are also involved in assessing siting issues at the state level.

Regarding shale gas production, there are challenges in terms of infrastructure development, land and water access, siting, and water treatment and disposal (water is one of the key ingredients in the hydraulic fracturing process used to dislodge the gas from the shale rock formations). While there is a shale gas resource in New York, use of the hydraulic fracturing process is not permitted per state regulation announced in late 2014. New York State does allow conventional drilling production. Total annual state output was 20 Bcf in 2014. The state’s conventional production has been steadily declining since 2007.

There is also some conventional production in eastern Canada.

Gas from offshore Nova Scotia in eastern Canada continues to be produced as part of the Sable Offshore Energy Project. Its output however has been declining and its future output is uncertain. A gas production field in New Brunswick, the McCully field of Corridor Resources, began production in 2007, and provides some small amounts of gas for delivery into the Maritimes and Northeast Pipeline.

There are estimates of considerable natural gas reserves offshore Newfoundland & Labrador that conceivably could be developed. Potential shale resources exist in the other Eastern Canadian provinces but no shale development is occurring per provincial moratoria.



Production in the Northeast continues to advance, through development of the Marcellus Shale. Pennsylvania and West Virginia have been the main locus of Marcellus production to date.

Regional Storage

Storage is a critical part of the natural gas supply and delivery chain. The Northeast region has considerable underground storage, notably in Pennsylvania (8.4% of the U.S. total); New York’s underground storage represents 2.7% of the U.S. total. Total gas storage in New York is 246 Bcf, with maximum deliverability of about 2 Bcf/day. The geology of New Jersey and New England is not suitable for underground gas storage.

As noted, LNG is another important part of the Northeast storage portfolio. Total LNG storage

NGA “Year in Review 2015”

Another key supply point for the region is liquefied natural gas (LNG). The region has four import facilities, three in MA and one in New Brunswick, Canada. Nationally and regionally, LNG imports are down, as U.S. domestic production is on the increase. Interest is growing in the U.S. for potential LNG exports, in light of the robust U.S. supply output. At the same time, LNG remains especially important to New England for peak days. Photo is of the Distrigas plant in MA.



capacity in New York is 3.2 Bcf, while LNG storage capacity in New Jersey is about 4 Bcf. LNG storage capacity in New England is 16 Bcf on the LDC system, and another 3.4 Bcf at the DOMAC import terminal. The Canaport LNG facility in Saint John, NB has 9.9 Bcf of storage.

Recent System Enhancements

In 2015, several system enhancements were placed into service, notably in the Pennsylvania/New Jersey/New York area. These include:

- * Columbia’s “Eastside Expansion”;
- * Tennessee’s “Niagara Expansion”;
- * several projects by National Fuel Gas, including “Northern Access 2015”, “Tuscarora Lateral”, and “Westside Expansion.”

Additional projects are in the regulatory process or in development for the Northeast and New England markets over the next four years, as discussed below.

Also, local distribution companies are investing in system growth to meet growing demand.

Projected Market Growth

United States

The 2015 U.S. EIA Annual Energy Outlook forecasts 0.3% annual energy growth for the United States through 2040. EIA projects that natural gas will grow at a rate of 0.5% annually, coal at 0.2%, renewables at 1.4%, petroleum at 0%, and nuclear at 0.2%.

Regional Growth

NGA “Year in Review 2015”

The 2015 EIA Outlook projects a 0.7% annual growth rate for natural gas consumption in New England, and a similar 0.7% annual rate in the Mid-Atlantic region – through 2040. Total energy use in New England is projected to decline by –0.1% over the period, and remain flat at 0% in the Mid-Atlantic region.

Planned Infrastructure Enhancements

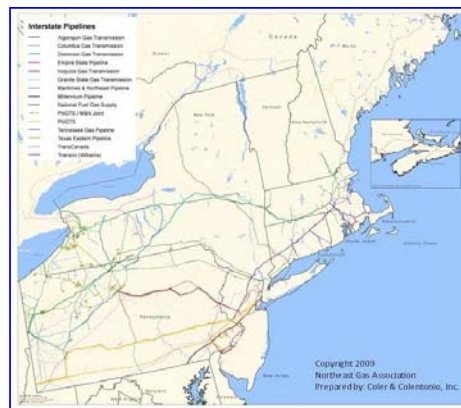
The Northeast region’s natural gas industry plans numerous infrastructure projects to meet growing market demand within the 2016-2018 timeframe. The region remains constrained at several points on its natural gas system, especially into New England and southern New York / Long Island. New supplies and infrastructure will help to ease these constraints, and should also help to ameliorate the regional price disadvantage. These projects will help further increase regional natural gas capacity, deliverability, flexibility and reliability, as well as provide economic and environmental benefits to the region.

NGA regularly posts updates on proposed projects at:
http://www.northeastgas.org/pipeline_expansion.php.

Challenges for new projects include siting, environmental concerns, and securing market position. The New England region to date has not had any major pipeline projects linked directly to Marcellus, although there are several proposals in development for the 2016 - 18 timeframe (and one is under construction as of fall 2015 – Spectra’s “AIM Project”). Securing contract commitments in New England however remains a challenging market issue, as the largest consuming sector, power generation, is constrained by the complex economic structure of its electric market. Natural gas utilities on the other hand have committed to investing in proposed pipeline projects – gas utilities have signed up for over 1 billion cubic feet of new capacity to meet system growth and reliability needs.

Another supply/delivery development has been the introduction of portable or

The interstate pipeline system in the Northeast accesses supplies from multiple sources. The pipelines also can access storage at different points along their systems, including local storage in Pennsylvania and New York. With prolific production underway in Appalachia, these pipeline operators are undertaking numerous projects to add facilities to bring these new supplies to local markets in the Northeast, changing traditional flow patterns.



NGA “Year in Review 2015”

mobile compressed natural gas (CNG) and LNG to bring natural gas to communities and businesses not located near a pipeline or distribution system. Some businesses and institutions, such as medical centers and colleges, are opting for natural gas delivered by truck to meet energy needs. The gas is transported via a trailer that then offloads the gas into the industrial or institutional facility.

MARKET ISSUES

Supply Outlook

In terms of U.S. natural gas supply, the outlook remains positive.

In April 2015, the Potential Gas Committee (PGC) at the Colorado School of Mines released its year-end 2014 biennial report - *Potential Supply of Natural Gas in the United States*. The updated assessment finds that the nation possesses a technically recoverable natural gas resource potential of 2,515 trillion cubic feet (Tcf). This is the highest resource evaluation in the PGC’s 50 year history—exceeding by 131 Tcf the previous record-high assessment from year-end 2012. The future supply of domestic natural gas continues to grow due to the emergence and advancement of key technologies that are able to unlock gas production from reservoirs such as shale formations.

In November 2015, the U.S. Energy Information Administration (EIA) released its latest annual report on U.S. oil and gas reserves (the data is for 2014). EIA reported that total natural gas proved reserves in the country increased 10% in 2014, to reach a new record of 388.8 Tcf. EIA reports that Pennsylvania had the most shale gas proved reserves in 2014, surpassing Texas for the first time, while West Virginia remained the third-largest shale gas reserves state. The Marcellus Shale remains the largest shale play (ranked by proved reserves) in the U.S.

Canada has considerable natural gas reserves itself and remains an important energy partner, although its share of the U.S. natural gas market is expected to continue to decline over the long-term. As mentioned, the growth of U.S. supplies is leading to lower imports from Canada into the Northeast; at the same time, natural gas demand within Canada is expected to grow, leaving less for export. An indicator of the changing dynamic is

New supply developments are transforming the traditional paths of supply sourcing into the region, creating a more diverse supply mix and a more robust delivery network.

NGA “Year in Review 2015”

Natural gas and renewable energy are the leading growth fuels in the region, for sectors from power generation to alternate fuel transportation. Natural gas can help balance power system demand for intermittent fuels like solar and wind. Shown here is a photo of an LNG tank on the National Grid system, along with a solar panel array installed by Grid.



that a few pipelines in the U.S. Northeast are now exporting supplies to Ontario – a reversal of historical supply patterns.

The rise in domestic U.S. production is also having an impact on LNG imports. LNG imports into the U.S. dropped by about 80% over the last five years, and the focus now for several areas of the U.S. is shifting from *imports* to potential *exports*. Several LNG import facilities in the U.S. – on both coasts and especially in the Gulf - are proposing to add liquefaction facilities so that they can export LNG to the world market. With the Northeast delivery system still constrained at certain points, the regionally-based LNG facilities will continue to ease bottlenecks and increase supply and delivery options.

Efficiency Initiatives

The Northeast region is a recognized leader in per capita energy efficiency. A 2015 report by the American Council for an Energy Efficient Economy (ACEEE) noted that \$1.4 billion was invested in natural gas efficiency programs nationwide in 2014 (the latest data). Over one-third of the national total (\$514 million) was invested in the eight Northeast states alone.

As ACEEE has noted, efficiency opportunities exist in multiple sectors: "While the roots of natural gas efficiency programs lie within residential markets, there are now programs serving multiple types of natural gas customers - from homeowners to large industries...Programs may target specific technologies that use natural gas, such as furnaces, water heaters, boilers, and cooking equipment, or they may target the systems and facilities that are served by natural gas technologies. Improving the thermal envelope of buildings is one example of programs that address whole buildings."

NGA “Year in Review 2015”

Price Trends

The key variables in natural gas price formation are demand growth, the condition of the economy, production levels, storage levels, weather, and alternative fuel prices.

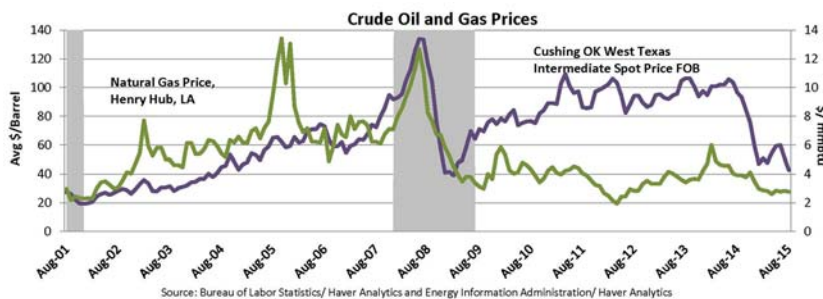
The natural gas price story in this new era of domestic production has been positive for both consumers and the entire U.S. economy. In early July 2008, natural gas reached \$13.50/MMBtu and oil hovered close to \$150 a barrel. The average natural gas commodity price for 2014 was \$4.39/MMBtu; as of November 2015, EIA is projecting the annual rate for 2015 to be around \$2.70/MMBtu, and at \$3.00/MMBtu in 2016.

The Northeast states continue to be leaders in per capita energy efficiency.

Given the size of the domestic supply resource base, it is projected that the natural gas price bandwidth will stay relatively moderate over the coming years. EIA’s 2015 Outlook forecasts that Henry Hub spot prices will stay below \$5/MMBtu in 2013 dollars through 2020, and then rise along with demand.

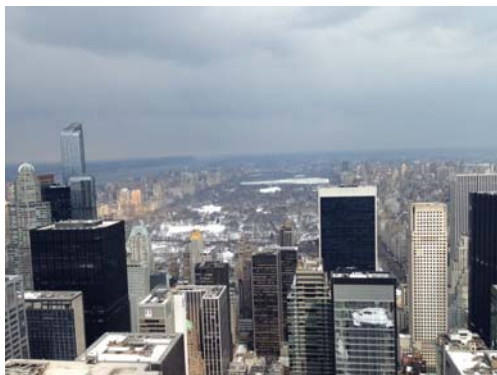
However, short-term volatility reflecting delivery constraints and weather will continue, especially in regional markets.

The lower commodity price offers economic opportunities for states in the region. New Jersey’s draft 2015 State Energy Master Plan (EMP) notes that “Today, New Jersey’s natural gas prices are among the lowest in the country. Prices in our state were the 17th highest in the nation in 2011; today we rank 46th. This huge decrease was anticipated in the 2011 EMP and has been critical to successfully reducing the cost of electricity and improving the environmental performance of New Jersey’s electric generation.”



The wide price differential between natural gas and oil from late 2008 through 2014 narrowed in 2015. Natural gas retains a price advantage - but the lower price of crude oil is probably the energy story of 2015. Chart: Federal Reserve Bank of Boston, 9-15

NGA “Year in Review 2015”



New York City continues to make progress on its efforts to phase out the use of #4 and #6 oil in city buildings in favor of cleaner fuels such as natural gas. In September 2013, the Mayor’s Office noted that the city’s air was the cleanest in decades, thanks in part to new investments in gas distribution and transmission pipelines.

Likewise, New York State, in its 2015 Energy Plan, observed: “Projected prices reflect continued industry success in tapping the nation’s extensive shale gas resources. With its nearness to the Marcellus Shale basin, New York should participate in prices lower than those experienced from 2000 through 2010 and more similar to those of the last few years.”

Winter Challenges

The back-to-back winters of 2013-14 and 2014-15 brought colder than normal weather to the Northeast and set new records for both pipeline and gas utility sendout. The consistent cold weather, which tested regional energy delivery systems, resulted in significant energy price volatility.

The FERC noted in its 2013-14 winter assessment that “during each of these cold events, customers who had firm transportation capacity on natural gas pipelines generally managed to secure natural gas deliveries.”

Most gas generators in New England do not have firm transportation and so several were unable to obtain gas during high demand periods. ISO New England’s “winter reliability program” utilized oil through special contracts to offset the unavailability of the generators’ interruptible gas arrangements; LNG was also an option in the winter of 2014-15. ISO-NE’s program has been extended for another three winters in recognition of the projected constraints on the natural gas delivery system and the resultant impact on “non-firm” transportation customers such as many power generators.

Natural gas utility customers in the region



NGA “Year in Review 2015”

are shielded in large part from the volatility of the spot market price, thanks to gas utilities’ firm contract arrangements for pipeline capacity and their storage arrangements. Some market participants however, such as many power generators and industrial customers, do rely on non-firm capacity and thus are subject to spot market prices and interruptions in capacity delivery, according to their contract terms.

There is a further impact on regional electric prices. FERC notes that “as natural gas is the marginal fuel for most electricity energy markets, the price of natural gas plays a leading role in setting the price of electricity.”

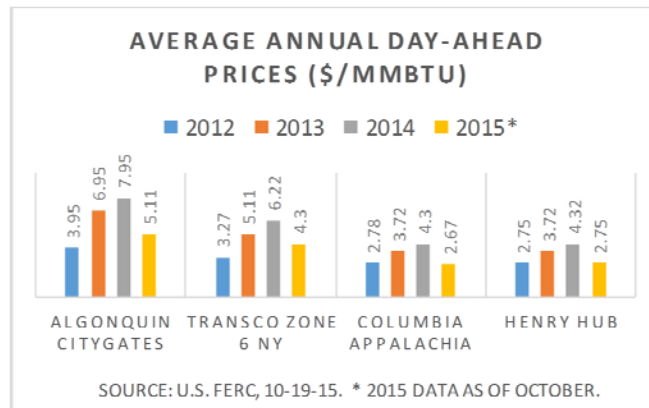
The winter of 2014 - 15 witnessed less dramatic volatility in spot natural gas prices. U.S. gas production was up strongly, LNG imports to New England were higher, storage remained in a good position despite a strong drawdown, and the region saw a “shift to coal and oil in the winter” according to ISO-NE. Even so, regional prices in the Northeast, while well below the spot price records of a year ago, remained much higher than the national average, reflecting ongoing pipeline capacity constraints. And electric prices in New England remained relatively high.

The situation in the summer months is far less challenging – Northeast prices were very low in summer 2015 for both natural gas and electric customers.

The addition of new infrastructure in the region, increasing supply availability, would help to mitigate the volatility of the Northeast energy market.

Gas and Electric Power Generation

Gas for electric generation is the leading gas consumption sector nationally and regionally. New technology, particularly combined-cycle technology (CCT),



The Northeast region remains among the most constrained gas delivery areas in the U.S. This chart shows average annual day-ahead prices for several points. The Algonquin serves as a proxy for New England, the Transco for NY. Both are higher priced than the nearby Appalachian, or the national Henry Hub.

NGA “Year in Review 2015”



Air emissions from power generation in the region have declined substantially in the past decade thanks in great part to the use of cleaner-burning fuels such as natural gas.

Photo: Joseph Murphy

has made the natural gas power plant the energy system of choice over the last two decades. CCT’s advantages over other conventional fuel types include higher efficiency, lower heat rates, shorter construction lead times, and reduced air emissions.

Gas plants - along with industrial-scale wind - are the leading fuel type for new proposed power generation capacity in the generator queues in New Jersey (where gas represents 95% of proposed new generation), New York (70%) and New England (61%). As the fossil fuel with the lowest carbon content, gas appears positioned as a stable power generation source for years to come. Natural gas also provides back-up potential for variable energy sources such as solar and windpower.

Nationally, a trend toward coal power plant retirements is being spurred by environmental regulations—such as the U.S. EPA’s proposed “Clean Power Plan” - leaving natural gas as a pivotal generation source. EPA Administrator Gina McCarthy said in August 2015: “Cleaner-burning energy sources like natural gas are key compliance options for our Clean Power Plan and we are committed to ensuring safe and responsible production that supports a robust clean energy economy.”

The regional power generation fleet, already highly reliant on natural gas, appears positioned to become more so in the near - to mid-term. In New England, a nuclear plant in Vermont and a coal/oil plant in Massachusetts retired in 2014, and a nuclear plant in Massachusetts has announced it will retire in either 2017 or 2019. The head of ISO-NE observed in November 2015 that “the region has lost – and is at risk of losing – substantial non-gas resources.” In New York, a nuclear plant has also announced plans to close in the next few years. Gas along with in-region renewables, imported hydro from Canada, and efficiency, are seen as the most likely and available options for the region.

NGA “Year in Review 2015”

Natural gas power plant near Boston.



There are several unresolved gas generation issues that continue to challenge the market, however. As noted, most power generators in New England do not contract for firm gas pipeline capacity and instead rely on “if and as available gas” non-firm capacity, or, in some cases, capacity held by third parties. Pipeline capacity is added to meet the needs of gas customers who desire firm service and are willing to execute firm contracts for such service.

The pipelines serving New England have proposed several new projects. Natural gas utilities are committing to participate. The power generators are not, stating that the current electric system model in New England fails to give them the proper incentives to contract for firm pipeline gas transportation.

The two New England pipeline projects planned to be in-service in late 2016 – Spectra’s “AIM” and Tennessee’s “CT Expansion” – do have gas utilities as customers but zero power generators. This remains a long-standing and unresolved power market dilemma.

In December 2013, the New England Governors issued a joint statement expressing commitment to a regional initiative that called for the development of new natural gas pipeline infrastructure as well as electric transmission infrastructure and energy efficiency. In 2014, the Governors’ energy planning committee, NESCOE, worked to implement this initiative, proposing a new electric tariff to support investment in new gas and electric infrastructure. The regional tariff concept did not ultimately advance.

In April 2015, the governors held an energy summit in Hartford to continue discussion on this topic, seeking to address the high energy costs impacting the region. In place of a regional tariff, several states are advancing individual legislative and regulatory procedures to support both “clean energy” electric transmission investments – including potential links to Canadian hydro - and natural gas transmission investments. For the latter, several states

New England Governors and Energy



The New England Governors continue to hold discussions on regional energy infrastructure needs, including electric and gas transmission. Shown here are the Governors in April 2015 in Hartford. Photo: Hartford Courant

NGA “Year in Review 2015”



A natural gas vehicle fueling station in New Jersey—refuse trucks and other heavy-duty vehicles are key market participants. Photo: NJNR

are seeking to enable electric distribution utilities to invest in gas pipeline capacity to help alleviate the electric market’s contracting issue. The topic will continue to be considered in 2016.

