March 22, 2021

# New England Interstate Natural Gas Overview

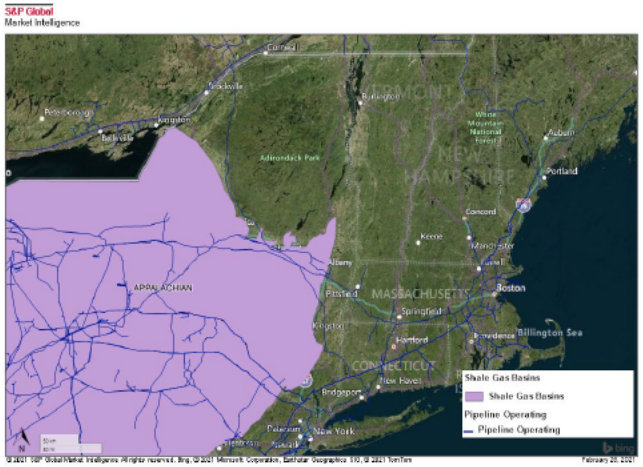
## Briefing for Rhode Island Senate Commission

**This presentation is a product of the staff of the Federal Energy Regulatory Commission. Any views expressed herein are those of staff and do not necessarily reflect the views of the Commission, its Chairman, or any individual Commissioner.**

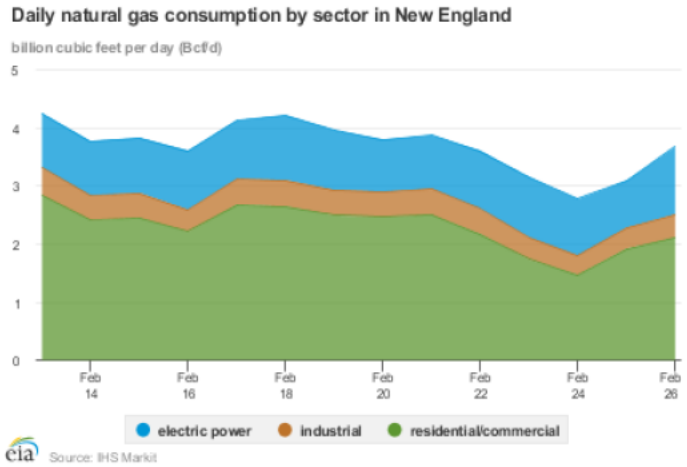
# Agenda

## Federal Regulation

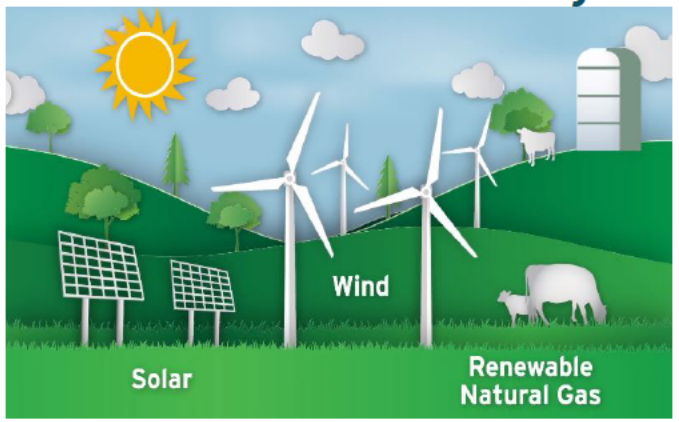

## Infrastructure and its Implications




## Supply and Demand




## Natural Gas and the Transition to a Low-Carbon Economy




## Key Takeaways

# New England Interstate Natural Gas Overview

## Federal Regulation

# Regulation of Interstate Natural Gas Pipelines

U.S. Department of Transportation
**Pipeline and Hazardous Materials Safety Administration**

PHMSA has the primary responsibility for the promulgation and enforcement of federal pipeline safety standards.

To promote compliance with the safety standards, PHMSA conducts inspections of management systems, procedures, and processes, conducts physical inspections of facilities, investigates safety incidents, and maintains a dialogue with pipeline operators.

FERC reviews applications for construction and operation of interstate natural gas pipelines under the authority of Section 7 of the Natural Gas Act (NGA).

Under Sections 4 and 5 of the NGA, FERC is responsible for rate setting for interstate natural gas pipelines and for ensuring "just and reasonable rates."

FERC is responsible for authorizing the siting and construction of onshore and near-shore LNG import or export facilities under Section 3 of the NGA.

The Energy Policy Act of 2005 designates FERC as the "lead agency" for coordinating environmental review and compliance in pipeline certificate applications. Cooperating agencies for pipeline projects often include the Environmental Protection Agency, PHMSA, the Department of the Interior's Bureau of Land Management, Fish and Wildlife Service, and National Park Service, and the U.S. Army Corps of Engineers, among others.

# Section 7(c) of the Natural Gas Act

- The Commission is authorized to issue certificates of "public convenience and necessity" for "the construction or extension of any facilities ... for the transportation in interstate commerce of natural gas."
- FERC is the lead agency for National Environmental Policy Act compliance.
- Constructing a pipeline requires the company to undertake routing and site planning, environmental analysis and mitigation planning, and consultation with local communities.
  - FERC certificates contain many conditions. These conditions may specify, for example, when to construct, how to construct, what types of additional reporting will be necessary, and special treatment of some land uses.
  - Upon the award of a certificate of public convenience and necessity, the company receives the "right of eminent domain." A company will first attempt to negotiate an easement – the legal right to use a landowner's property for the purpose of building and/or operating natural gas pipeline facilities – with landowners, including compensation for use of the land. An easement gives the company the right to use the property, but the landowner retains the legal title or ownership of the land.
  - If the Commission approves a proposed project, but the company cannot reach an agreement with a landowner, the Natural Gas Act, enacted by Congress, gives the company authority to obtain the easement by the exercise of the right of eminent domain. In such circumstances, eminent domain proceedings are initiated by the company in the federal district or state courts, and the court determines just compensation to the landowner. FERC is not involved in eminent domain proceedings.