Natural Gas Vehicles

Natural gas vehicles (NGVs) remain a competitive alternative fuel option, especially for fleets, buses, and a range of heavy-duty vehicles, including refuse trucks. It retains a price advantage compared to diesel and gasoline even as crude oil prices have declined substantially in 2015.

On the environmental front, NGVs have other comparative advantages. The U.S. Department of Energy noted that “Commercially available medium - and heavy-duty natural gas engines have demonstrated over 90% reductions of carbon monoxide (CO) and particulate matter, and more than 50% reduction in nitrogen oxides (NOx) relative to commercial diesel engines.”

In the last decade, ACEEE rated the compressed natural gas (CNG) vehicle as among the “greenest vehicles” on the road in the U.S. The passenger vehicle market however has particular challenges, notably the paucity of fueling stations. In 2015, Honda announced it would be retiring the Civic GX, a very efficient and highly-rated CNG vehicle – a reflection of fueling station constraints and lower gasoline prices.

The market for heavy-duty vehicles remains strong by comparison, notably in the bus and refuse truck sectors. Compressed natural gas (CNG) accommodates the widest range of vehicles, from fleet vehicles to buses and garbage trucks. There is also interest in LNG as a fuel for heavy-duty trucks that travel defined routes.

New England has a few LNG fueling sites currently (in CT and MA), and some initiatives are underway in the U.S. and Canada for “LNG highways” to establish fueling stations to facilitate truck travel. New Jersey continues to see CNG station development. New York State has seen an investment in CNG “virtual pipeline” facilities. Also, in January 2015, the NY Department of Environmental Conservation released new regulations for LNG facilities in the state. DEC observed that “The adopted regulations enable permits to be granted to safely site, construct and operate new LNG facilities under requirements established

NGA “Year in Review 2015”

in a DEC permit...Projections indicate that for the first five years, nearly all of the expected permit applications will be for facilities designed to supply fuel for long-haul tractor trailers and large capacity fleet trucks that use LNG as a substitute for diesel fuel. LNG offers a lower cost, cleaner fuel for truckers and an emissions benefit for the environment.”

State Policies to Increase Access to Natural Gas

The benefits of natural gas – lower price, lower emissions, domestic supply, etc. – are leading to higher levels of customer conversions and new customer development. Multiple states and municipalities are looking to natural gas as a way to provide both greater energy choice and economic benefits to consumers and local economies, as well as to assist in complying with air and health quality standards.

In its draft state energy master plan (EMP), released in November 2015, the State of New Jersey summarized some of the opportunities presented by natural gas. The report noted that “Expansion of the State’s gas distribution companies’ (GDCs) intrastate pipeline capacity and the capacity of the interstate pipelines serving the state provides an opportunity for the State to take advantage of relatively low priced and abundant nearby natural gas supplies. This will assist in meeting the increased and competing demands upon natural gas supply as fuel for residential and commercial

heat and electric generation. Although New Jersey is generally well-supplied with natural gas pipeline capacity for heat and existing power



generation, the state lacks adequate natural gas infrastructure to support new, gas-fired electrical generation, as well as substitution for other fuels in the residential and commercial sectors. Expanding the capacity for natural gas can increase economic development with lower costs for energy and enhance environmental quality through lower emissions.”

A summary of state activities is provided later in this report.

Utility System Expansions and Fuel Conversions

NGA “Year in Review 2015”

There are several operational – and planned - system expansions on local utility systems. In July 2015 for example, Enbridge St. Lawrence Gas Company completed its transmission line expansion in Franklin County in upstate New York. Vermont Gas continues its Addison Expansion Project with service anticipated to reach Middlebury later in 2016. Similarly, other utilities are looking to expand their distribution systems to serve areas lacking natural gas access. Some utilities in New England are looking as well to expand their LNG liquefaction capability. The lower cost of oil in 2015 has changed the dynamic a bit - although natural gas remains the lower-cost option.

Natural gas utilities in the region report steady levels of new customers and customer conversions from other fuels, and are seeking to grow their system capabilities. In 2014, Con Edison reported the owners of over 1,400 large New York City buildings converted from oil to natural gas.



Photo: Vermont Gas

Environmental Considerations

Environmental issues remain central to energy system use. Highlights of some environmental topics and the role of natural gas follows.

Reductions in air emissions from power generation

Because natural gas compares favorably to other fossil fuels regarding air emissions, it will likely remain a favored fuel for new power generation. MIT’s June 2011 study on gas concluded that using very efficient natural gas powerplants to replace coal-fired plants was “the most cost-effective way of reducing CO₂ emissions in the power sector” over the next 25 to 30 years. Natural gas will also play “a central role in integrating more intermittent renewable sources - wind and solar - into the electricity system because they can easily be brought in and out of service as needed.”

In November 2015, the U.S. EIA reported that U.S. energy-related carbon emissions, after declining for several years, rose in both 2013 and 2014. EIA notes that “natural gas emissions have generally increased since 2008, primarily reflecting growth in the natural gas share of electricity generation largely through displacement of coal-fired generation.” At the same time, the increasing use of natural gas in the power sector is resulting in lower carbon emissions, as gas substi-

NGA “Year in Review 2015”



Photo: National Grid

tutes for the more carbon-intensive coal. EIA concludes: “The two main factors that have contributed to lower carbon intensity (CO₂/kWh) since 2005 in the electric power sector: (1) substitution of less-carbon-intensive and more efficient combined cycle natural gas generation for coal and petroleum, and (2) growth in non-carbon generation, especially renewables such as wind and solar.”

At the regional level, the air emissions story remains favorable. NY ISO reports that from the years 2000 to 2014, emissions rates from the power sector saw a 39% decline in CO₂, a 78% decline in NO_x, and a 94% decline in SO₂. ISO New England reports that “an increase in natural-gas-fired power generation and the implementation of emission controls on the region’s fossil-fuel-fired power plants have resulted in significant reductions in air emissions in New England.” For the period from 2001-2013, SO₂ emissions in that region declined by 91%, NO_x emissions by 66%, and CO₂ by 23%. In New Jersey, the state reports that the CO₂ emission rate of fossil generation declined by 37% from 2011 to 2013.

Reductions of methane emissions in natural gas system operations

The natural gas industry is cognizant of its responsibility to reduce emissions from its system operations. Many of NGA’s distribution and transmission company members already participate in the U.S. EPA’s “Natural Gas STAR” Program - progress continues on this front. For 2013 in the U.S., Natural Gas STAR partners reported methane emissions reduction of 51 Bcf, providing “cross-cutting benefits” according to EPA. Reducing leaks is an issue of paramount interest (see section on infrastructure replacement below).

Methane emissions related to the U.S. natural gas system were slightly higher in 2014 compared to the year before, but since 1990, methane emissions are down by 12%, according to the EPA’s April 2015 national GHG inventory report. The report noted that “The decrease in CH₄ emissions is largely due to a decrease in emissions from production and distribution... The decrease in distribution emissions is due to a decrease in unprotected steel and cast iron pipelines and their replacement with plastic pipelines.”

In 2015, the Obama Administration introduced a voluntary “Methane Challenge Program” and proposed new regulations to reduce methane emissions from the oil and natural gas industry, focusing principally on the production and trans-

NGA “Year in Review 2015”

mission/storage sectors.

For the distribution sector, the main emphasis has been on accelerating the replacement of older, more “leak-prone” pipe. Early in 2015, a national study led by Washington State University reported that direct measurement analysis showed “decreasing methane emissions from natural gas local distribution systems in the United States.” Replacement of older pipe systems and improved leak surveys were among the reasons cited for the industry performance. A Harvard/BU study found higher estimates for methane emissions in the Boston area; while an ICF study for the Commonwealth of Massachusetts found that for the three geographic areas studied in the state, methane emissions fell within the range of 0.6 to 1.1% of all gas received. ICF noted that “the effectiveness of replacing cast iron and unprotected steel with plastic pipe to reduce emissions is clearly demonstrated in this study.”



Source: U.S. EPA

Shale gas development

The development of shale gas involves a range of environmental issues and impacts that continue to merit analysis and technology improvements. MIT’s June 2011 study on natural gas notes that “the environmental impacts of shale development are challenging but manageable.” Argonne National Laboratory, in a September 2012 paper for DOE’s “Clean Cities” Program, noted that even as improved science-based assessments of potential environmental impacts continue, “early results indicate that the risks can be managed and lowered through existing practices.”

Industry and government regulatory agencies are working to address development in an environmentally safe manner. The natural gas production industry has been addressing the issue of disclosure regarding the additives used in hydraulic fracturing. The Ground Water Protection Council (GWPC) and the Interstate Oil and Gas Compact Commission (IOGCC), with funding support from DOE, unveiled a web-based national registry (<http://fracfocus.org>) disclosing the chemical additives used in the hydraulic fracturing process on a well-by-well basis. As of November 2015, the industry had registered 106,000 wells.

An October 2011 paper from the National Regulatory Research Institute (NRRI) stated that “Based on more than one million wells drilled with fracking, however, there is little evidence that fracking directly causes groundwater contamination...[R]eports show that these incidents resulted from surface spills, poor cementing jobs in wellbores, and other operational failures.”

In June 2015, the EPA released its draft assessment on the potential impacts of hydraulic fracturing activities on U.S. drinking water resources. EPA’s review

NGA “Year in Review 2015”



Energy infrastructure projects of all types face siting challenges and local opposition, including natural gas pipelines— part of an ongoing debate over the region’s energy market fuel mix.



of data sources available to the agency found specific instances where well integrity and waste water management related to hydraulic fracturing activities impacted drinking water resources, but they were small compared to the large number of hydraulically fractured wells across the country. The study will be finalized after review by the Science Advisory Board and public review and comment.

The Pennsylvania Governor’s Marcellus Shale Advisory Commission has reported that “The primary concerns regarding hydraulic fracturing relate to surface spills of fluids, well control and lost containment of production and flowback water on the surface.” Proper procedures and oversight are necessary at all stages of the process.

Other issues, such as reducing the use of diesel fuel in the production process, enhancing “green completion” in the entire production cycle to reduce emission losses, and mitigating community impacts, continue to receive industry attention. The industry must be responsible for best practices at all times.

Pipeline Safety & Public Awareness

Pipeline safety is a primary issue for the industry. Federal and state regulatory requirements are rigorous, and several recent regulations have been announced to enhance operations safety, from transmission and distribution integrity management to control room operations.

The rate of incidents is declining nationwide at both gas transmission and distribution levels. However, “high profile, high consequence” incidents, as termed by PHMSA, have occurred in recent years in California, Pennsylvania and New York.

The industry and government regulators continue to prioritize worker and contractor training, including addressing the prevalence of “third party dam-



In 2015 NGA and its NY Gas LDC Members produced a series of public safety messages in multiple languages, from Arabic, Spanish and Chinese to Vietnamese, with advice on how to respond to an odor of gas. Shown here is an excerpt from the message in French.

NGA “Year in Review 2015”

age” (the leading cause of incidents); the importance of “call before you dig” programs; increasing public awareness of natural gas; encouraging individuals to call utility or emergency personnel if they notice a smell of gas in the home or street; and maintaining and enhancing the physical components of the delivery system, through methods such as “accelerated infrastructure replacement”, to replace older, more risk-prone pipe materials.

NGA and its member companies continue to work on important initiatives in the areas of public awareness, worker training, awareness of third party damage, integrity management implementation, and new technologies.

Accelerated Pipeline Replacement

An issue related to safe operations and environmental performance is the replacement of older pipeline system components (pipes constructed of bare steel



or cast-iron) that are considered more “leak-prone”. The accelerated repair and replacement of more “leak-

prone” natural gas distribution system components is thus an issue of growing interest. PHMSA is urging action on repairing older, potentially more leak-prone systems.

In general, the Northeast states have higher levels of such distribution pipe components than the national average, due to older systems. The U.S. average for systems with bare steel and cast iron components is about 5%. The percentage is 35% in Rhode Island, 24% in Massachusetts, and 22% in New York. Replacing these older components is a priority, for safety reasons and to reduce system leaks and related emissions.

State regulatory agencies are working with utilities on programs to achieve pipe replacement in an economically appropriate manner.

Rhode Island and Massachusetts enacted legislation on this topic in recent years, and the New York State Public Service Commission announced in April 2015 that it is considering plans to accelerate utility replacement of “leak-prone” pipe in the state. In November 2015, the New Jersey Board of Public Utilities, as another example, approved a utility’s Gas System Modernization Program (GSMP) which will replace up to 400 miles of gas mains and related service lines over a three-year period.

NGA “Year in Review 2015”

President Obama’s 2013 “Climate Action Plan” observed that “...investments to build and upgrade gas pipelines will not only put more Americans to work, but also reduce emissions and enhance economic productivity.”

New Technology R&D

NGA has a significant R&D program operated by NYSEARCH.

NYSEARCH has been involved with innovative projects such as pipeline sensing and guided wave technology, and continues to utilize its own testbed facility in Johnson City, NY for advanced demonstrations. Recent success stories include the development, testing and commercialization of the Remote Methane Leak Detector (RMLD), and the EXPLORER II robotics program.

NGA also has a program with the Gas Technology Institute (GTI) that transfers knowledge about new technologies that can enhance operations, safety, efficiency, and analysis.

Technology is the bridge to our energy future; continued investment in natural gas technology is an avenue to progress.



Technology research & development continues to be essential to industry progress in such areas as supply development, environmental improvements, and increased operational safety.

NGA’s NYSEARCH organization is an industry leader in North America on new technology innovations.

NGA is also pleased to partner with the Gas Technology Institute (GTI).

Photos: NYSEARCH

II.

REGIONAL ENERGY OVERVIEW

This section provides an introduction to the energy scene in New England, New York and New Jersey.

Among the areas addressed are:

- *economic profile*
- *projected energy consumption by fuel type*
- *primary energy mix*
- *electric generation mix*
- *state energy consumption.*

NORTHEAST ECONOMIC PROFILE

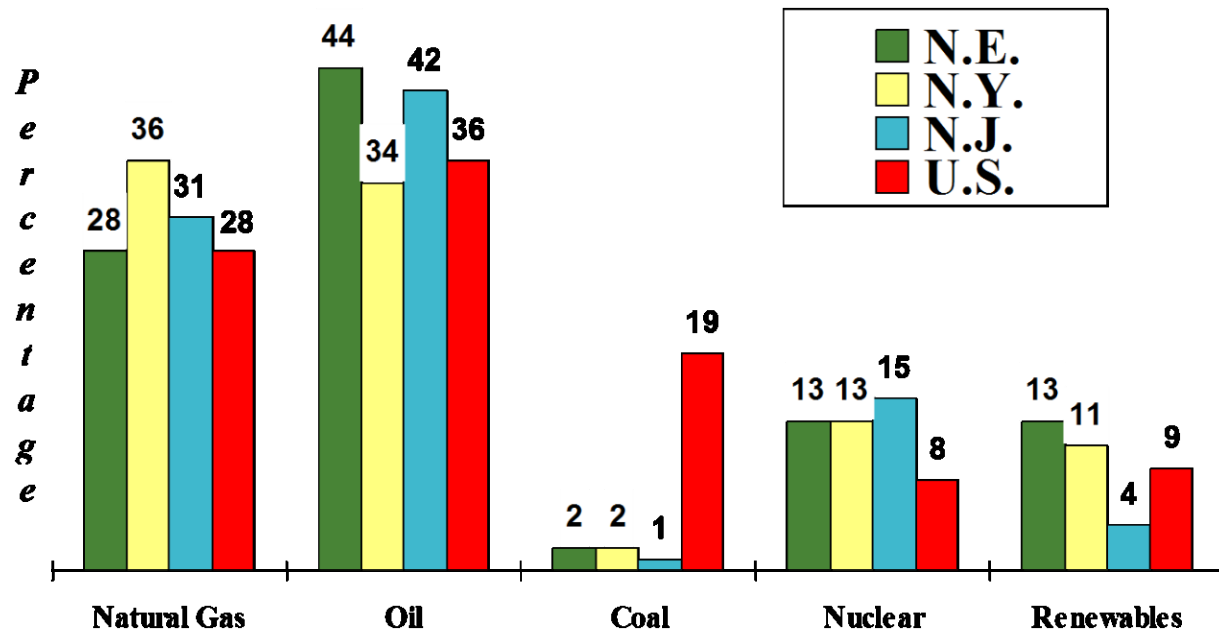
The Northeast states (New England, New Jersey and New York) represent a total population of 43.3 million, a civilian labor force of 22 million, gross state domestic product of \$2.87 trillion, and account for 16.7% of total U.S. gross domestic product.

STATE	POPULATION (2014)	HOUSEHOLDS (2014 est.) [total housing units]	LABOR FORCE (Aug. 2014) [thousands]	GROSS DOMESTIC PRODUCT (GDP) (2014) [\$ billions]	GDP as % OF U.S. TOTAL (2014)	PER CAPITA PERSONAL INCOME (2014)
Connecticut	3,596,677	1,493,564	1,921	253	1.5	\$64,864
Maine	1,330,089	727,632	689	55.8	0.3	\$40,745
Massachusetts	6,745,408	2,828,492	3,634	459.9	2.7	\$58,737
New Hampshire	1,326,813	619,856	747	71.6	0.4	\$52,773
New Jersey	8,938,175	3,591,588	4,553	549.1	3.2	\$57,620
New York	19,746,227	8,191,040	9,655	1,404.5	8.1	\$55,611
Rhode Island	1,055,173	462,625	554	55	0.3	\$48,359
Vermont	626,562	325,789	348	29.6	0.2	\$46,428
U.S.	318,857,056	133,957,180	157,072	17,316	100	\$46,049

Sources: U.S. Bureau of the Census, U.S. Bureau of Economic Analysis, U.S. Bureau of Labor Statistics. GDP = current dollar.

TOTAL PRIMARY ENERGY CONSUMPTION

A comparison of New England, New York and New Jersey primary energy consumption indicates a strong role for petroleum, reflecting the inclusion of the transportation sector, a very small role for coal compared to the national average, a consistent role for nuclear, a varying share for hydro and biofuels, and a solid and growing share for natural gas.

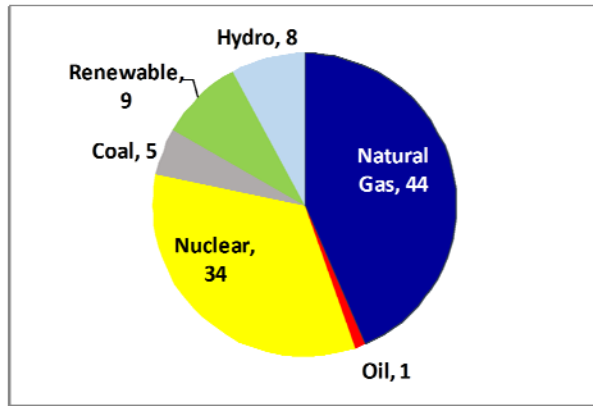


Sources: U.S. Energy Information Administration (EIA), "State Energy Data Report 2013," released 2015.