# Further Clarification Regarding Pipelines Initiating Construction While Rehearing is Pending

- In January 2021, FERC issued Order No. 871-A, seeking further comment on modifications last summer to its regulations under Natural Gas Act Sections 3 and 7 that prohibited initiating pipeline construction, pending timely filing of any rehearing request, or a rehearing order on the merits.
- Order No. 871-A inquires whether the Commission should
  - withhold authorizations to commence construction during pending rehearing requests; or
  - prohibit construction only if rehearing requests raise certain issues;
  - specify what issues would trigger the construction prohibition;
  - prohibit construction activities under both NGA Section 3 and Section 7;
  - establish a specified stage of the certification process at which the prohibition should terminate (g., 90 days from the filing of the rehearing request); and
  - modify its practices or procedures to address concerns regarding the exercise of eminent domain while rehearing requests are pending.

# Ratemaking Under the Natural Gas Act Sections 4 and 5

- Sections 4 and 5 of the NGA require that rates and charges for transportation or sale of natural gas shall be just and reasonable. Rates are generally set in accordance with one of two basic methodologies: cost-based or negotiated.
  - Cost-based rates are based on the cost of providing service, as established during a Section 4 rate case, plus a reasonable return on investment.
  - In 1996, FERC granted jurisdictional pipeline companies the option of charging negotiated rates. Under this program, pipelines and their customers are free to negotiate rates that vary from the cost-based rates. However, the pipeline companies must also offer a cost-based rate as recourse for customers preferring that pricing.
- Pipeline companies file their tariffs. Pipeline companies are also required to file an annual report called a "Form 2" providing FERC and customers with pipeline financial and operational information.

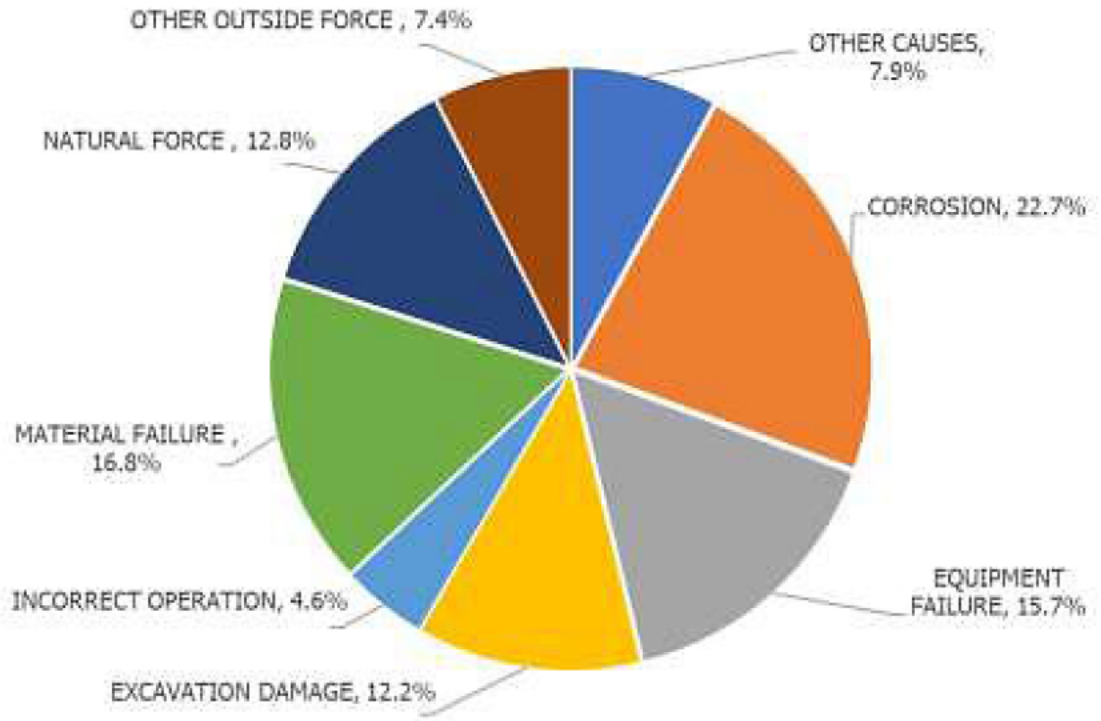
# Energy Policy Act (EPAct) 0f 2005

- Two legislative developments affect most significantly natural gas marketers.
  - One was the enactment of section 315 amending the NGA by adding a new section 4A authorizing FERC to prohibit market manipulation.
  - The other was the contemporaneous enactment of section 314 of EPAct amending the NGA to authorize civil penalties of up to $1 million dollars per violation per day. The penalties may be assessed by FERC for violation of its market-manipulation rules promulgated under NGA section 4A.
- EPAct also amended the NGA by adding a new section 23 authorizing the Commission to promote transparency by obtaining information relating to pricing, sales quantities, and transported volumes. Pursuant to this authority, the Commission issued Order No. 704 in 2007, requiring that market participants annually report the volume of their physical natural gas transactions through FERC Form No. 552.

# PHMSA Administers Pipeline Federal Safety Regulations

- Since the Pipeline Safety Act was passed in 1968, interstate pipeline operators have worked with PHMSA to research technologies, update regulatory mandates, and develop standards.
- All interstate pipeline companies must have in place Integrity Management Programs (IMP) designed to provide heightened attention to "high consequence areas" that could be affected in the event of a leak or failure.
- On October 1, 2019, PHMSA issued three final rules that became effective on July 1, 2020, and amended regulations applicable to gas transmission pipelines, and which addressed, in particular:
  - Reconfirmation of maximum allowable operating pressure (MAOP);
  - Modifications to integrity management regulations including addressing cyclic fatigue, manufacturing and construction defects, electric resistance welded pipe, and cracks; and
  - Assessment of pipelines outside of high consequence areas.

**Gas Transmission System Incidents by Threats, 2005-2018**



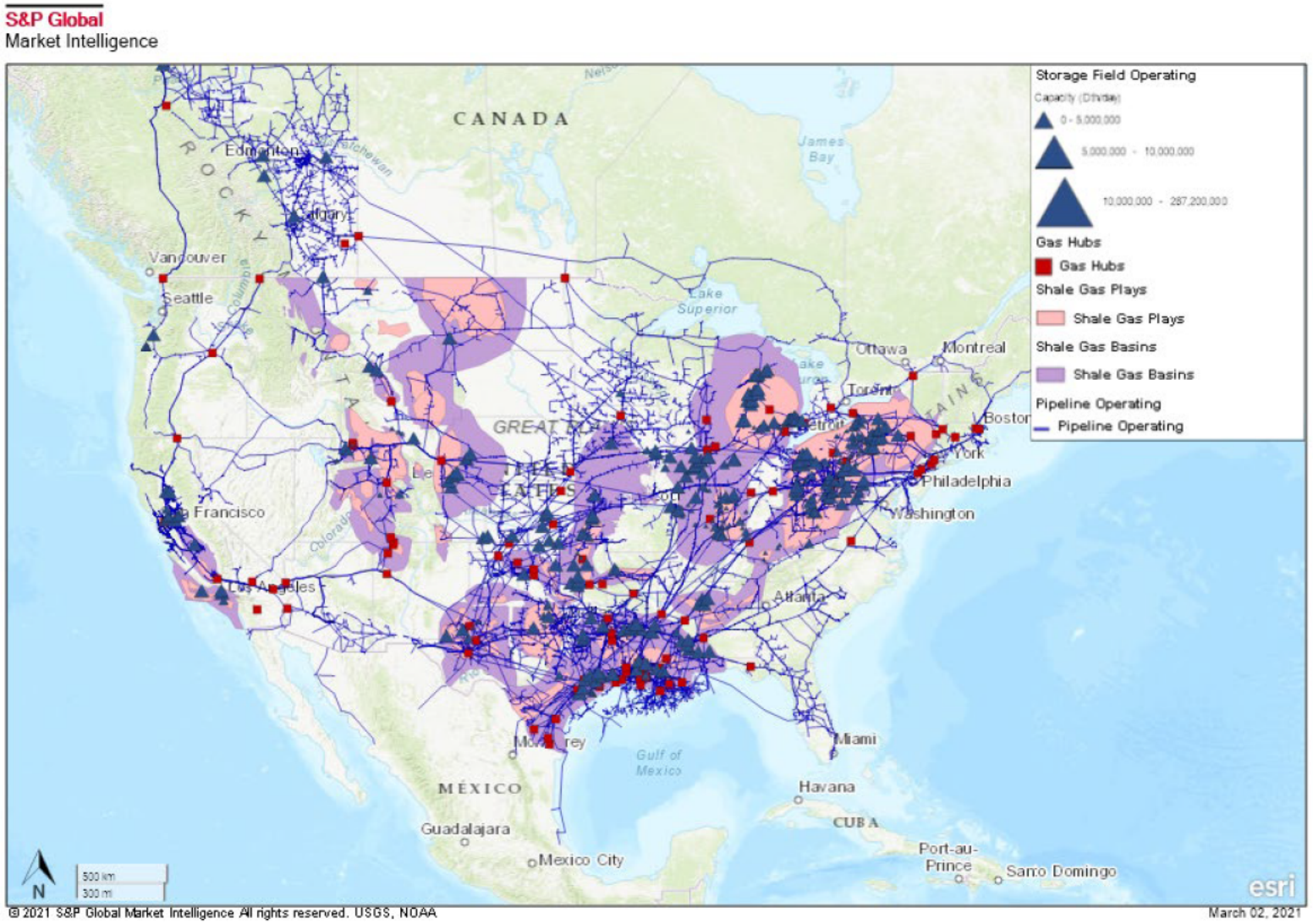

Source: Pipeline and Hazardous Materials Safety Administration

# New England Interstate Natural Gas Overview

## Infrastructure and its Implications

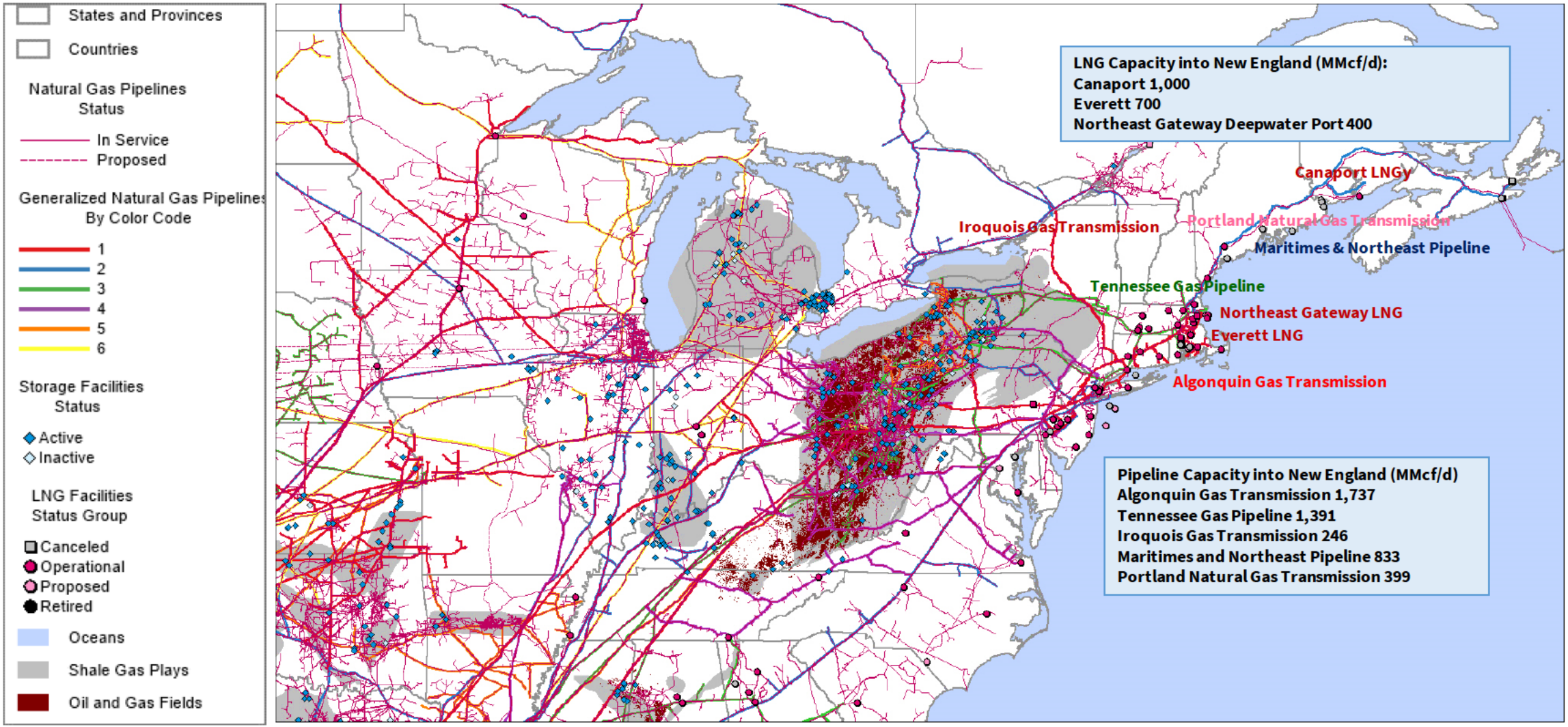
# North America Natural Gas Resources and Infrastructure

- The Lower 48 states have more than 300,000 miles of interstate and intrastate natural gas transmission pipelines in use. There are 379 active storage fields.
- Natural gas products can be traded at more than 120 locations.
- Notable supply areas are the Appalachian basin in primarily Ohio, Pennsylvania, and West Virginia, and the Permian Basin in West Texas.
- The gas industry has no equivalents to the electricity RTOs/ISOs. Pipelines generally operate independently of one another.




Source: S&P Global Market Intelligence

# New England Natural Gas Infrastructure




Sources: Velocity Suite and Energy Information Administration

# Index of Top Shippers for Pipelines Serving New England (Max Daily Dth)

| Algonquin Gas Transmission | | Iroquois Gas Transmission | | Maritimes and Northeast | | Tennessee Gas Pipeline | | Portland Natural Gas Transmission | |
|---|---|---|---|---|---|---|---|---|---|
| Kaiser Neg Lateral LLC | 800,000 | KeySpan Gas East Corporation | 319,760 | Repsol Energy North America Corporation | 730,000 | Mex Gas Supply, S.L. | 843,000 | Eversource Gas Company Of Massachusetts | 75,800 |
| Boston Gas Company | 674,245 | Consolidated Edison Company of New York, Inc. | 150,234 | Casco Bay Energy Company LLC | 105,000 | Antero Resources Corporation | 790,000 | Boston Gas Company | 57,068 |