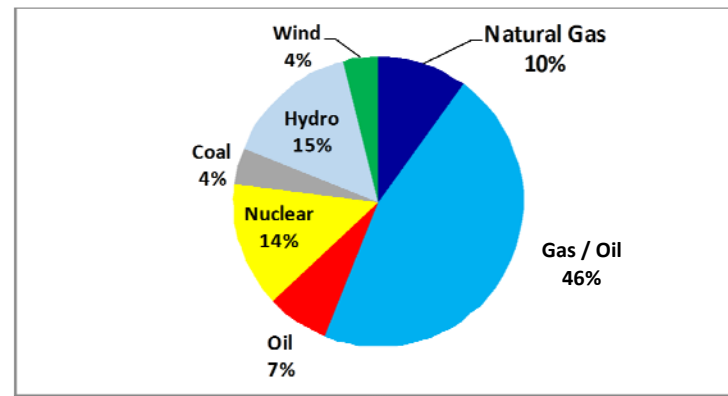
ELECTRIC GENERATION FUEL SOURCE

(% of total)

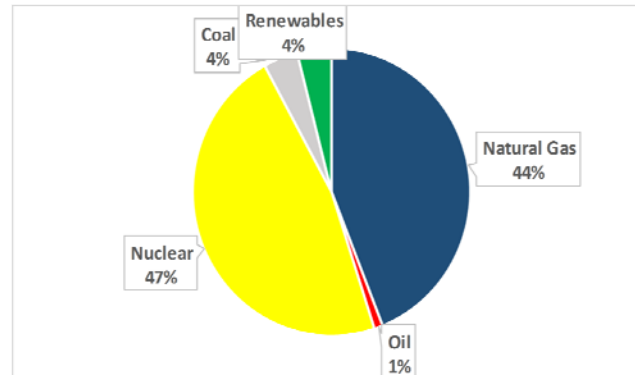
NEW ENGLAND



NEW YORK



Sources:
 ISO New England, 2014 sources of total electric energy production;
 NY ISO, 2015 "Power Trends";
 New Jersey electric generation by fuel type, 2014, "Draft 2015 State Energy Master Plan."



NEW JERSEY

ENERGY CONSUMPTION BY MAJOR SOURCE

The Northeast states consume less energy per capita than the U.S. on average. Source: U.S. Energy Information Administration, "State Energy Data Report 2013," released 2015. Sum of fuel totals is not equal to total consumption due to other energy components not shown. Rank signifies level of state consumption compared to 50 U.S. states and District of Columbia. Electricity is that sold to end users. The data for fuels in TBtu is EIA's estimates for the year 2013.

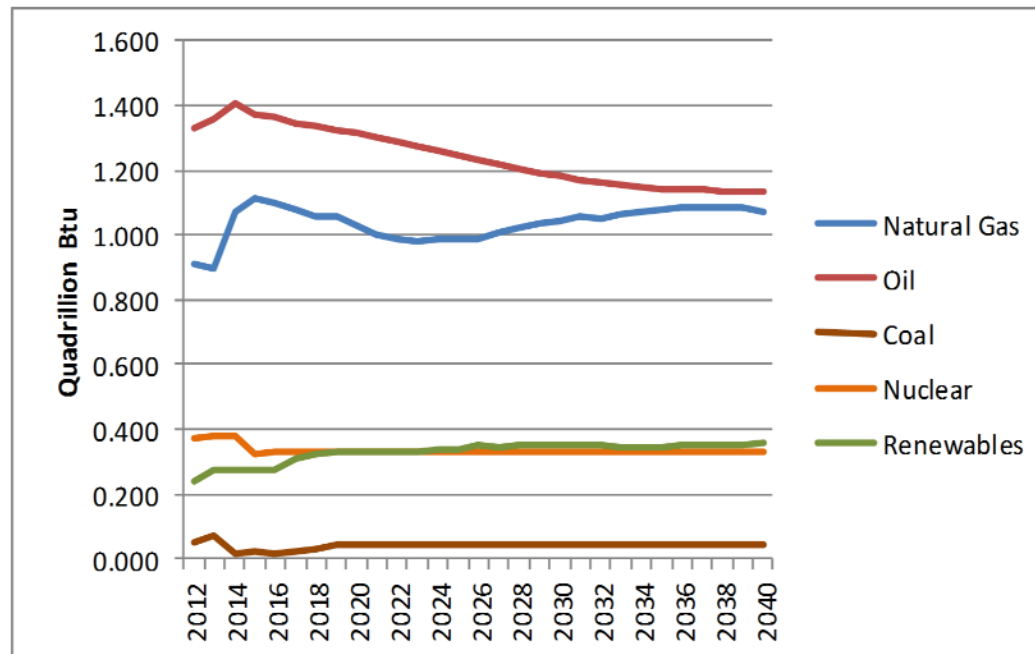
	Per Capita, 2013, Consumption		<i>Natural Gas</i>		<i>Petroleum</i>		<i>Coal</i>		<i>Electricity</i>	
	MMBtu	Rank	TBtu	Rank	TBtu	Rank	TBtu	Rank	TBtu	Rank
CT	207.8	47	240.1	34	307.4	33	7.7	47	101.8	37
ME	306.4	27	65.9	47	182.7	42	1.7	48	40.4	44
MA	215.0	43	454.5.9	17	547.7	20	42.2	37	188.6	26
NH	228.9	42	55.6	48	141.2	46	16.8	43	37.7	47
NJ	259.7	37	713.1	10	968.9	9	25.9	41	254.7	21
NY	184.1	50	1,321.6	4	1,235.9	5	68.7	35	504.6	5
RI	183.8	51	88.6	44	77.8	49	-	50	26.5	49
VT	213.2	45	9.7	50	75.2	50	-	51	19.1	51
<i>Northeast</i>			2,949.1		3,536.8		163.0		1,173.4	
<i>U.S.</i>	306.9		26,801.8		34,728.2		18,038.8		12,710.0	

PROJECTED ENERGY CONSUMPTION GROWTH, NEW ENGLAND

U.S. EIA projects natural gas to grow at an annual rate of 0.7% in New England through 2040.

EIA projects growth trends for other leading energy sources as follows:

Renewables, 0.9%
Coal, -1.8%
Nuclear, -0.5%
Oil, -0.7%.



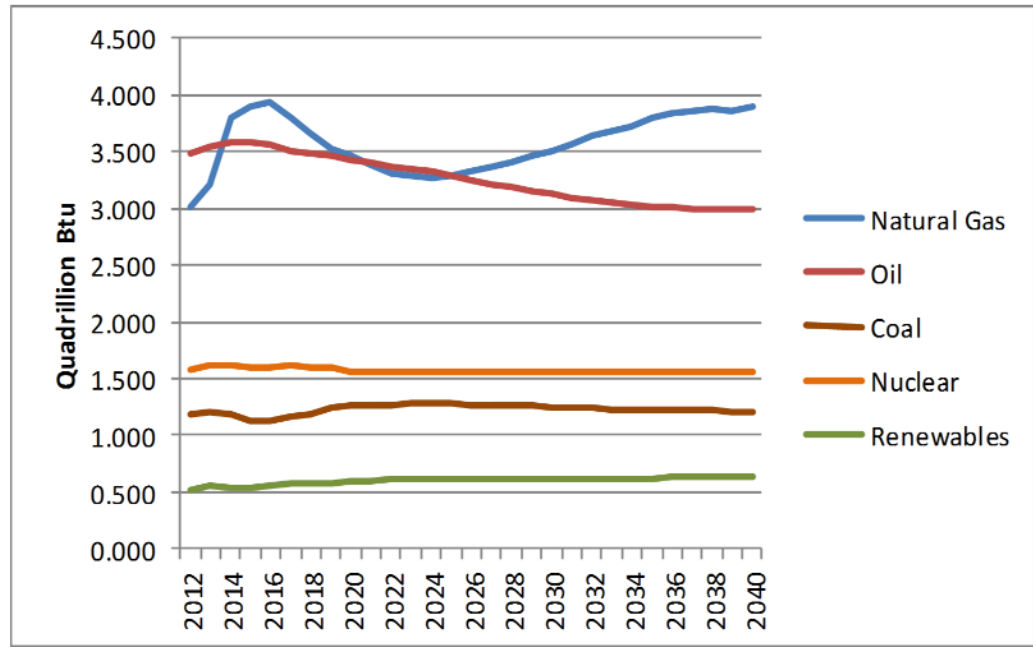
Source: U.S. Energy Information Administration, "2015 Annual Energy Outlook"

PROJECTED ENERGY CONSUMPTION GROWTH, MID-ATLANTIC

U.S. EIA projects natural gas to grow at an annual rate of 0.7% in the Mid-Atlantic region through 2040.

EIA projects growth trends for other leading energy sources as follows:

- Renewables, 0.5%
- Coal, 0.0%
- Nuclear, -0.2%
- Oil, -0.6%.



Source: U.S. Energy Information Administration, "2015 Annual Energy Outlook"

III.

SUPPLIES & INFRASTRUCTURE

This section provides an introduction to the natural gas delivery network in the Northeast.

Among the areas addressed are:

- *Description of pipeline systems*
- *Liquefied natural gas (LNG)*
- *Sources of regional gas supply*
- *Proposed infrastructure enhancements.*

Description of Pipelines/LNG Import Facilities Serving the Northeast Market

Algonquin Gas Transmission Company is a business unit of Spectra Energy. Its system incorporates approximately 1,129 miles of pipe. Its system commences in NJ, connecting with Texas Eastern, and extends through NY, CT, northern RI, and eastern and southeastern MA. Its capacity is 2.74 Bcf/d.

Columbia Gas Transmission, Inc. is a subsidiary of Columbia Pipeline Group and is headquartered in Richmond, VA. The company serves customers along its nearly 12,000-mile pipeline system in 10 Northeastern, Midwestern, and Mid-Atlantic states. It transports an average of 3 Bcf/day. It enters New York State through Pennsylvania and runs along the southern counties of New York bordering Pennsylvania; it also serves New Jersey. It has storage of over 650 Bcf.

Distrigas of Massachusetts Corporation (DOMAC), a subsidiary of GDF SUEZ NA, owns and operates an LNG import terminal in Everett, Massachusetts. It interconnects with both the Tennessee and Algonquin systems. It began operation in 1971. Its vaporization send-out is approx. 715 MMcf/d, with another 100 MMcf/d by truck. Its storage is 3.4 Bcf. The facility has received over 1,100 cargoes, and served more than 350,000 truck loads.

Dominion Transmission, Inc., headquartered in Richmond, VA, is the interstate gas transmission subsidiary of Dominion Resources. Primarily a provider of gas transportation and storage services, Dominion Transmission, Inc. operates the world's largest underground natural gas storage system. Dominion Transmission, Inc. maintains 7,800 miles of pipeline in six states—Ohio, West Virginia, Pennsylvania, New York, Maryland and Virginia. The system enters New York State through Pennsylvania, and continues to points in western, central, and eastern New York, extending to the Albany area.

Empire Pipeline is a subsidiary of National Fuel Gas Company. Empire is a 24-inch diameter natural gas transmission pipeline that originates at the U.S./Canada border at Niagara, and extends easterly 249 miles from Buffalo, NY to near Syracuse and then south to Corning. Constructed in 1992 and in service since 1993, Empire has a rated capacity in excess of 750 million cubic feet per day.

Excelerate Energy operates the Northeast Gateway Deepwater LNG Port facility located approx. 13 miles offshore near Cape Ann, MA. The facility received its first shipment in May 2008. The physical infrastructure consists of a dual subsea buoyssystem and an approx. 16 mile long pipeline connecting into the HubLine pipeline operated by Algonquin Gas Transmission. The Northeast Gateway infrastructure is designed to accommodate gas deliveries up to 800 million cubic feet per day.

Granite State Gas Transmission, Inc. is a unit of Unitil. Granite State operates 86-miles of underground interstate pipeline extending from the MA-NH border through the New Hampshire coastal area to Portland, Maine, transporting gas from other pipeline companies. The NH portion began operation in 1956; in 1966 the line was extended to Maine.

Iroquois Gas Transmission System is a 416-mile interstate pipeline owned by a partnership of 5 U.S. and Canadian energy companies. It began operation in 1991. It transports natural gas from TransCanada PipeLine at the Ontario/NY border as well as Marcellus receipts, and travels through NY and CT to Long Island and into the New York City area. It has a physical receipt capability of 1.5 Bcf/d. It interconnects with TransCanada, Dominion, Tennessee and Algonquin.

Maritimes & Northeast Pipeline (M&NE) is a partnership of Spectra Energy, Emera and ExxonMobil. It transports gas from the Maritimes to markets in Atlantic Canada and New England. The total pipeline is 889 miles, with about 346 miles located in Maine, New Hampshire and Massachusetts. U.S. capacity is 833 MMcf/d; its capacity in Canada is 555 MMcf/d.

Millennium Pipeline traverses New York's lower Hudson Valley and Southern Tier. It is comprised of 220 miles of 30 inch diameter steel pipeline and is capable of transporting up to 850,000 dekatherms per day of natural gas. It is owned by subsidiaries of NiSource, National Grid and DTE Energy. It began commercial operations in December 2008.

National Fuel Gas Supply Corporation provides interstate natural gas transmission and storage for affiliated and nonaffiliated companies through an integrated gas pipeline system of 2,300 miles that extends from southwestern Pennsylvania to the New York-Canadian border at the Niagara River. It also owns and operates 31 underground natural gas storage areas.

Neptune LNG is an LNG facility located approximately ten miles off the coast of Gloucester, MA. It is owned by GDF SUEZ. It was completed in 2010. It connects with the Spectra underwater HubLine system via a 13 mile-interconnect. It was designed to deliver from 400 to 750 million cubic feet per day. It has been inactive. It requested a five-year suspension of its operating license in 2013 from the U.S. Maritime Administration.

North Country Pipeline is an intrastate pipeline of approximately 22 miles that runs from the Canadian border in northeastern New York near Champlain to the Plattsburgh area, with natural gas imported from the TransCanada system. It has a capacity of about 100 DTH/day.

Portland Natural Gas Transmission (PNGTS) is sponsored by an international consortium of energy companies - TransCanada PipeLines and Gaz Métro. It transports western Canadian gas to New England from an interconnection with TransCanada PipeLines (through the TQM extension). On the U.S. side, it involves 292 miles of pipeline including 50 miles of variously sized laterals, extending through northern NH to southern Maine and interconnecting with Maritimes & Northeast through the Joint Facilities. Its firm capacity is 168 MMcf/d. On a day-to-day, interruptible basis, it has delivered as much as 228 MMcf/d in the winter of 2014/15. It interconnects with the Maritimes & Northeast Pipeline at Westbrook, Maine; from there, the Joint Facilities line extends to Dracut, MA.

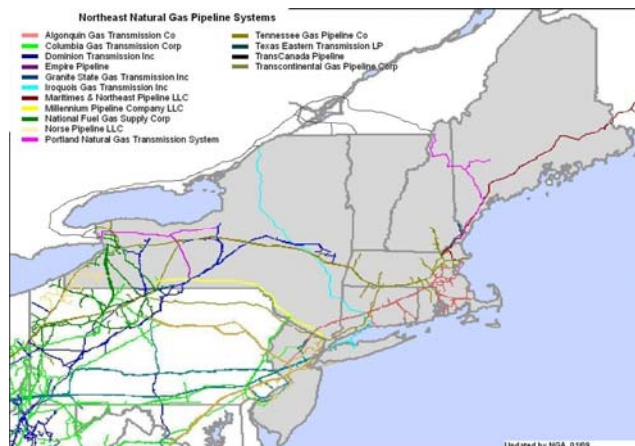
Repsol operates the Canaport LNG facility located in Saint John, New Brunswick, Canada; its project partner is Irving Oil. The facility received its first shipment in June 2009. The physical infrastructure consists of three storage tanks with total capacity of 9.9 Bcf. The terminal has a maximum sendout capacity of 1.2 Bcf/day. Regasified LNG from the terminal flows through the Brunswick Pipeline, a 90 mile pipeline connecting the terminal to the Maritimes & Northeast Pipeline at the Maine border. Since its start-up, it has delivered about 320 Bcf to the market.

Tennessee Gas Pipeline Company is a business unit of Kinder Morgan. The Tennessee Gas Pipeline has 11,900 miles of pipeline. Tennessee’s system enters New England at two points: western Mass. near West Pittsfield and southern Connecticut near Greenwich. It enters New York at several points – from southwestern Pennsylvania, central Pennsylvania, an interconnect at Niagara, and through New Jersey into the New York City area and on to Connecticut. It has 92 Bcf of storage, and a capacity of ~9 Bcf/d.

Texas Eastern Transmission Company is a business unit of Spectra Energy. Its system incorporates approximately 9,022 miles of pipe, from the U.S. Gulf Coast to New Jersey. Its capacity is 10.38 Bcf/d, with storage of 74 Bcf.

TransCanada PipeLine has a network of approximately 37,000 miles of pipeline which transports the majority of western Canada’s natural gas production to markets in Canada and the United States. It interconnects with several systems serving New York and New England. It has approximately 380 Bcf of storage capacity.

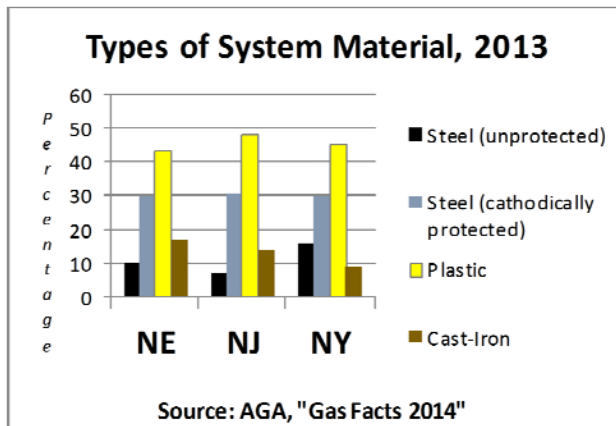
Transcontinental (Transco) is a subsidiary of Williams Company. The Transco pipeline comprises a 10,200-mile pipeline system, extending from South Texas to New York City. The peak system design capacity is 10.9 billion cubic feet per day. In the Northeast, it provides gas service to New York City, New Jersey and the Mid-Atlantic region. It has 197 Bcf of seasonal storage.



UTILITY MILES OF PIPELINE AND MAIN, NORTHEAST

The miles of pipeline and distribution mains form a basic indicator of access to the gas market. The Northeast has continued to increase both its transmission and distribution systems; planned infrastructure enhancements and LDC system growth will produce increases to these numbers in coming years.

The chart below shows percentage of pipeline mains by material by region, 2013. Plastic pipe is in the mid-40s percentile range for all three regions, but is the dominant method for new distribution pipe, and now represents 54% of all U.S. miles of main.



STATE / U.S.	DISTRIBUTION MAIN MILES	TRANSMISSION MILES
<i>Connecticut</i>	7,889	588
<i>Maine</i>	1,118	509
<i>Massachusetts</i>	21,526	1,129
<i>New Hampshire</i>	1,908	251
<i>New Jersey</i>	34,436	1,536
<i>New York</i>	48,422	4,538
<i>Rhode Island</i>	3,188	96
<i>Vermont</i>	757	74
<i>U.S. total</i>	1,265,463	301,691

Source: PHMSA, U.S. Department of Transportation, 2014 data

NORTHEAST PIPELINE PROJECTS IN PROCESS

2015 saw several infrastructure projects placed in service in the region, to link Marcellus supplies to market. Several other projects are in the regulatory and development process for the period 2016-2018 and are summarized below. This list changes with market conditions—please visit NGA’s web site during the year for updated listings.

PROJECT	COMPANY	DESCRIPTION	EST. IN-SERVICE	STATUS
Salem Lateral Project	Algonquin Gas Transmission / Spectra Energy	Algonquin proposes to construct and operate a 1.2-mile-long, 16-inch-diameter lateral pipeline (Salem Lateral Pipeline) to provide 115,000 dekatherms (Dth) per day of firm natural gas transportation service to Footprint Power Salem Harbor Development, LP’s (Footprint) redeveloped Salem Harbor Station, a 630-megawatt quick-start combined-cycle, natural gas-fired generation facility, in Salem, MA.	Nov. 2016	Filed with FERC, July 2014. Approved by FERC, May 2015. Under construction.
Constitution Pipeline	Cabot/Williams	Approximately 120-mile Constitution Pipeline is being designed to extend from Susquehanna County, PA, to the Iroquois Gas Transmission and Tennessee Gas Pipeline systems in Schoharie County, N.Y. Proposed capacity of 650 MMCF/d. Cabot and Southwestern are announced shippers.	Late 2016	Announced spring 2012. Filed with FERC, 6-13. FERC issued final EIS, 10-14. Approved by FERC, 12-14. Awaiting NY state permit.
Wright Interconnect Project (WIP)	Iroquois Gas Transmission	WIP will enable delivery of up to 650,000 Dth/d of natural gas from the terminus of the proposed Constitution Pipeline in Schoharie County, NY into both Iroquois and the Tennessee Gas Pipeline under a 15 year capacity lease agreement with Constitution.	Late 2016	Announced 1-13. Filed with FERC, 6-13. FERC issued final EIS, 10-14. Approved by FERC, 12-14.
Northern Access 2016	National Fuel Gas Supply & Empire Pipeline	Capacity of 350,000 Dth/day on Empire, 497,000 on NFGSC. Deliveries to Chippawa, with new interconnect at TGP 200 Line. 100+ miles of 24” pipeline and 2 compressor stations.	Nov. 2016	In FERC pre-filing process, March 2015.

This table is based on publicly-available information as of Nov. 2015; project details may change.

NORTHEAST PIPELINE PROJECTS IN PROCESS (cont'd)

PROJECT	COMPANY	DESCRIPTION	EST. IN-SERVICE	STATUS
New Market Project	Dominion Pipeline	Planned for customers in upstate NY (National Grid). Will include the addition of 2 new compressor stations along DTT's existing transmission pipeline; and increased compression at an existing station. Capacity of 112 MMcf/d.	Nov. 2016	Filed application with FERC, June 2014.
AIM	Algonquin Gas Transmission / Spectra Energy	Providing 342 MMcf/d of additional capacity to move Marcellus production to Algonquin City Gates. Shippers are 6 gas utilities in New England.	2 nd half 2016	Open season held, fall 2012. Filed with FERC, 2-14. FERC issues final EIS, 1-15. Approved by FERC, 3-15. Under construction.
Connecticut Expansion	Tennessee Gas Pipeline / Kinder Morgan	Capacity of 72,100 Dth/d. Pipeline looping on TGP 200 and 300 lines. Market is CT natural gas utilities.	Nov. 2016	Open Season held July 2013. Filed with FERC, 7-14. FERC issued environmental assessment, 10-15.
Garden State Expansion Project	Williams/Transco	The project has been designed to provide up to 180,000 dekatherms per day of natural gas service in two phases to a new delivery point with New Jersey Natural Gas in Burlington County, N.J. The project will include the installation of a new compressor station, meter and regulating station on land located in Burlington County, N.J. It will also require modifications and the addition of compression at an existing compressor station. No expansion of the pipeline is required.	Nov. 2016 (Phase 1) / Aug. 2017 (Phase 2)	Filed with FERC, Feb. 2015.
Valley Lateral Project	Millennium Pipeline	The Valley Lateral Project will connect Millennium's gas mainline to CPV's energy center in Wawayanda, NY, and provide access to natural gas for its new 650 MW combined-cycle electric power generating facility. Capacity of 130,000 Dth/d.	Apr. 2017	Filed with FERC, Nov. 2015.

This table is based on publicly-available information as of Nov. 2015; project details may change.

NORTHEAST PIPELINE PROJECTS IN PROCESS (cont'd)

PROJECT	COMPANY	DESCRIPTION	EST. IN-SERVICE	STATUS
Continent to Coast (C2C) Expansion	PNGTS	C2C will access natural gas supplies from key North American natural gas basins via Trans-Canada Pipeline. Atlantic Canada markets can then transport on PNGTS to an interconnect with Maritimes and Northeast Pipeline at Westbrook, ME. Shippers interested in moving natural gas further south into New England can transport on PNGTS to interconnects with other NE natural gas pipelines. May raise PNGTS' current capacity of 168,000 Dth/d to approx. 300,000 Dth/d.	Nov. 2017	Open season, April 1 to June 28, 2013. Open season re-convened, Dec. 2013 – Jan. 2014. Relaunch of open season, Jan. – Feb. 2015. Project is confirmed to proceed.
South-to-North (“SoNo”) Project	Iroquois Gas Transmission	Reverse flow on Iroquois offering physical transport to U.S./Canada border. The SoNo project would transport up to 650,000 Dth/day from Iroquois' existing interconnects with Dominion Transmission in Canajoharie, NY and Algonquin Gas Transmission in Brookfield, CT, as well as the proposed Constitution Pipeline in Wright, NY.	Nov. 2017	Open season held, Dec. 2013 – Jan. 2014. Relaunch of open season, Jan. – Feb. 2015.
Atlantic Bridge	Spectra Energy	Incremental expansion on Algonquin and Maritimes & Northeast, to serve New England and Canadian Maritimes. Proposed capacity of ~133,000 Dth/d.	2017	Announced, Feb. 2014. Open season held, Feb.- March, 2014. In pre-filing with FERC, Feb. 2015. Filed with FERC, Oct. 2015.
PennEast Project	AGL Resources, NJR Pipeline Company, South Jersey Industries, UGI Energy Services, Spectra Energy and PSE&G Power LLC	100-mile pipeline intended to bring lower cost natural gas produced in the Marcellus Shale region to homes and businesses in Pennsylvania and New Jersey. Designed to provide natural gas service to the equivalent of 4.7 million homes, up to 1 Bcf per day. PennEast is investing nearly \$1 billion to build the pipeline with the costs split among the four entities. Construction of the pipeline could begin in 2017 pending regulatory approvals.	2017/2018	Announced Aug. 2014. Open season held August 2014. In FERC pre-filing process, Oct. 2014. Filed with FERC, Sept. 2015.

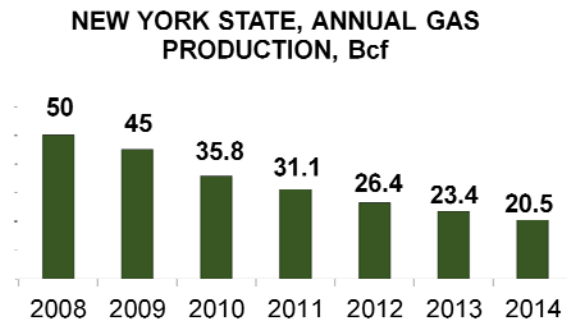
This table is based on publicly-available information as of Nov. 2015; project details may change.

NORTHEAST PIPELINE PROJECTS IN PROCESS (cont'd)

PROJECT	COMPANY	DESCRIPTION	EST. IN-SERVICE	STATUS
New York Bay Expansion	Transco / Williams	The New York Bay Expansion Project would provide National Grid with an additional 115,000 dekatherms of natural gas per day in time for the 2017/2018 winter heating season. The project will include the installation of additional horsepower at three existing Transco compressor facilities, in addition to uprating Transco's existing Lower New York Bay lateral and replacing 0.2 miles of 42-inch pipe in Middlesex County, N.J. The project will also include modifications to existing Transco meter & regulator stations in Middlesex County, N.J., and Richmond County, N.Y.	2017	Filed with FERC, July 2015.
Northeast Energy Direct (NED) Project	Tennessee Gas Pipeline / Kinder Morgan	This project proposes a "market path" route from Wright, NY to Dracut, MA. Proposes construction of greenfield pipeline, additional meter stations and compressor stations, and modifications to existing facilities in New York, Massachusetts, Connecticut, and New Hampshire. Proposed capacity of 1.3 Bcf/d (30"). Approximately 91% co-located along existing utility corridors / adjacent to TGP mainline for Market Path Component.	Nov. 2018	Open season held, Feb.-March, 2014. In FERC pre-filing process as of 9-14. Kinder Morgan has announced that gas utilities in region have committed to project as initial shippers, at level of approx. 550,000 dekatherms per day (Dth/d). In July 2015, Kinder Morgan Board announced support for 1.3 Bcf/d capacity design. Filed with FERC, Nov. 2015.
Access Northeast	Spectra Energy, Ever-source Energy, National Grid	The gas pipeline expansion project will enhance the Algonquin and Maritimes pipeline systems and market area storage assets in New England to deliver up to one billion cubic feet of natural gas per day for electric generation markets. Alliance with Iroquois Gas Transmission announced, 12-14. Can provide as much as 0.9 Bcf/d to power plants.	Nov. 2018	Announced 9-14. Solicitation of interest held, fall 2014. Open season held first half of 2015. In FERC pre-filing.

This table is based on publicly-available information as of Nov. 2015; project details may change.

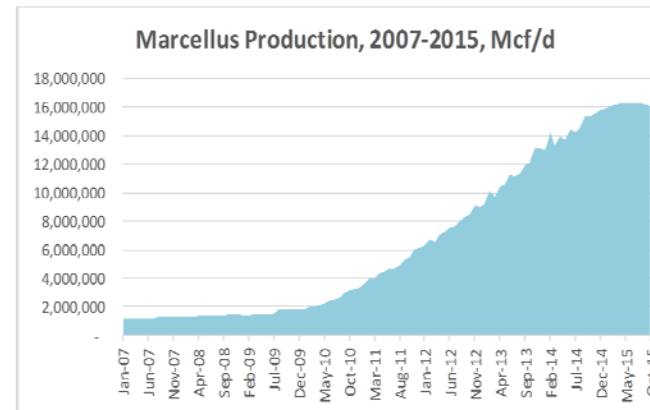
NATURAL GAS PRODUCTION IN NORTHEAST U.S.



Source: NY State Dept. of Environmental Conservation/ Office of Oil & Gas

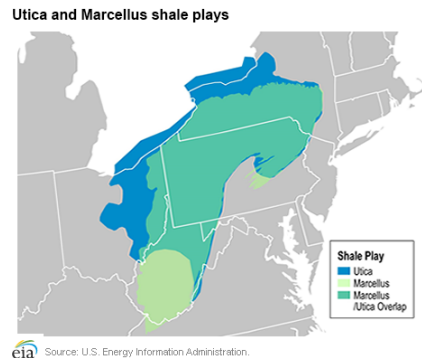
The New York State Department of Environmental Conservation / Division of Mineral Resources reports that gas production in the state in 2014 was 20.5 billion cubic feet (Bcf), down from 23.4 Bcf in 2013. Annual production is less than half what it was in 2008. The 2014 production was driven by wells in the Trenton-Black River formation in the Finger Lakes region, as well as in the Medina formation. The production is from conventional gas wells; the hydraulic fracturing drilling process is not permitted in the state.

Natural gas production in the Northeast continues steady and rapid growth, as illustrated in the chart below with data from the U.S. Energy Information Administration (EIA). Marcellus production reached 20 Bcf per day on occasion in summer 2015. U.S. EIA observed in November 2013: “This trend has reduced the cost and increased the supply of natural gas in the Northeast. This additional supply has encouraged greater use of natural gas in the Northeast...and has also reduced net inflows of natural gas into the region from other regions such as the Gulf of Mexico, the Midwest and Eastern Canada.”



Source: U.S. Energy Information Administration

SHALE GAS DEVELOPMENT IN THE NORTHEAST / MIDWEST



Map: U.S. EIA

Significant shale gas basins have emerged in the Northeast region in recent years: the Marcellus Shale and Utica Shale in the Appalachian basin. The Marcellus Shale runs through several mid-Atlantic states, including West Virginia, Pennsylvania and New York. Shale gas now represents 40% of U.S. dry natural gas production—up from 5% in 2007.

Estimates are that the Marcellus basin alone may hold as much as 500 trillion cubic feet (Tcf) of natural gas.

Current Marcellus production is centered in Pennsylvania and West Virginia. Production there has reached 16 billion cubic feet per day, and is expected to grow further in coming years. In its 2013 assessment of U.S. proved natural gas reserves, EIA reported that “Pennsylvania and West Virginia account for 70% of the increase in natural gas proved reserves.”

The Utica Shale, centered principally in Ohio, is both an oil and natural gas play, but production volumes have mostly been oil to date, reflecting the price spread between natural gas and oil.

New technology in the form of horizontal drilling has enabled producers in recent years to access the shale gas in a technically and economically feasible manner.

Already, as outlined in preceding pages, the interstate pipelines in the Northeast are working to increase their interconnections to bring these new supplies to market. This new infrastructure development is quickly transforming the gas supply dynamic in the region.

There are also potential shale resources located in Eastern Canada but no production has occurred to date.

INCREASING GAS POTENTIAL IN THE U.S.

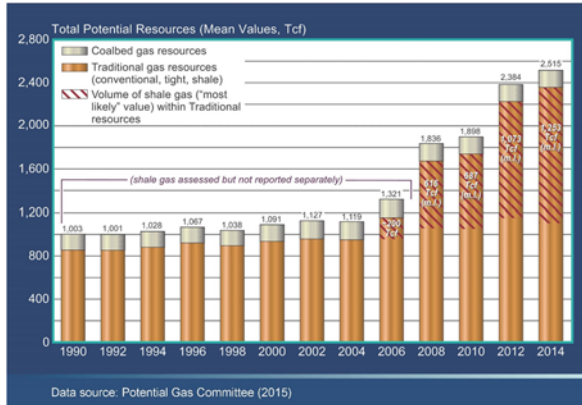
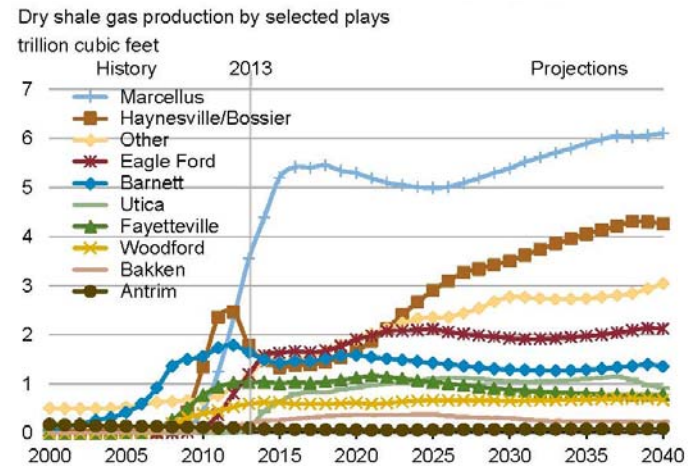


Chart: Potential Gas Committee, 4-15

Every 2 years, the Potential Gas Committee (PGC) of the Colorado School of Mines releases a long-term assessment of U.S. potential natural gas supply. Its 2014 assessment, released in April 2015, and illustrated in the PGC chart above, shows an increase in total estimated potential supplies from the previous study, due in large part to shale (shown in the red stripe). According to this latest assessment, the U.S. possesses a total technically recoverable resource base of 2,515 trillion cubic feet (Tcf). The 2014 assessment is “the highest resource evaluation in the Committee’s 50-year history.”

U.S. SHALE GAS PRODUCTION PROJECTIONS



Source: EIA, Annual Energy Outlook 2015

The projected production outlook for U.S. shale gas plays projects long-term resource viability for the U.S. The U.S. EIA chart above shows the outlook for major U.S. shale gas plays, through 2040. Leading the field is the Marcellus, shown in the top light blue line.

Chart: U.S. EIA, 6-15

LNG SERVING NEW ENGLAND MARKET

Import facilities:

Distrigas terminal, Everett, MA (part of GDF SUEZ). Began operation in 1971.

- Storage of 3.4 billion cubic feet.
- On a sustainable basis, the vaporization capacity is approximately 715 million cubic feet per day.
 - Additional sendout capability of 100 MMBtu/d in liquid via truck.

Canaport facility, Saint John, NB, Canada. Began operation in 2009.

- Operated by Repsol in partnership with Irving Oil.
- Sendout capability of 1 Bcf/d in vapor via Brunswick Pipeline into Maritimes & Northeast.
 - Three storage tanks of 3.3 Bcf each, or ~10 Bcf total.

Northeast Gateway facility, offshore Cape Ann, MA. Began operation in 2008.

- Operated by Excelerate Energy.
- Sendout capability of 0.4 to 0.8 Bcf/d in vapor via underwater HubLine.

Neptune facility, offshore Gloucester, MA (part of GDF SUEZ). Completed in 2010 but inactive.

- Connects to underwater pipeline, HubLine, via 13.4 miles of offshore pipe. Not currently operating.

LDC satellite tanks/peak-shaving units:

- 44 tanks in 29 communities in 5 states (CT, ME, MA, NH, RI).
 - LDCs' total LNG storage capacity is 16.1 Bcf.
 - LDCs' vaporization capacity is 1.44 Bcf/day.
- Liquefaction is available at 5 LDC-owned facilities - total liquefaction capability is 43,500 MMBtu/day.

UNDERGROUND STORAGE IN NY

- 26 natural gas storage facilities.
- Total capacity: 246 billion cubic feet.
- Maximum deliverability: 1.98 Bcf/day

Source: U.S. Energy Information Administration, New York State Dept. of Environmental Conservation

LNG IN NEW YORK

LDC-owned peak-shaving plants:

- New York City area and Long Island, on Con Edison and National Grid systems.
 - Storage capacity of approximately 3.2 Bcf.
 - LNG obtained via liquefaction of pipeline gas.
- Vaporization capacity is approximately 0.56 Bcf/day.
 - Liquefaction capacity is 19,850 MMBtu/day.

LNG IN NEW JERSEY

- Storage capacity of approximately 3.7 Bcf.
- LDC tanks in 6 communities, owned by 4 LDCs, as well as one pipeline-owned facility.
 - Vaporization capacity is approximately 0.7 Bcf/day.

NORTHEAST NATURAL GAS STORAGE

Storage is essential to the natural gas supply and delivery system. The principal storage system in the U.S. is underground storage, in salt caverns, aquifers, and depleted oil and gas fields. There are 400 such facilities in the U.S., with demonstrated peak working gas capacity of about 4.2 Tcf.

For the Northeast, there are two main types of storage: underground, and liquefied natural gas (LNG).

There is no underground storage in New England or New Jersey, as the map indicates, because of the unsuitability of the region's geology.