| NSTAR Gas Company | 425,556 | NJR Energy Services Company | 115,468 | Essential Power Newington Energy, LLC | 90,000 | MC Global Gas Corporation | 650,000 | Irving Oil Terminals Inc. | 55,633 |
| Narragansett Electric Company | 248,705 | Louis Dreyfus Energy Services LP | 110,200 | Irving Oil Terminals Inc. | 65,196 | Chesapeake Energy Corporation | 536,200 | Northern Utilities, Inc. | 50,003 |
| Kleen Energy Systems, LLC | 232,000 | Yankee Gas Services Company | 101,023 | Bangor Gas Company, LLC | 27,000 | Equinor Natural Gas LLC | 526,700 | Narragansett Electric Company | 29,000 |
| Yankee Gas Services Company | 226,053 | Freepoint Commodities LLC | 85,100 | Heritage Gas Limited | 10,030 | Talisman (U.S.) Inc | 475,000 | New England NG Supply Limited | 16,500 |
| KeySpan Gas East Corporation | 196,000 | Shell Energy North America (US), L.P. | 82,850 | Maine Natural Gas | 6,500 | Boston Gas Company | 473,601 | Heritage Gas Limited | 10,000 |
| Eversource Gas Company Of Massachusetts | 194,059 | Brooklyn Union Gas Company | 80,936 | Exelon Generation Company, LLC | 3,000 | Equitable Energy, L.L.C. | 450,000 | Louis Dreyfus Energy Services LP | 10,000 |
| Lake Road Generating Company, LP | 186,335 | Direct Energy Business Marketing LLC | 78,000 | | | Tennessee Valley Authority | 445,000 | Enbridge Gas New Brunswick | 8,000 |
| Excelerate Energy Limited Partnership | 180,000 | Southern Connecticut Gas Company | 77,515 | | | Corpus Christi Liquefaction, LLC | 375,000 | Citadel Energy Marketing LLC | 7,500 |

Source: S&P Global Market Intelligence compilation of Federal Energy Regulatory Commission Form 549B - Index of Customers