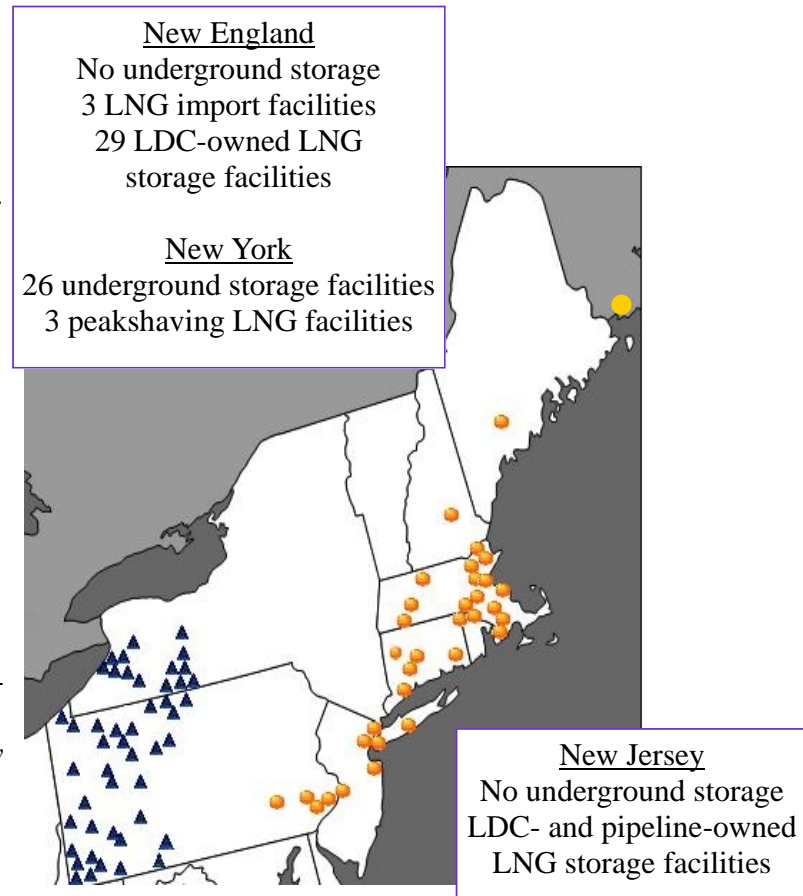
New England and New Jersey do utilize LNG. There are three LNG import facilities operating in the Northeast, all near the greater Boston area. There is also a facility in New Brunswick, Canada, close to the U.S. border.

In addition, the LDCs operate above-ground LNG storage tanks for peak-shaving.

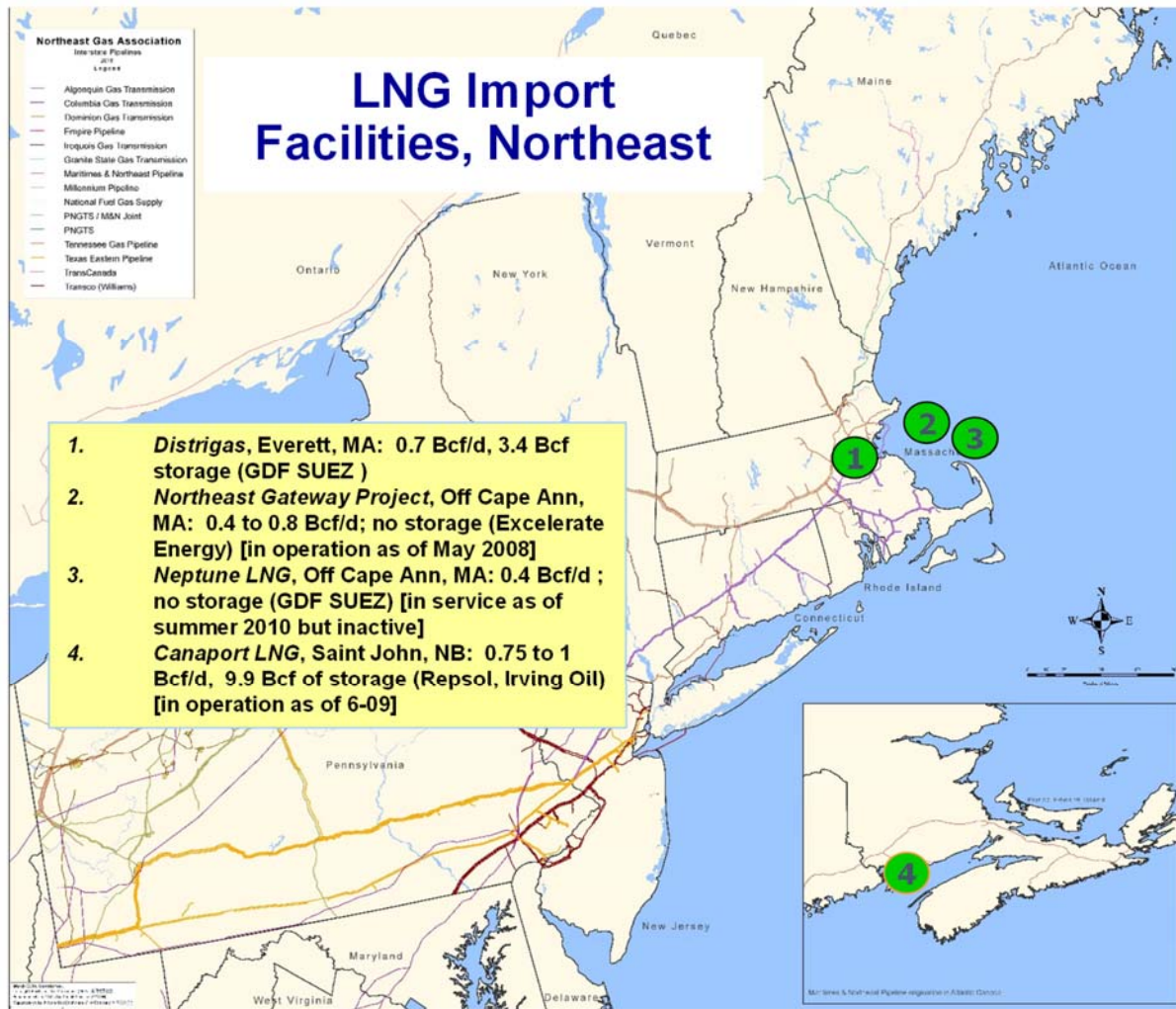
Pennsylvania has considerable underground gas storage, 8.4% of total U.S. capacity.

New York has 26 underground storage facilities. New York's underground storage represents about 2.7% of the U.S. total.

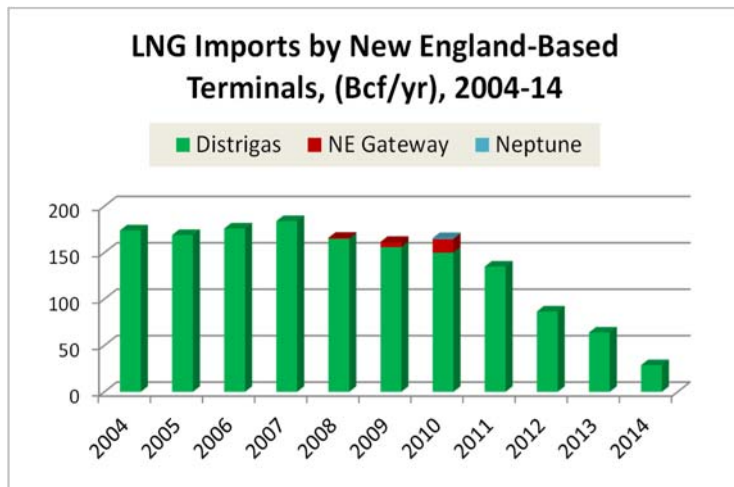
New York also has 3 LNG peakshaving facilities, in the downstate area.



Blue = underground storage, orange = LNG.
 Source: U.S. EIA



LNG ANNUAL VOLUMES IMPORTED INTO NEW ENGLAND TERMINALS, 2004-2014



LNG imports into New England facilities were 29 Bcf in 2014, compared to 64 in 2013. Distrigas of MA represented half of all U.S. ship imports in 2014. An offshore LNG facility - Northeast Gateway - had its first cargo in 4 years in late 2015/early 2015. The strong output of domestic shale gas is changing the LNG dynamic in the U.S. and regionally.

Source: U.S. Department of Energy, Office of Fossil Energy, Office of Natural Gas & Petroleum Import Activities.

Liquefied natural gas (LNG) is an important component of the region's gas supply, especially for peak winter needs. Distrigas of Massachusetts Corp. (DOMAC), a subsidiary of GDF SUEZ, owns and operates a land-based facility at Everett, MA. There are also two facilities located offshore near Gloucester, MA, but they have been only sporadically active.

Repsol's Canaport LNG facility in nearby New Brunswick, Canada has supplied about 320 Bcf to the market since it began operation in mid-2009.

The chart below from Repsol shows the levels of various supply inputs from/into the Maritimes Canada for the period of Nov. 2010 through February 2015. Canaport is shown in red.

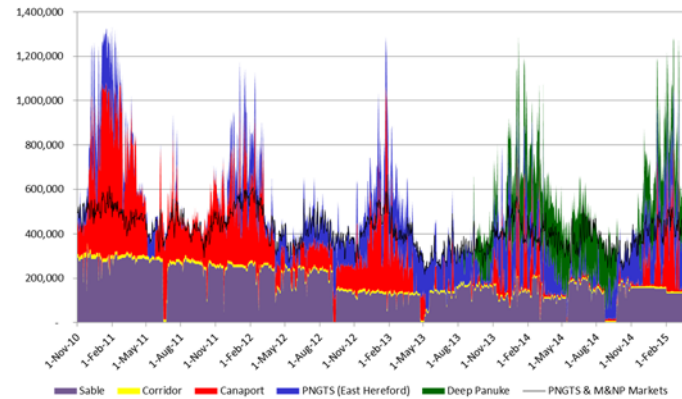
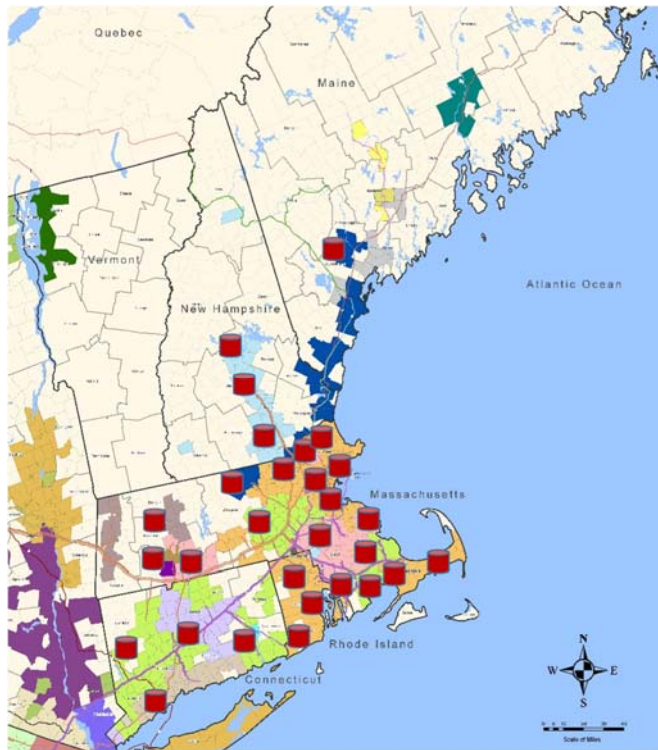


Chart: Repsol, based on Repsol and Ventyx. Gas volumes in Dth.

LNG STORAGE HELD BY NEW ENGLAND GAS UTILITIES



Map prepared by NGA. Red tanks indicate LNG satellite tanks owned and operated by gas LDCs. Locations approximate.

Liquefied natural gas (LNG) is a key form of in-region storage for natural gas utilities in the Northeast—but particularly so in New England. For some of the larger utilities, LNG can represent 35 to 40% of peak day supply.

LNG on the gas utility system provides not only peak day supply but also pressure support at key points on the systems.

The map shows the location of LNG tanks in the New England region. LNG is stored by utilities in 29 communities in 5 New England states.

There are proposals by several New England utilities to increase LNG storage capacity in the next few years—to go from a total of 16 billion cubic feet to about 22 Bcf.

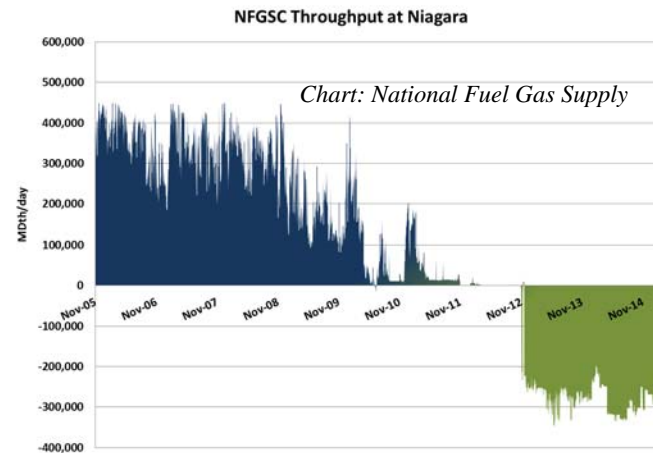
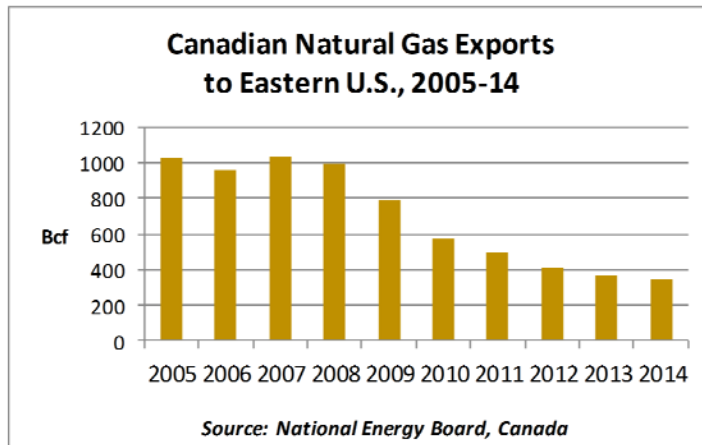
PROPANE / LP AIR: STORAGE CAPACITY AT NEW ENGLAND GAS LDCs

Year	Number of Communities with Facilities	Number of Tanks	Storage Capacity in Gallons
1998	46	346	16,053,819
2015	13	89	3,926,732

As natural gas pipeline capacity and LNG storage have increased in the region, propane storage at the natural gas utility level has declined. Propane/air was often used to supplement gas pipeline capacity for several utilities in the Northeast, particularly in New England.

The rise of natural gas production in the Appalachian region meanwhile is creating opportunities for considerable propane development in the region.

CANADIAN GAS EXPORTS TO THE NORTHEAST U.S.



Canadian imports have long been a major source of U.S. - and Northeast - natural gas supply. The Northeast has drawn supplies from Alberta, offshore Nova Scotia and New Brunswick. Increasingly however the supply dynamic is changing, as U.S. domestic production rises, reducing the need for imports. As indicated in the chart on the left, Eastern U.S. imports have declined considerably over the last few years. Canadian gas exports dropped by 5% in 2014 to the U.S. East region. (U.S. EIA reports that natural gas imports into the U.S. reached the lowest level in almost twenty years in 2014.)

The chart on the right from National Fuel Gas Supply Corp. shows the evolving supply dynamic with the changing import/export flows at Niagara on the New York-Ontario border. The blue shows Canadian exports into the U.S., the green shows the shift, starting in late 2012, with exports back into Ontario at the Niagara point, after National Fuel's "Northern Access Project" went into service.

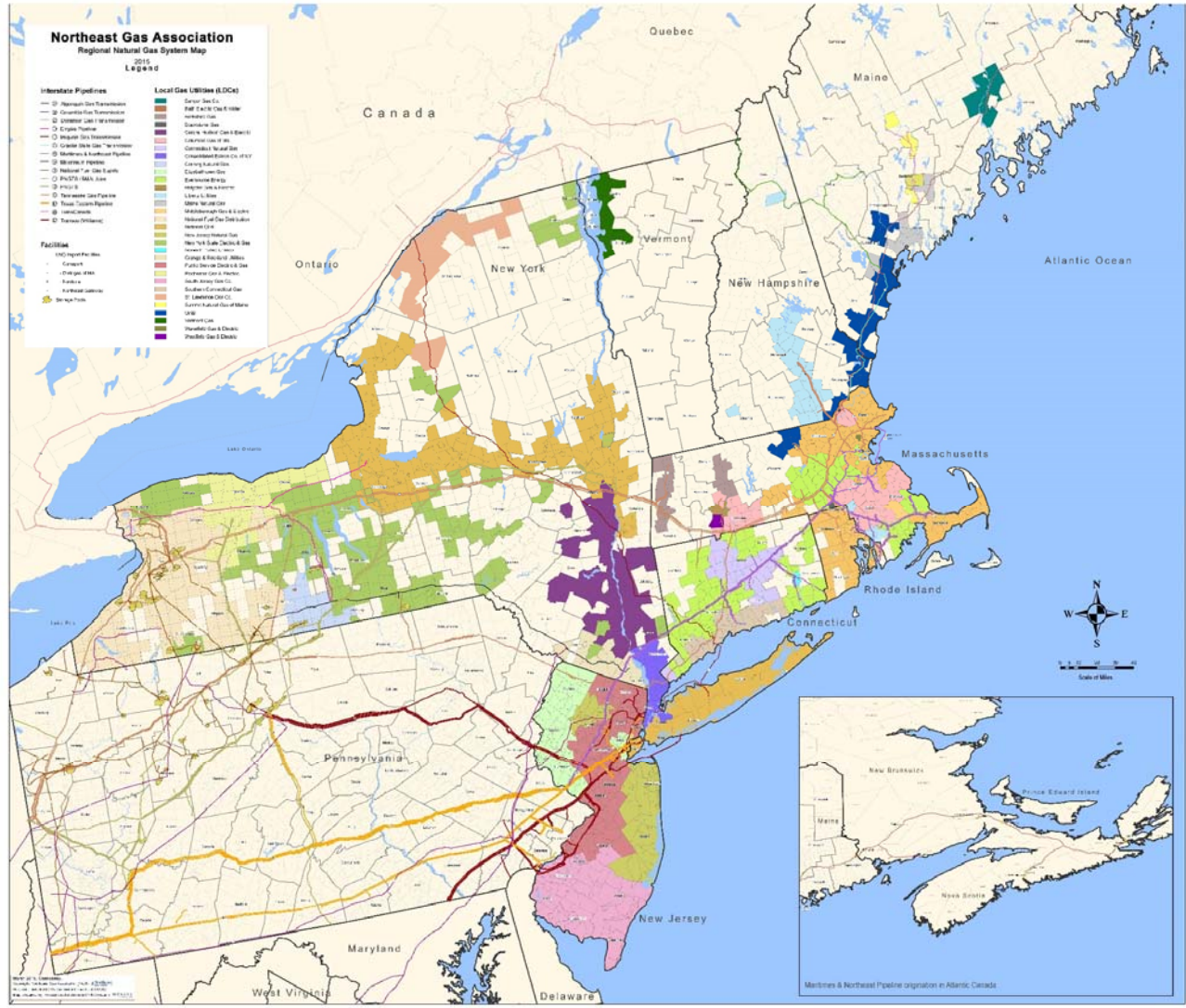
IV.

NATURAL GAS TRENDS IN THE NORTHEAST

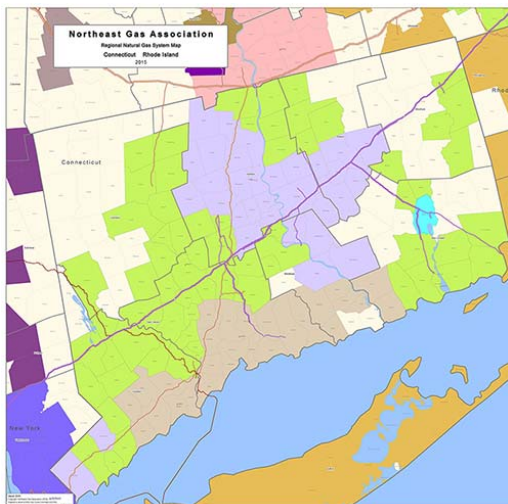
This section provides an introduction to the natural gas industry in the Northeast.

Among the areas addressed are:

- *Gas consumption by sector*
- *Price trends*
- *Growth areas*
- *Gas & power generation.*



CONNECTICUT



Natural Gas Utilities in Connecticut

There are 4 natural gas utilities:

Connecticut Natural Gas
(purple area on map)

Eversource (Yankee Gas Services Co.)
(lime-green area on map)

Norwich Public Utilities
(aqua area on map)

The Southern Connecticut Gas Co.
(light brown area on map)

Natural Gas Utility Customers:

There are approximately 640,000 natural gas customers in the state.

Natural Gas Use in Connecticut

Primary energy: 32%

Electric generation capacity: 32%

% of households with gas as main heating fuel: 34%

Annual consumption: 231 billion cubic feet (Bcf) of natural gas.

Natural Gas Pipelines Serving Connecticut

- **Algonquin Gas Transmission**, a subsidiary of Spectra Energy.
- **Iroquois Gas Transmission.**
- **Tennessee Gas Pipeline Company**, a subsidiary of Kinder Morgan.

LNG Storage in Connecticut

There is utility liquefied natural gas (LNG) storage facilities in four communities.

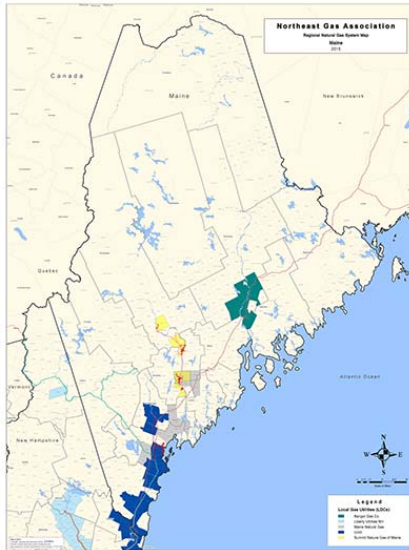
Underground Storage

None.

Natural Gas Production

None.

MAINE



Natural Gas Utilities in Maine

There are 4 natural gas utilities:

Bangor Gas

(green area on map)

Maine Natural Gas

(grey area on map)

Summit Natural Gas

(yellow area on map)

Unitil

(blue area on map)

Natural Gas Use in Maine

Primary energy: 16%

Electric generation capacity: 49%

% of households with gas as main heating fuel: 7%

Annual consumption: 59 billion cubic feet (Bcf) of natural gas.

Natural Gas Utility Customers:

There are approximately 39,000 natural gas customers in the state.

Natural Gas Pipelines Serving Maine

4 natural gas pipelines transport gas:

- **Portland Natural Gas Transmission (PNGTS).** It is owned by TransCanada PipeLines and Gaz Métro.
- **Maritimes & Northeast Pipeline.** It is owned by Emera, Spectra Energy and Exxon Mobil.
- **Joint Facilities of PNGTS and Maritimes & Northeast Pipeline.**
- **Granite State Gas Transmission.** It is owned by Unitil.

LNG Storage in Maine

There is a utility liquefied natural gas (LNG) storage facility in 1 community.

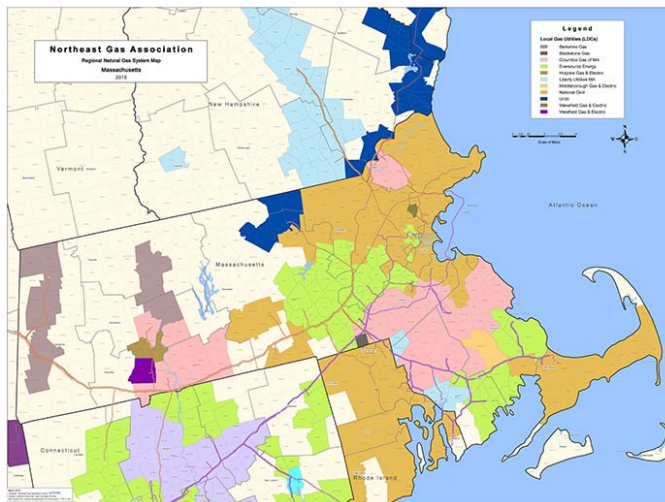
Underground Storage

None.

Natural Gas Production

None.

MASSACHUSETTS



Natural Gas Pipelines Serving Massachusetts

- **Algonquin Gas Transmission**, a subsidiary of Spectra Energy.
- **Tennessee Gas Pipeline Company**, a subsidiary of Kinder Morgan.
- **Joint Facilities of PNGTS and Maritimes & Northeast.**

LNG Import Facilities

There are three—one onshore, two offshore.

- **Distrigas of Massachusetts**, a subsidiary of GDF SUEZ NA
- **Neptune**, a subsidiary of GDF SUEZ NA
- **Northeast Gateway**, a subsidiary of Exceleerate Energy

Natural Gas Use in Massachusetts

Primary energy: 32%

Electric generation capacity: 49%

% of households with gas as main heating fuel: 51%

Annual consumption: 412 billion cubic feet (Bcf) of natural gas.

Local Gas Utilities:

There are eleven natural gas utilities in the state.

Natural Gas Utility Customers:

There are approximately 1.6 million natural gas customers in the state.

LNG Storage in Massachusetts

There is utility liquefied natural gas (LNG) storage facilities in 18 communities.

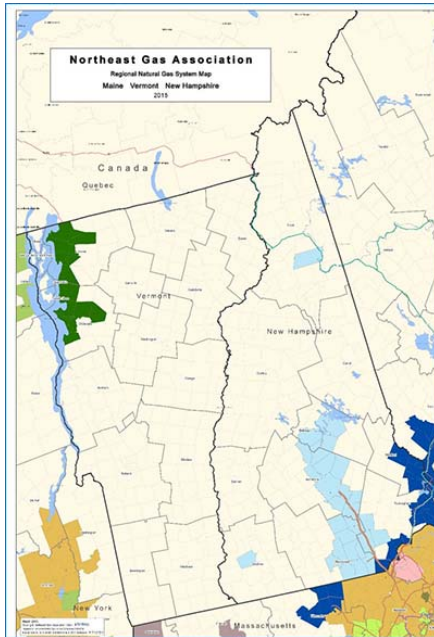
Underground Storage

None.

Natural Gas Production

None.

NEW HAMPSHIRE



Natural Gas Utilities in New Hampshire

There are 2 natural gas utilities:

Liberty Utilities

(light blue area on map)

Unitil Corp.

(dark blue area on map)

Natural Gas Use in New Hampshire

Primary energy: 18%

Electric generation capacity: 29%

% of households with gas as main heating fuel: 19%

Annual consumption: 57 billion cubic feet (Bcf) of natural gas.

Natural Gas Utility Customers :

There are approximately 120,000 natural gas customers in the state.

Natural Gas Pipelines Serving New Hampshire

4 natural gas pipelines transport gas:

- ***Portland Natural Gas Transmission (PNGTS).*** It is owned by TransCanada PipeLines and Gaz Métro.
- ***Tennessee Gas Pipeline Company,*** a subsidiary of Kinder Morgan.
- ***Joint Facilities of PNGTS and Maritimes & Northeast Pipeline.***
- ***Granite State Gas Transmission.*** It is owned by Unitil.

LNG Storage in New Hampshire

There is utility liquefied natural gas (LNG) storage facilities in 3 communities.

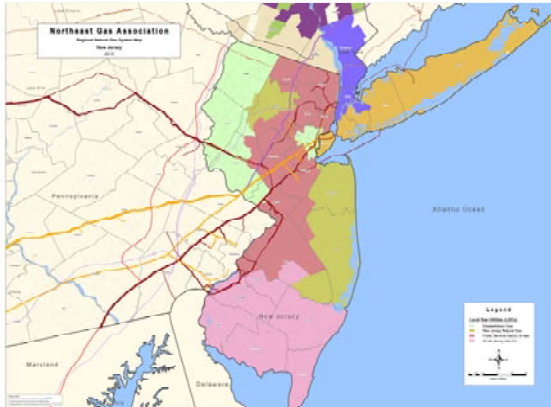
Underground Storage

None.

Natural Gas Production

None.

NEW JERSEY



Natural Gas Utilities in New Jersey

There are 4 natural gas utilities:

Elizabethtown Gas

(pale green area on map)

New Jersey Natural Gas

(lime green area on map)

PSE&G

(light red area on map)

South Jersey Gas

(light purple area on map)

Natural Gas Use in New Jersey

Primary energy: 31%

Electric generation capacity: 44%

% of households with gas as main heating fuel: 75%

Annual consumption: 757 billion cubic feet (Bcf) of natural gas.

Natural Gas Utility Customers:

There are approximately 2.9 million natural gas customers in the state.

Natural Gas Pipelines Serving New Jersey

- ***Algonquin Gas Transmission and Texas Eastern Transmission,*** subsidiaries of Spectra Energy.
- ***Columbia Transmission.***
- ***Dominion Transmission***
- ***Tennessee Gas Pipeline Company,*** a subsidiary of Kinder Morgan.
- ***Transcontinental Pipeline,*** a subsidiary of Williams.

LNG Storage in New Jersey

There is utility liquefied natural gas (LNG) storage facilities in several communities.

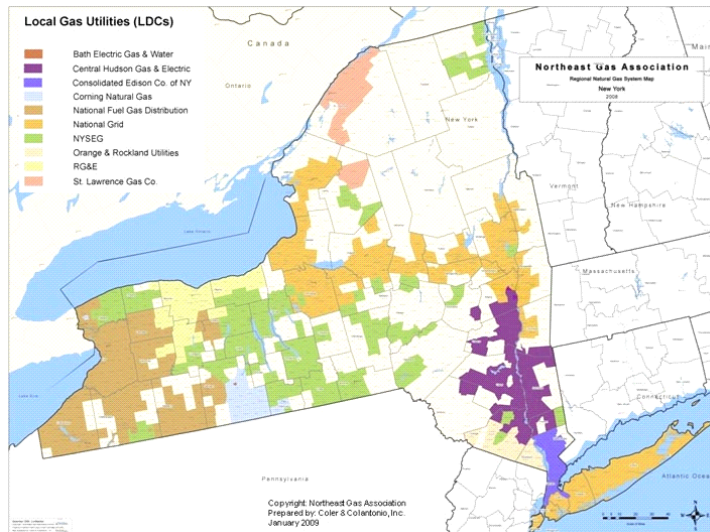
Underground Storage

None.

Natural Gas Production

None.

NEW YORK



Natural Gas Use in New York

Primary energy: 33%

Electric generation capacity: 56% gas, and/or gas/oil.

% of households with gas as main heating fuel: 57%

Annual consumption: 1,319 billion cubic feet (Bcf) of natural gas.

Local Gas Utilities:

There are ten natural gas utilities in the state.

Natural Gas Utility Customers:

There are approximately 4.7 million natural gas customers in the state.

Natural Gas Production

In 2014, production was 20 Bcf.

Natural Gas Pipelines Serving NY

- **Algonquin Gas Transmission and Texas Eastern**
- **Columbia Transmission**
- **Dominion**
- **Empire Pipeline**
- **Iroquois Gas Transmission**
- **Millennium Pipeline**
- **National Fuel Gas Supply**
- **North County Pipeline**
- **Tennessee Gas Pipeline Company**
- **Transcontinental Pipeline.**

LNG Storage in New York

There is utility liquefied natural gas (LNG) storage facilities in three communities.

Underground Storage

Approximately 246 Bcf.

RHODE ISLAND



Natural Gas Utility in Rhode Island

There is 1 natural gas utility:

National Grid

(tan area on map)

Natural Gas Use in Rhode Island

Primary energy: 46%

Electric generation capacity: 98%

% of households with gas as main heating fuel: 53%

Annual consumption: 86 billion cubic feet (Bcf) of natural gas.

Natural Gas Utility Customers:

There are approximately 259,000 natural gas customers in the state.

Natural Gas Pipelines Serving Rhode Island

2 natural gas pipelines transport gas:

- ***Algonquin Gas Transmission***, a subsidiary of Spectra Energy.
- ***Tennessee Gas Pipeline***, a subsidiary of Kinder Morgan.

LNG Storage in Rhode Island

There is utility liquefied natural gas (LNG) storage facilities in 3 communities.

Underground Storage

None.

Natural Gas Production

None.

VERMONT



Natural Gas Utility in Vermont

There is 1 natural gas utility:

Vermont Gas Systems

(dark green area on map)

Natural Gas Use in Vermont

Primary energy: 7%

Electric generation capacity: 0%

% of households with gas as main heating fuel: 17%

Annual consumption: 10.6 billion cubic feet (Bcf) of natural gas.

Natural Gas Utility Customers :

There are approximately 47,500 natural gas customers in the state.

Natural Gas Pipeline Supplying Vermont

1 natural gas pipeline transports gas to the VT border:

- ***TransCanada Pipelines.***

LNG Utility Storage in Vermont

None.

Underground Storage

None.

Natural Gas Production

None.

NORTHEAST STATES' ANNUAL NATURAL GAS CONSUMPTION BY SECTOR, 2014 (Bcf)

STATE	RESIDENTIAL	COMMERCIAL	INDUSTRIAL	ELECTRIC POWER	TOTAL *
CT	51	51	28	100	231
ME	2	9	24	24	59
MA	127	106	46	133	412
NH	8	9	8	31	57
NJ	248	202	61	245	757
NY	458	320	84	453	1,319
RI	20	13	8	45	86
VT	4	5	2	—	10.6

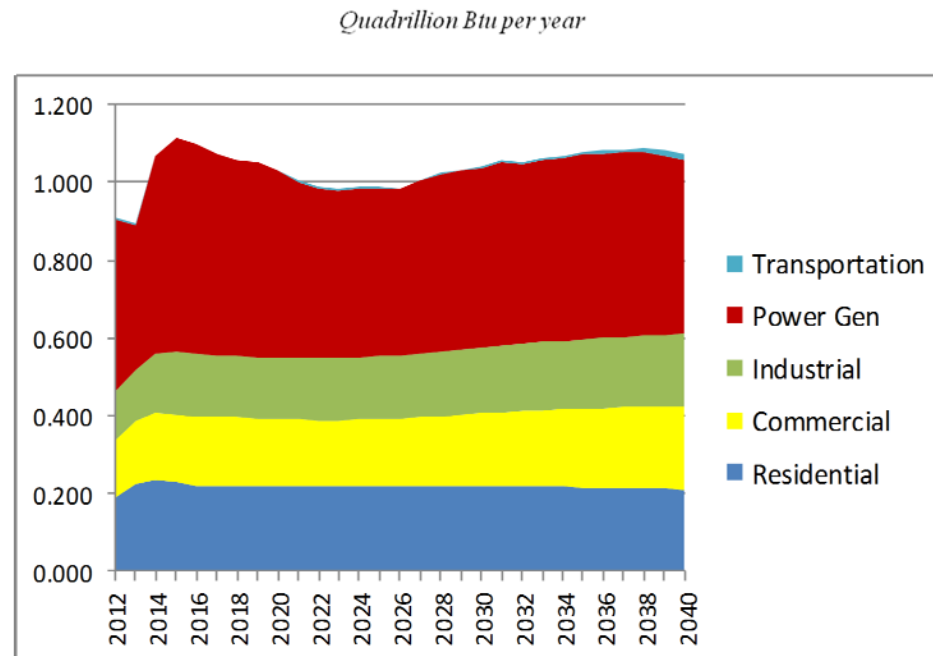
*Source: U.S. Energy Information Administration, "Natural Gas Annual 2014," released September 2015. Numbers are rounded off. Delivered energy consumption. * Vehicle fuel consumption not shown, which slightly increases total number for some states.*

PROJECTED NATURAL GAS MARKET GROWTH, NEW ENGLAND

U.S. EIA projects natural gas to grow at an annual rate of 0.7% in New England through 2040.

Projected sectoral growth rates:

Residential: -0.2%
Commercial: 1.0%
Industrial: 1.2%
Power Gen: 0.7%
Transportation (CNG & LNG): 8.6%



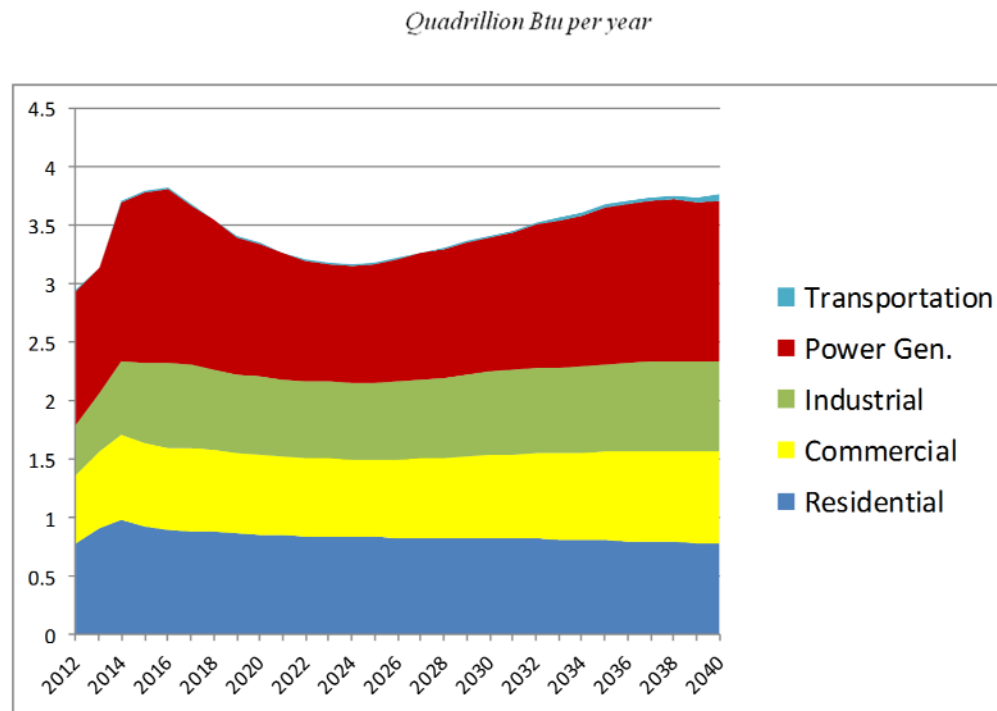
Source: U.S. Energy Information Administration, "2015 Annual Energy Outlook"

PROJECTED NATURAL GAS MARKET GROWTH, MID-ATLANTIC

U.S. EIA projects natural gas to grow at an annual rate of 0.7% in the Mid-Atlantic region (NJ, NJ, PA) through 2040.