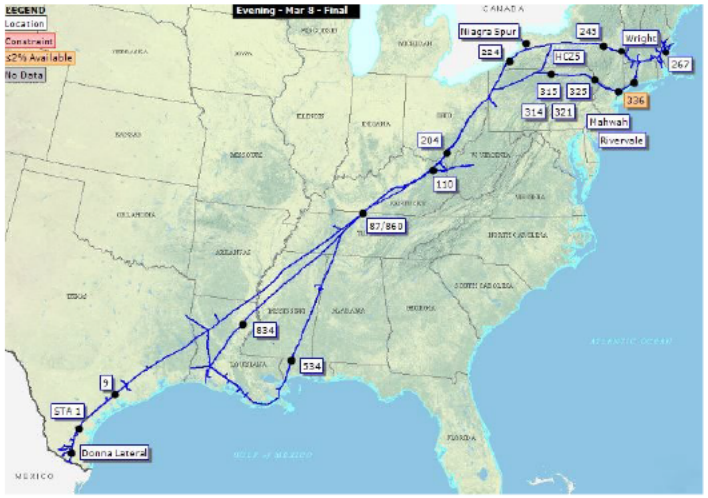
# Rhode Island is Primarily Supplied by Algonquin Gas Transmission and Tennessee Gas Pipeline

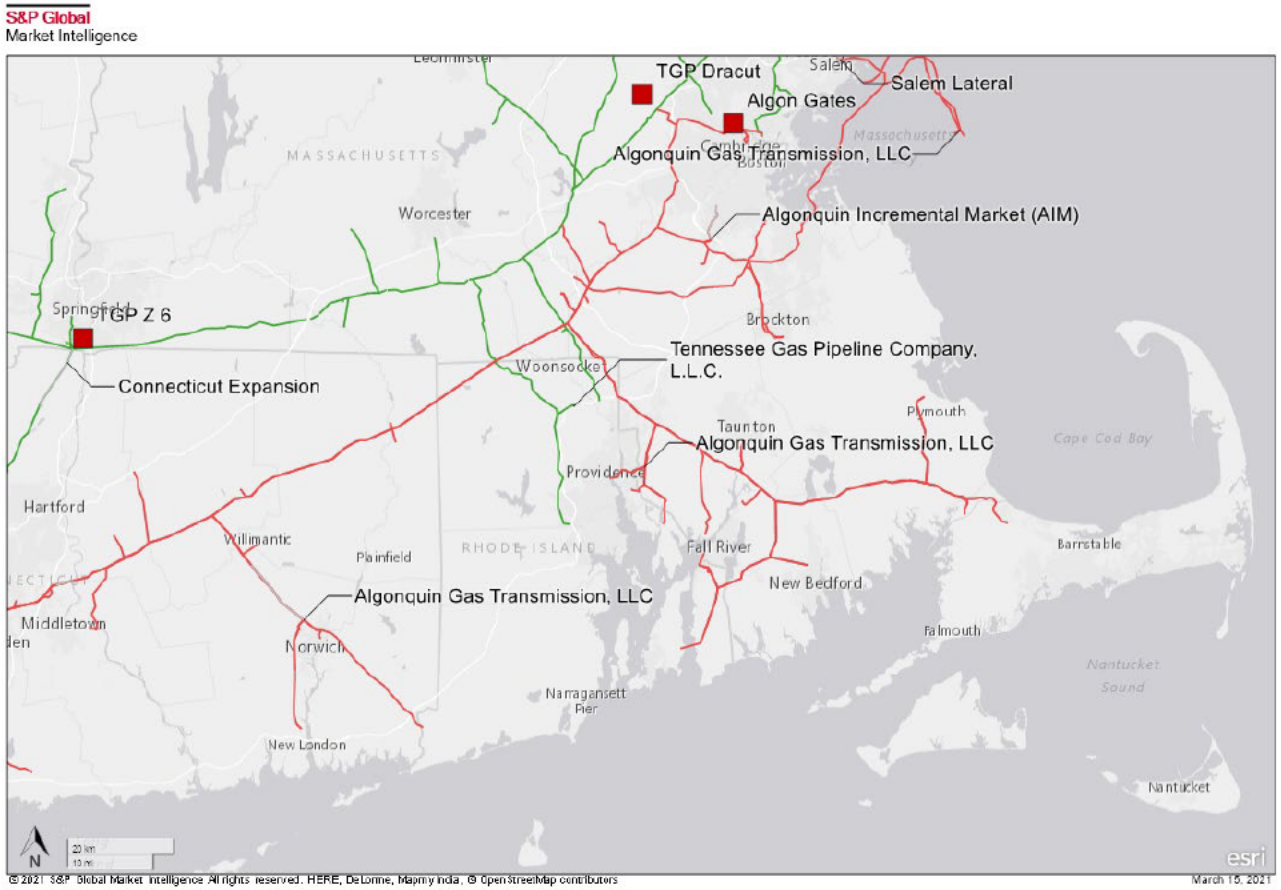
**Algonquin Gas Transmission**

- Location: New England, New York and New Jersey
- Length: 1,130 miles
- Capacity into Rhode Island: 275 MMcf/d
- Ownership: Enbridge Inc.


**Tennessee Gas Pipeline**

- Location: Louisiana, the Gulf of Mexico, South Texas, and the Northeast
- Length: 11,750 miles
- Capacity into Rhode Island: 173 MMcf/d
- Ownership: Kinder Morgan, Inc.