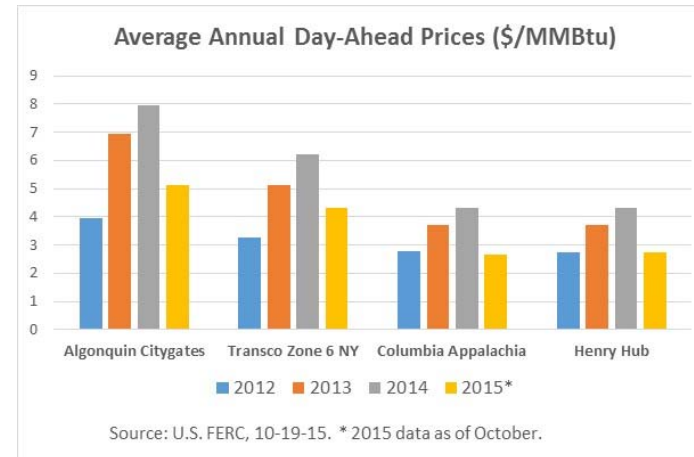
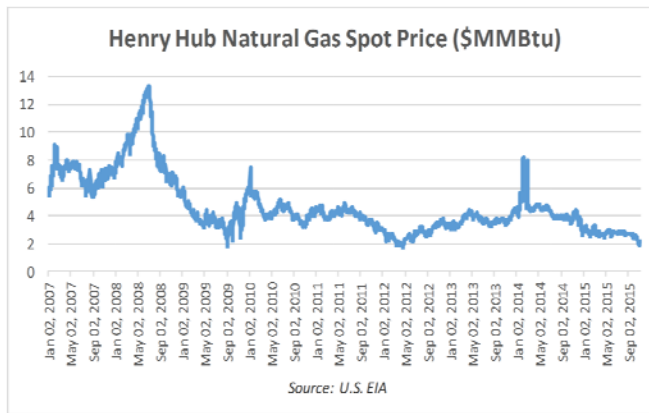
Projected sectoral growth rates:

Residential: -0.6%
Commercial: 0.7%
Industrial: 1.6%
Power Gen: 1%
Transportation (CNG & LNG): 8.9%



Source: U.S. Energy Information Administration, "2014 Annual Energy Outlook"

NATURAL GAS PRICE TRENDS



U.S. natural gas prices in 2014-15 have continued on a steady path. Commodity prices in 2015 have been relatively low, at around \$2.70/MMBtu for the Henry Hub annual average. U.S. EIA projects the 2016 Henry Hub price to be in the range of \$3.00. The Northeast market remains higher-priced than the national average, particularly in New England, reflecting infrastructure constraints. The entire Northeast region experienced considerable spot price volatility in the “polar vortex” winter of 2013-14, and again in the winter of 2014-15, although the heights were less extreme. Additional pipeline capacity into the region would help to alleviate constraints and reduce the regional price volatility and basis differential. The New England Governors' ongoing initiative to increase energy infrastructure investments - both natural gas and electric - reflects concerns over energy reliability and economic impacts.

The region's proximity to abundant shale gas resources remains however a positive factor. As the New York State Energy Planning Board observed in its June 2015 “New York State Energy Plan”: “Projected prices reflect continued industry success in tapping the nation's extensive shale gas resources. With its nearness to the Marcellus Shale basin, New York should participate in prices lower than those experienced from 2000 through 2010 and more similar to those of the last few years.”

RESIDENTIAL HEATING FUELS

STATE	2014%	1990 %	1980 %
Connecticut	Gas, 34 Oil, 43 Elec., 16	Gas, 26.3 Oil, 54.4 Elec., 15.1	Gas, 21.6 Oil, 63.8 Elec., 10.7
Maine	Gas, 7 Oil, 62 Wood, 14	Gas, 1.8 Oil, 69.5 Elec., 11.7	Gas, 1.5 Oil, 71.3 Elec., 10.6
Massachusetts	Gas, 51 Oil, 28 Elec., 15	Gas, 38 Oil, 44 Elec., 13.5	Gas, 32.8 Oil, 54 Elec., 9.6
New Hampshire	Gas, 19 Oil, 44 Propane, 15	Gas, 15.2 Oil, 55.8 Elec., 12.4	Gas, 11.8 Oil, 59.8 Elec., 13.4
New Jersey	Gas, 75 Oil, 10 Elec., 12	Gas, 57.5 Oil, 29.2 Elec., 10	Gas, 44.2 Oil, 46 Elec., 7.9
New York	Gas, 57 Oil, 24 Elec., 11	Gas, 45.7 Oil, 39.6 Elec., 8.5	Gas, 39.3 Oil, 51.9 Elec., 5.1
Rhode Island	Gas, 53 Oil, 32 Elec., 10	Gas, 40.7 Oil, 47 Elec., 7.9	Gas, 32.3 Oil, 57.2 Elec., 6.9
Vermont	Gas, 17 Oil, 45 Wood, 17 Propane, 15%	Gas, 8 Oil, 54.3 Elec., 9.1	Gas, 6 Oil, 61 Elec., 10.1

Natural gas continues to make inroads in the residential heating market in the region. This table illustrates the leading house heating fuels, by percentage, for the years 1980, 1990 and 2014.

For the 8 state region, natural gas in 2014 represented 54% of home heating, compared to 26% for heating oil.

According to the most recent data, natural gas represented 57% of the home heating market in New York state, and three-fourths of the home heating market in New Jersey.

In New England, gas's share is 38.5%. Heating oil is second in that sub-regional heating market, at 37.2%. Electricity is 12.6%.

Other fuels are wood and propane, of particular note in northern New England.

Source: U.S. Census Bureau, "Profile of Selected Housing Characteristics." Data is 2014, 1-year estimates.

INCREASING ACCESS TO NATURAL GAS

The region's natural gas utilities report continued service requests for new customers, as well as for conversions from other heating fuels. At the same time, several states in the region are exploring policy and regulatory options to increase access for citizens and businesses to gain access to natural gas.

Vermont: Addison Natural Gas Project under construction, to extend Vermont Gas distribution system to Middlebury by 2016.

New Hampshire: NH PUC assessing electricity prices in the state and connection to natural gas availability. Expansion proposed for southwestern NH.

Maine: Maine Legislature enacted Energy Bill in June 2013 that includes provision for State purchase of gas transmission capacity to “facilitate energy cost reductions” – up to 200 million feet of gas per day. PUC continues its investigation as of Nov. 2015.

New York: In Nov. 2012, State Department of Public Service opened a proceeding on gas expansion in the State. NYS Dept. of Health announced in Nov. 2014 that hydraulic fracturing should not be permitted in New York; conventional drilling can continue.

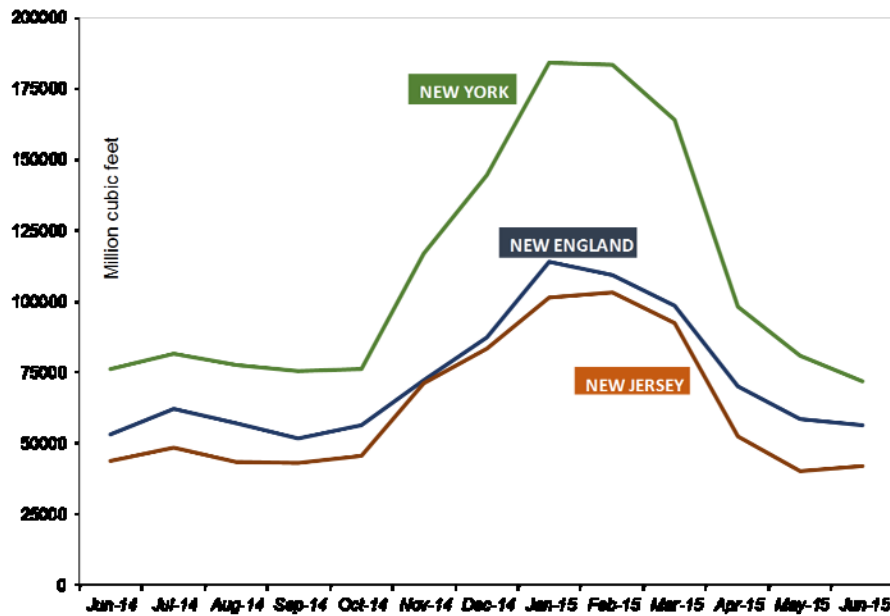
Connecticut: Legislature passed Public Act 15-107, An Act Concerning Affordable and Reliable Energy, in June 2015. It authorizes state DEEP to procure a range of long-term resources, including natural gas, energy efficiency, renewable energy, large-scale hydropower, and energy storage.

Massachusetts: In June 2014, Legislature unanimously passed natural gas legislation that included provision on expansion of gas distribution service. State energy agency released study in Jan. 2015 citing need for pipeline expansion to meet power sector demand. DPU assessing possible electric utility investment in pipeline capacity.

New Jersey: “NJ Strong” energy investments continue. “Draft 2015 State Energy Master Plan” notes that “expansion of the State’s gas distribution companies’ (GDCs) intrastate pipeline capacity and the capacity of the interstate pipelines serving the state provides an opportunity for the State to take advantage of relatively low priced and abundant nearby natural gas supplies.”

Rhode Island: Working with other New England states on plans to increase access to “clean energy” - including imported hydro—and to increasing gas pipeline capacity to relieve high electric costs.

NEW ENGLAND / NEW JERSEY / NEW YORK MONTHLY LOAD CURVE

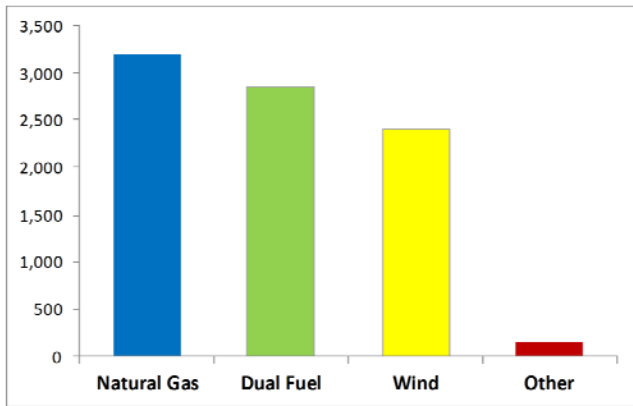


Source: U.S. Energy Information Administration, "Natural Gas Monthly"

This graph displays the monthly variations in gas consumption in New England, New Jersey and New York, for the illustrative period of June 2014 through June 2015. As can be seen, all three regions are winter-peaking systems. The region's utilities set new peaks during the recent winter in Jan-Feb. 2015. The New England gas utilities recorded a new sendout record on Feb. 15, 2015; two New Jersey utilities also had new sendout records on that same date. Con Edison had its top January monthly sendout in 2015. It was the coldest February in New York City since 1934, and the coldest February on record in such cities as Buffalo, Syracuse, Binghamton, Portland and Hartford.

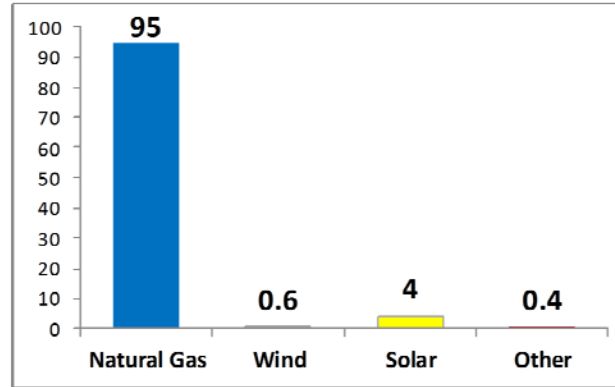
PROJECTED NATURAL GAS ADDITIONS IN REGIONAL ELECTRIC GENERATION SECTOR

PROPOSED GENERATOR ADDITIONS, NEW YORK, Megawatts (Source: NY ISO, "Power Trends 2015")

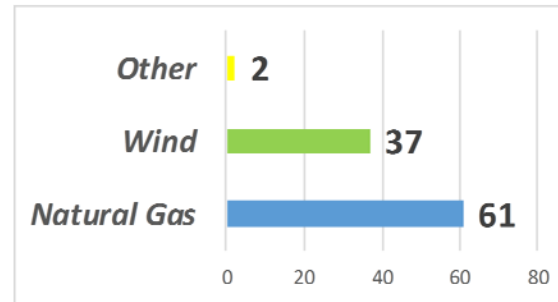


Natural gas has been an increasingly significant fuel in the Northeast electric power system. The region's electric grid operators, as shown in these graphics, report that natural gas remains among the leading choices for proposed new power plants. Renewable energy, imported hydro from Canada, and efficiency (not portrayed) are the other leading projected future power sources at this time.

PROPOSED GENERATOR ADDITIONS, NEW JERSEY, Percentage (Source: PJM RTEP 2014 Generator Queue, released 3-15)



PROPOSED GENERATOR ADDITIONS, NEW ENGLAND, Percentage of nameplate capacity (Source: ISO-NE Generator Queue, as of 10-15)



V.

TECHNOLOGY & ENVIRONMENTAL ISSUES

New technologies and environmental issues have been key drivers in shaping the regional gas market in recent years.

Among the areas addressed are:

- *Natural gas vehicles*
- *Power generation technologies*
- *Efficiency investments*
- *Environmental issues*
- *RD&D advances.*

NATURAL GAS VEHICLES

Natural gas fueled vehicles (also known as NGVs) have shown steady growth in recent years nationally and regionally. CNG/LNG vehicles represent 11% of all alternatively-fueled vehicles on the road in the U.S. These vehicles provide environmental benefits, reliability, cost-effectiveness, and are sourced from domestic supplies. Natural gas fuels about 20% of all transit buses in the U.S., and is a leading fuel for new trash hauler trucks.

The U.S. Department of Energy's alternative fuel vehicle website notes that natural gas burns cleaner than conventional gasoline or diesel due to its lower carbon content.

The availability of public fueling stations remains a challenge. According to the U.S. Department of Energy's Alternative Fuels Data Center, New York State has 38 public compressed natural gas (CNG) fueling stations, New Jersey has 11, and New England has 25. Nationally, there are nearly 900 CNG fueling stations in the U.S. Efforts are underway to increase the number of publicly available stations. Pennsylvania is creating a CNG fueling network along its state turnpike.

The private sector is at the same time establishing its own network for private fleets, from delivery vans to trucks. Companies with specific daily travel routes are finding it makes sense to use CNG or LNG, depending on weight and distance.



CNG AND LNG FOR OFF-SYSTEM SUPPLY

Areas not currently served by pipeline (or distribution) infrastructure are looking at ways to gain access to the fuel—and increasingly opting for portable delivery systems, often referred to as a “virtual pipeline.”

In this process, CNG or LNG can be delivered via truck to serve institutional or industrial sites. The gas is transported via a trailer that also can serve to offload the gas into the facility.

This application is proving especially popular in areas of New England, New York and Eastern Canada where natural gas pipeline infrastructure has yet to reach. The new fuel system can potentially be set up in a matter of several months.

The natural gas can be sourced from the local gas distribution utility, or via the interstate transmission company.

Among the companies that are providing this service within the Northeast region today are: Global CNG; Innovative Natural Gas LLC; NG Advantage; XNG / XPress Natural Gas; and Irving Oil.

Customers include paper mills, medical facilities, and farm/food processing.

Shown in the photo is a CNG fueling station in Pembroke, NH that opened in the summer of 2014.

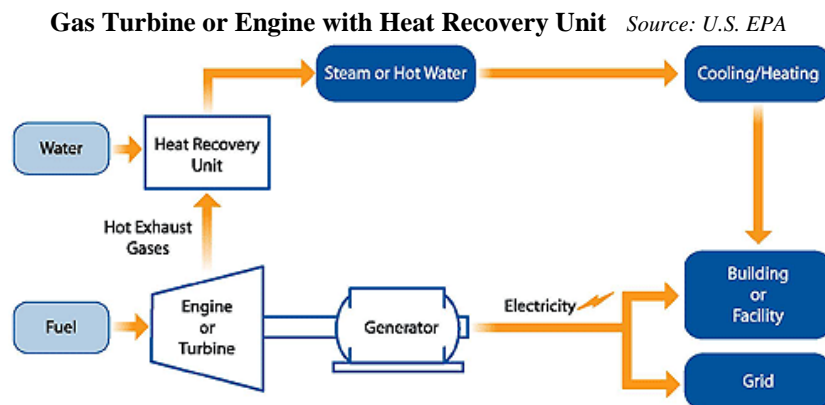


The station is owned and operated by Clean Energy. The station operates as a CNG refueling stations for vehicles, but also supplies CNG by truck—the white trucks in the photo are examples. NG Advantage is refueling its trucks at this station to serve markets in the area, including a paper mill in western NH and a major hospital center on the NH/VT border.

NEW TECHNOLOGY OPTIONS: CHP & FUEL CELLS

Natural gas is a key fuel input for energy systems that represent new technologies with opportunities for reduced air emissions, higher system efficiency, and greater reliability.

Combined heat and power (CHP), also known as cogeneration, is the simultaneous production of electricity and heat from a single fuel source – such as natural gas. **Natural gas fuels over 70% of existing CHP capacity in the U.S.** Total generating capacity in the U.S. from CHP in 2012 was 82 gigawatts, representing about 8% of total capacity. The U.S. EPA notes that “gas turbines produce a high quality (high temperature) thermal output suitable for most combined heat and power applications...There is a significant amount of gas turbine based CHP capacity operating in the United States located at industrial and institutional facilities. Much of this capacity is concentrated in large combined-cycle CHP systems that maximize power production for sale to the grid. However, a significant number of simple-cycle gas turbine based CHP systems are in operation at a variety of applications including oil recovery, chemicals, paper production, food processing, and universities.” CHP is environmentally beneficial. EPA reports that, “because of their relatively high efficiency and reliance on natural gas as the primary fuel, gas turbines emit substantially less carbon dioxide (CO₂) per kilowatt-hour (kWh) generated than any other fossil technology in general commercial use.”



Fuel Cells use “hydrogen as the fuel in an electrochemical process, similar to what occurs in a battery, that generates electricity” (EPA). The primary fuel source for the fuel cell is hydrogen, which can be obtained from natural gas and other fuels containing hydrocarbons. Fuel cells provide great advancements in efficiency and lower emissions. The National Academy of Science noted in an Oct. 2009 report that, looking ahead, “natural gas-powered fuel cells could become mainstream and generate significant amounts of electricity.”

NYSEARCH



NGA's NYSEARCH is recognized as one of the leading gas industry research and development organizations in the U.S., with pioneering programs that have received national and international recognition. NYSEARCH has recorded significant RD&D achievements - monitoring technology developments, identifying common needs, performing market research, evaluating potential technical solutions, and conducting product development.

Recent success stories include the development, testing and commercialization of the Remote Methane Leak Detector (RMLD), and the EXPLORER II robotics program.

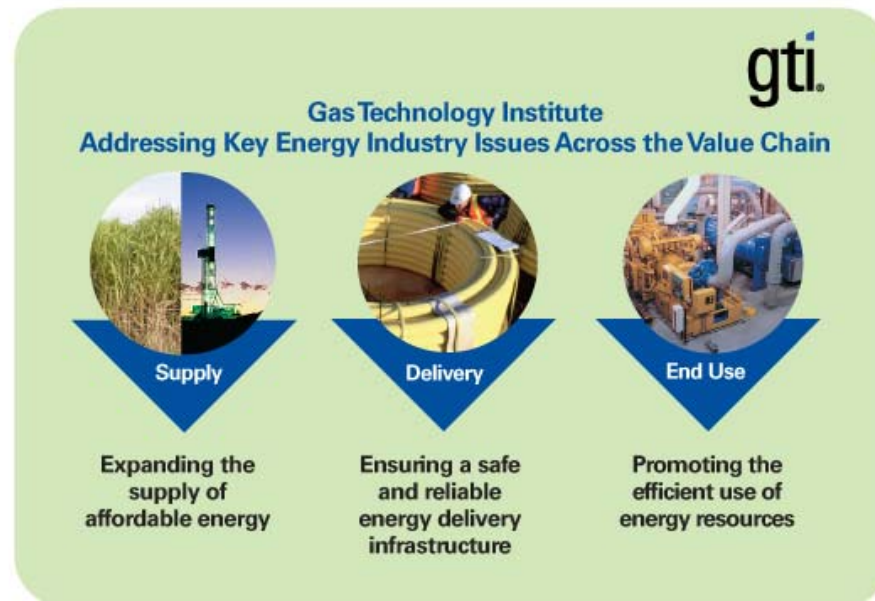
NYSEARCH presented a paper about its Gas Interchangeability Study & RANGE™ Model at the 2015 World Gas Conference in Paris.