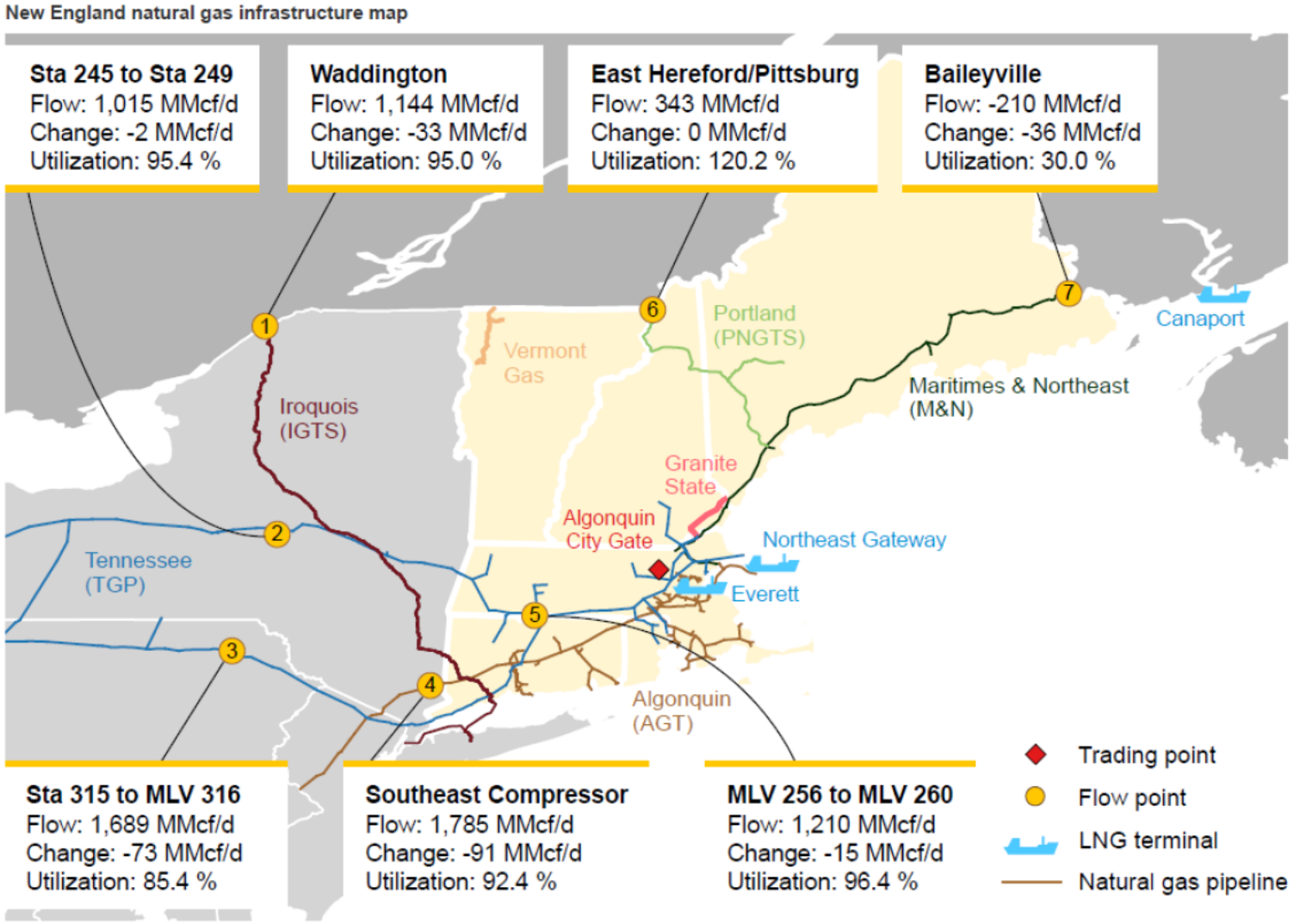




Sources: S&P Global Market Intelligence, Energy Information Administration, and informational postings for Algonquin Gas Transmission and Tennessee Gas Pipeline provided in compliance with requirements of the Federal Energy Regulatory Commission and the North American Energy Standards Board

# The New England Grid can Experience High Utilization

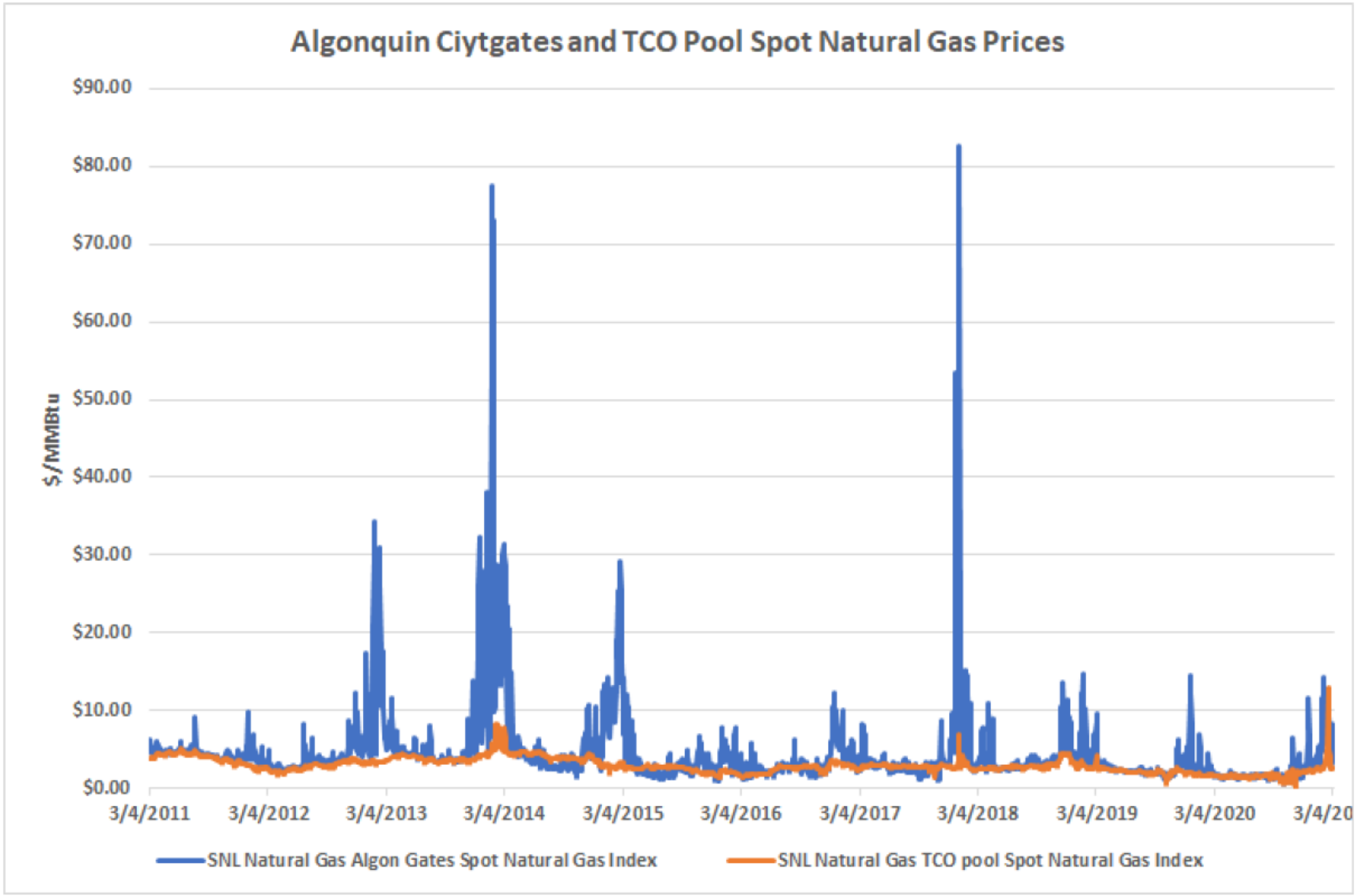
**February 11, 2021**:

- Temperatures in Boston were a high of 29 degrees and a low of 19 degrees.
- Weather conditions well above design day criteria; however, utilization exceeds 95% at several locations.




Sources: Energy Information Administration

# Limited Pipeline Capacity has led to Price Spikes




Source: S&P Global Market Intelligence

# Approved and Pending Major New England Pipeline Projects for 2020 and 2019

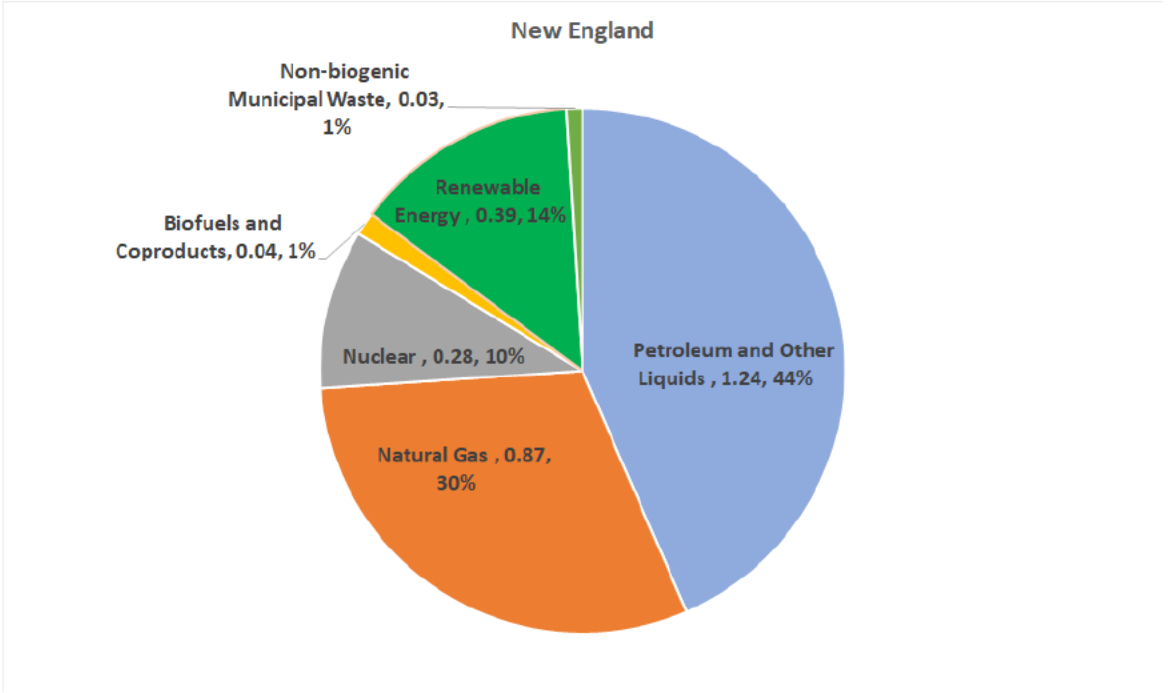
| Docket No. | Company/Project | Capacity (MMcf/d) | Miles of Pipe | Compression (HP) | States | Filing Date | Issued Date |
|---|---|---|---|---|---|---|---|
| CP20-16-000 | Portland Natural Gas Transmission System/Westbrook XPress Project Phases II and III | 131.20 | 0 | 15,900 | ME | 11/18/19 | 6/18/20 |
| CP20-48-000 | Iroquois Gas Transmission System, LP/Enhancement by Compression Project | 125.00 | 0 | 48,000 | CT, NY | 02/03/20 | Pending |
| CP19-07 | Tennessee Gas Pipeline Company, L.L.C., 261 Upgrade Projects | 72.40 | 2.10 | 4,418 | CT, MA | 10/19/18 | 12/19/19 |
| CP19-32-000 | Portland Natural Gas Transmission System, Westbrook XPress | 42.482 | 0 | No facility modifications or additions were required. | NH, ME | 12/21/18 | 07/02/19 |