For further information, visit the NYSEARCH web site at www.nysearch.org.

GTI TECHNOLOGY OUTREACH

NGA over the last two decades has maintained a valuable working partnership with GTI - the Gas Technology Institute. GTI's objectives are to "expand the supply of affordable natural gas and renewable energy; ensure a safe and reliable energy infrastructure; promote the clean and efficient use of energy resources; and reduce carbon emissions to the environment." Its web site is: www.gastechnology.org/

Some of GTI's scope areas are outlined below.



ADDRESSING CARBON EMISSIONS

Natural gas is a contributor to greenhouse gas emissions, but is the cleanest of all fossil fuels, and as a result, natural gas is included as part of the solution to the climate change challenge. At the same time, utility companies are implementing efficiency programs to reduce usage and emissions. Furthermore, natural gas companies are striving to reduce their emissions of methane, which is a greenhouse gas. Companies at all levels of the natural gas production and transmission chain are working to reduce pipeline leaks, fugitive emissions, and impacts from venting.

One highly successful program has been the “Natural Gas STAR” program of the U.S. EPA. Now in its 22nd year, the program invites voluntary participation from industry segments to reduce methane emissions. Over 1,500 billion cubic feet (Bcf) of methane emissions have been reduced by participating companies. NGA and a number of LDCs also participate in this program.

EPA reports that “reducing methane emissions can result in environmental, economic, and operational benefits.”

Source: U.S. EIA, 10-15

State Energy-Related CO2 Emissions
(million metric tons carbon dioxide)

State	1990	2013	Percentage Change
CT	41	34	-15.9%
ME	19	16	-15.2%
MA	84	65	-21.9%
NH	15	14	-5.4%
NJ	110	105	-4.5%
NY	209	160	-23.2%
RI	9	10	12.4%
VT	6	6	1.8%
US	5,023	5,279	5.1%

ACCELERATING REPLACEMENT OF OLDER PIPE MATERIALS

**Miles of Distribution Main Considered
“Replacement Candidates” by Type**

State	Bare Steel	Cast / Wrought Iron	Percentage of Total Main %
CT	165	1,381	19.6%
ME	1	48	4.4%
MA	1,638	3,433	23.5%
NH	22	119	7.4%
NJ	1,444	4,788	18.1%
NY	6,353	4,086	21.5%
RI	296	806	34.6%
VT	--	--	0.0%

2014 data, released 2015 by PHMSA.

*Accelerated repair and replacement of more “leak-prone” natural gas distribution system components is an issue receiving growing attention. The Pipeline and Hazardous Materials Safety Administration (PHMSA) of the U.S. Department of Transportation is urging action on repairing older pipe systems, which are considered more vulnerable to potential leaks. Accelerating repair and replacement would meet safety, environmental and efficiency goals. In July 2013, NARUC, the national state regulatory association, adopted a resolution encouraging “regulators and industry to consider sensible programs aimed at **replacing the most vulnerable pipelines as quickly as possible along with the adoption of rate recovery mechanisms** that reflect the financial realities of the particular utility in question.” Utilities in the Northeast are working to accelerate this replacement process, in concert with efforts to reduce emissions and extend the systems to meet market demand. As one example, in June 2014 the Massachusetts Legislature unanimously enacted legislation addressing “natural gas leaks” and facilitating utility accelerated replacement.*

REDUCING METHANE EMISSIONS IN NATURAL GAS SYSTEMS

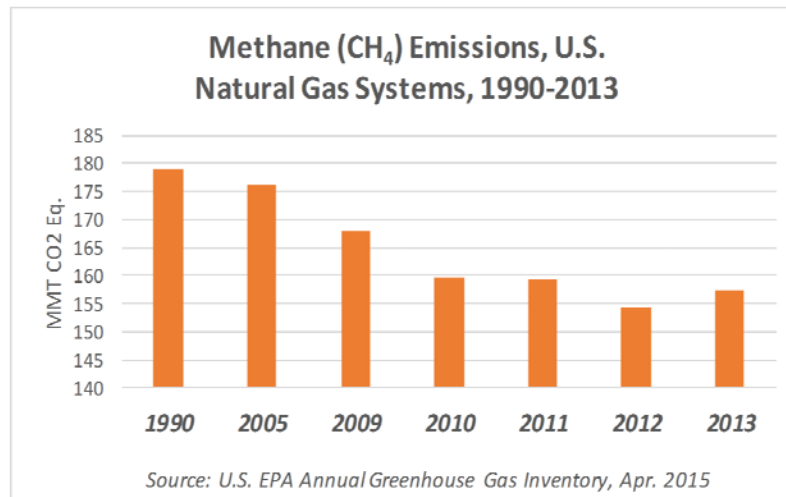
Natural gas systems are a leading contributor to CH₄ or methane emissions in the U.S., along with agriculture, landfills and coal mining. But methane emissions from natural gas have been trending lower overall in the last decade.

CH₄ emissions from natural gas systems declined by 12% from 1990 to 2013, according to the U.S. EPA's 2013 Greenhouse Gas Inventory, released in April 2015.

The decline is due to the following, notes EPA: "The decrease in CH₄ emissions is largely due to the decrease in emissions from production and distribution...The decrease in distribution emissions is due to a decrease in unprotected steel and cast iron pipelines and their replacement with plastic pipelines." [EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2013, page ES-14]

In August 2015, the Obama Administration announced proposed standards to reduce emissions of greenhouse gases (GHG) and volatile organic compounds (VOC) from the oil and natural gas industry, including finding and repairing leaks.

Reducing methane emissions further, through infrastructure replacement, new technology applications, and best practices, at all stages of the production and delivery process, is an industry priority.



ACHIEVING EMISSIONS REDUCTIONS IN THE POWER SECTOR

The electric utility sector in the Northeast has achieved major reductions in several air emission areas in recent years—in part thanks to new, more efficient power sources, from natural gas to renewables.

In New York State, from 2000 to 2014, NY ISO reports that emissions rates from the power sector dropped by 39% for CO₂, 78% for NO_x, and 94% for SO₂.

ISO-NE reports that from 2001 to 2013, total emissions from power plants in New England dropped by 91% for sulfur dioxide (SO₂), 66% for nitrogen oxides (NO_x), and 23% for CO₂.

For New Jersey, CO₂ emissions from fossil fuel plants declined by 37% over the period 2001-2013, according to the draft 2015 state energy master plan.

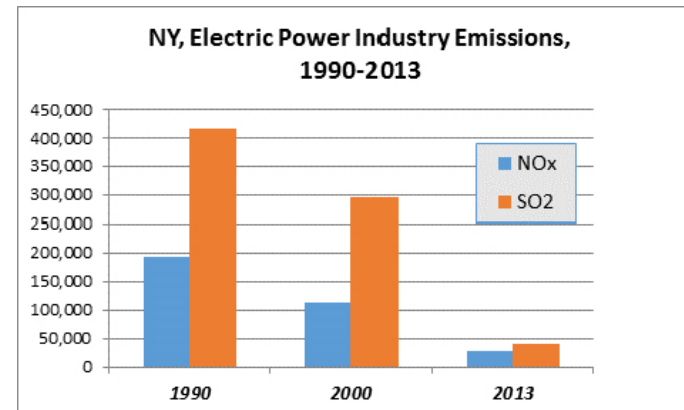
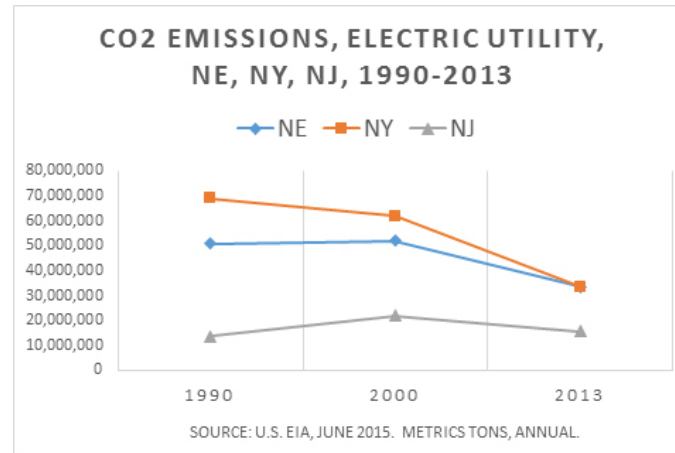
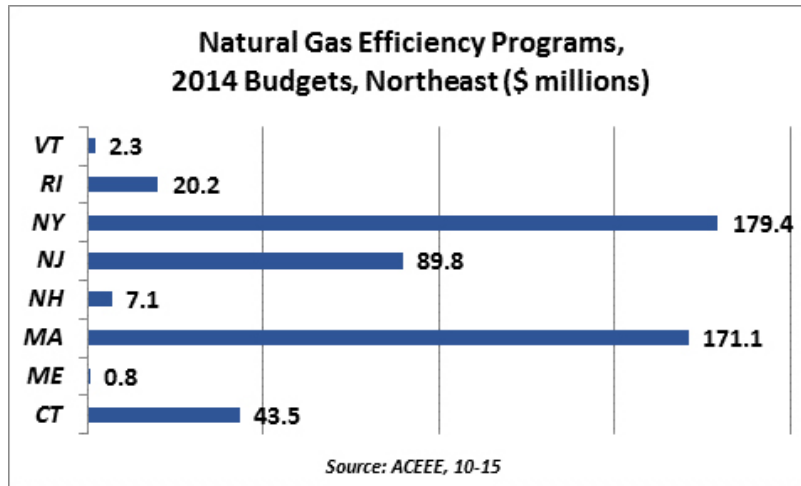


Chart source: U.S. EIA

NATURAL GAS EFFICIENCY



Source: ACEEE, “2014 State Energy Efficiency Scorecard”, released October 2015

Natural gas efficiency programs are a central part of the evolving national and regional natural gas supply/demand portfolio. Efficiency remains a resource of immense opportunity. The Northeast states already are national leaders in their per capita energy efficiency, and the utilities in the region, electric and gas, have been active for years in efficiency programs.

The 2015 annual ACEEE Scorecard for Energy Efficiency, which looks at both electric and natural gas programs, found that five Northeast states were in the top 10 in the U.S.: MA, RI, VT, CT, and NY.

In 2014, \$1.4 billion was invested in natural gas efficiency programs nationwide, according to the ACEEE. Of that, over one-third of the national total (\$514 million) was invested in the eight Northeast states (CT, ME, MA, NH, NJ, NY, RI and VT). These program investments - and energy savings - will grow even further in coming years.

**NGA's MEMBER LOCAL
DISTRIBUTION COMPANIES**
(as of November 2015)

Bangor Gas Company
21 Main Street
Bangor, ME 04402
(207) 941-9595
www.bangorgas.com

Bath Electric, Gas & Water System
7-11 South Avenue
Bath, NY 14810
(607) 776-3072

The Berkshire Gas Company
115 Cheshire Road, P.O. Box 138
Pittsfield, MA 01202
(413) 442-1511
www.berkshiregas.com

Blackstone Gas Company
61 Main Street, P.O. Box 162
Blackstone, MA 01504
(508) 883-9516
www.blackstonegas.com

Central Hudson Gas & Electric Corp.
284 South Avenue
Poughkeepsie, NY 12601
(845) 452-2000
www.cenhud.com

Columbia Gas of Massachusetts
4 Technology Drive, Suite 250
Westborough, MA 01581
(508) 836-7000
www.columbiagasma.com

Connecticut Natural Gas Corp.
77 Hartland Street, 4th floor
East Hartford, CT 06108
(860) 727-3000
www.cngcorp.com

Consolidated Edison Co. of NY, Inc.
4 Irving Place
New York, NY 10003
(212) 460-4600
www.coned.com

Corning Natural Gas Corp.
330 West William Street
Corning, NY 14830
(607) 936-3755
www.corninggas.com

Enbridge St. Lawrence Gas Company
33 Stearns Street
Massena, NY 13662
(315) 769-3516
www.stlawrencegas.com

NGA's LDC MEMBERS *(as of 11-15)*

Eversource Energy

One NSTAR Way
Westwood, MA 02090
(800) 592-2000

107 Selden Street
Berlin, CT 06037
(800) 286-5000
www.eversource.com

Fillmore Gas Company, Inc.

10577 New York 19
Fillmore, NY 14735
(585) 567-2272

Hamilton Municipal Gas

3 East Broad Street, PO Box 119
Hamilton, NY 13346-0119
(315) 824-1111
www.hamilton-ny.gov

Holyoke Gas & Electric Dept.

99 Suffolk Street
Holyoke, MA 01040
(413) 536-9300
www.hged.com

Liberty Utilities MA

PO Box 911
Fall River, MA 02722
(508) 324-7811
<http://www.libertyutilities.com/ma/>

Liberty Utilities NH

15 Buttrick Road
Londonderry, NH 03053
(800) 833-4200
www.libertyutilities.com/east/gas

Maine Natural Gas

PO Box 99
Brunswick, ME 04011
(207) 729-0420
www.mainenaturalgas.com

Middleborough Gas & Electric Dept.

32 South Main Street
Middleborough, MA 02346
(508) 947-1371
www.mgandonline.com

National Fuel Gas Distribution Co.

6363 Main Street
Williamsville, NY 14221
(716) 857-7000
www.natfuel.com

National Grid

One MetroTech Center
Brooklyn, NY 11201
(718) 403-2000
www.nationalgrid.com

40 Sylvan Road
Waltham, MA 02451
(781) 466-5000
www.nationalgrid.com

NGA's LDC MEMBERS *(as of 11-15)*

New Jersey Natural Gas Co.

1415 Wyckoff Road
Wall, NJ 07719
(732) 938-7977
www.njng.com

New York State Electric & Gas

4500 Vestal Parkway East
Binghamton, NY 13902
(607) 762-7200
www.nyseg.com

Norwich Public Utilities

173 North Main Street
Norwich, CT 06360
(860) 887-2555
www.norwichpublicutilities.com

Orange & Rockland Utilities, Inc.

One Blue Hill Plaza
Pearl River, NY 10965
(914) 352-6000
www.oru.com

Public Service Electric & Gas Co.

80 Park Plaza
Newark, NJ 07101
(973) 430-7000
www.pseg.com

Rochester Gas & Electric Corp.

89 East Avenue
Rochester, NY 14649
(585) 546-2700
www.rge.com

The Southern Connecticut Gas Co.

855 Main Street, P.O. Box 1540
Bridgeport, CT 06604
(203) 382-8111
www.soconngas.com

South Jersey Gas

One South Jersey Plaza
Folsom, New Jersey 08037
(609) 561-9000
www.southjerseygas.com

Summit Natural Gas of Maine

442 Civic Center Drive, Suite 100
Augusta, ME 04330
(207) 621-8000
www.summitnaturalgasmaine.com

Unitil

6 Liberty Lane West
Hampton, NH 03842
(888) 886-4845
www.unitil.com

NGA's LDC MEMBERS *(as of 11-15)*

Valley Energy, Inc.
523 S. Keystone Avenue
Sayre, PA 18840
(570) 888-9664
www.valley-energy.com

Vermont Gas Systems, Inc.
P.O. Box 467
S. Burlington, VT 05402
(802) 863-4511
www.vermontgas.com

**Wakefield Municipal Gas & Light
Department**
9 Albion Street, P.O. Box 190
Wakefield, MA 01880
(781) 246-6363
www.wmgld.com

Westfield Gas & Elect. Light Dept.
100 Elm Street
Westfield, MA 01085
(413) 572-0100
www.wgeld.org

TRANSMISSION COMPANIES AND LNG MEMBERS *(as of 11-15)*

Algonquin Gas Transmission Company

890 Winter Street, Suite 300
Waltham, Massachusetts 02451
(617) 254-4050
www.spectraenergy.com

Distrigas of Massachusetts Corp.

(part of GDF SUEZ)
20 City Square, 3rd Floor
Charlestown, Massachusetts 02129
(617) 886-8300
www.domac.com

Granite State Gas Transmission, Inc.

1075 Forest Avenue
Portland, Maine 04104
(207) 797-8002
www.unitil.com

Iroquois Gas Transmission System

One Corporate Drive, Suite 600
Shelton, Connecticut 06484
(203) 925-7200
www.iroquois.com

Maritimes & Northeast Pipeline

890 Winter Street, Suite 300
Waltham, Massachusetts 02451
(617) 254-4050
www.mnp-usa.com

Millennium Pipeline

One Blue Hill Plaza, 7th floor
Pearl River, NY 10965
(800).572-7515
www.millenniumpipeline.com

North Country Gas Pipeline Corp.

99 Weed Street, PO Box 2985
Plattsburgh, New York 12901
(518) 563-1072

Portland Natural Gas Transmission System (PNGTS)

One Harbour Place, Suite 375
Portsmouth, NH 03801
(603) 559-5500
www.pngts.com

Repsol Energy North America

2001 Timberloch Place, Suite 3000
The Woodlands, Texas 77380
(281) 297-1128
www.repsolenergy.com

Talisman Energy USA

337 Daniel Zenker Drive
Horseheads, NY 14845
(607) 562-4000
www.talisman-energy.com

Tennessee Gas Pipeline Company

1001 Louisiana
Houston, TX 77002
(713) 420-2600
www.kindermorgan.com

VII. ABOUT NGA

The Northeast Gas Association (NGA) is a regional trade association that focuses on education and training, operations, planning, technology research and development, 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 manufacturers and suppliers to the industry. These member 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).

Mission Statement

The Northeast Gas Association's mission is to promote and enhance the safe, reliable, efficient, and environmentally responsible delivery of natural gas to customers in the region, and to advocate for the industry from production to delivery.

Its web site is www.northeastgas.org/

For further information, contact NGA at:

Northeast Gas Association
75 Second Avenue, Suite 510
Needham, Massachusetts 02494-2859
Tel. 781-455-6800
Fax 781-455-6828

Its NYSEARCH office is located at:

20 Waterview Boulevard, 4th floor
Parsippany, NJ 07054
Tel. 973-265-1900
www.nysearch.org

DATA SOURCES

The data sources used in the Guide are referenced on each page. NGA is grateful to the many agencies and individuals from a variety of sectors who provided information and guidance in the preparation of this report.

Documents of particular interest include the following:

American Gas Association (www.aga.org)
- “Gas Facts 2014”

New York State Energy Research and Development Authority (NYSERDA)
(www.nyserda.org)
- “Patterns and Trends - New York State Energy Profiles: 1999-2013”

U.S. Department of Energy, Office of Fossil Energy, Office of Natural Gas & Petroleum Import and Export Activities
- “Natural Gas Imports and Exports”

U.S. Energy Information Administration (www.eia.gov)
- “Annual Energy Outlook 2015”
- “Natural Gas Annual 2014”
- “Natural Gas Monthly”
- “State Energy Data Report 2013”

National Energy Board of Canada
- “Statistics: Natural Gas Exports and Imports”

NGA will continue during the year to provide up-to-date summaries of regional gas industry developments, and will make that information available on its web site at:
www.northeastgas.org.



75 Second Avenue, Suite 510
Needham, Massachusetts
02494-2859
tel. 781-455-6800

20 Waterview Boulevard
Parsippany, New Jersey
07054
tel. 973-265-1900

www.northeastgas.org