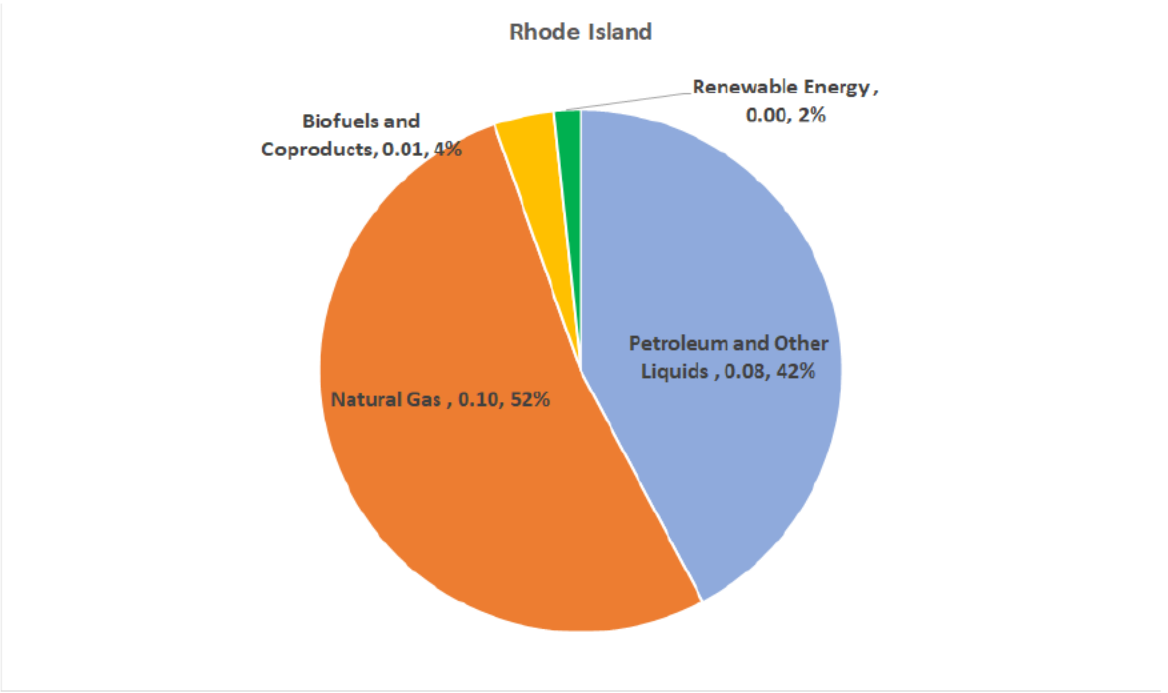
Source: Federal Energy Regulatory Commission

# New England Interstate Natural Gas Overview

## Supply and Demand

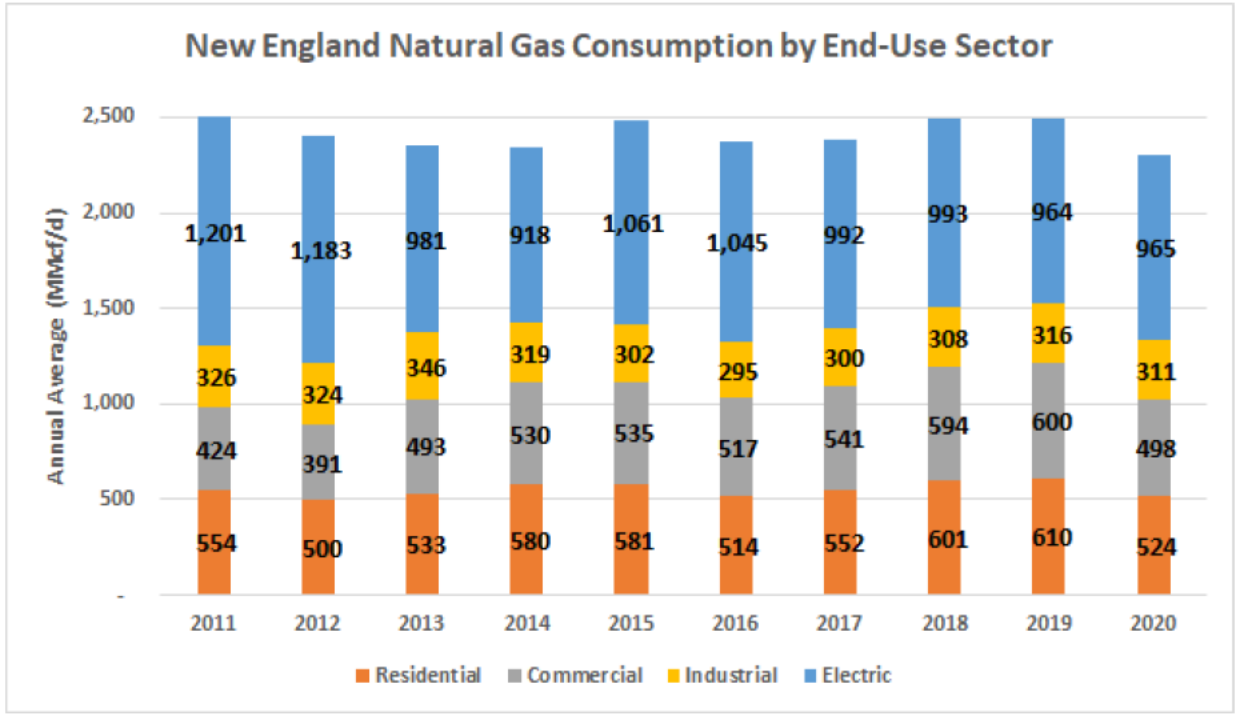
# Primary Energy Consumption in New England and Rhode Island (quadrillion Btu)

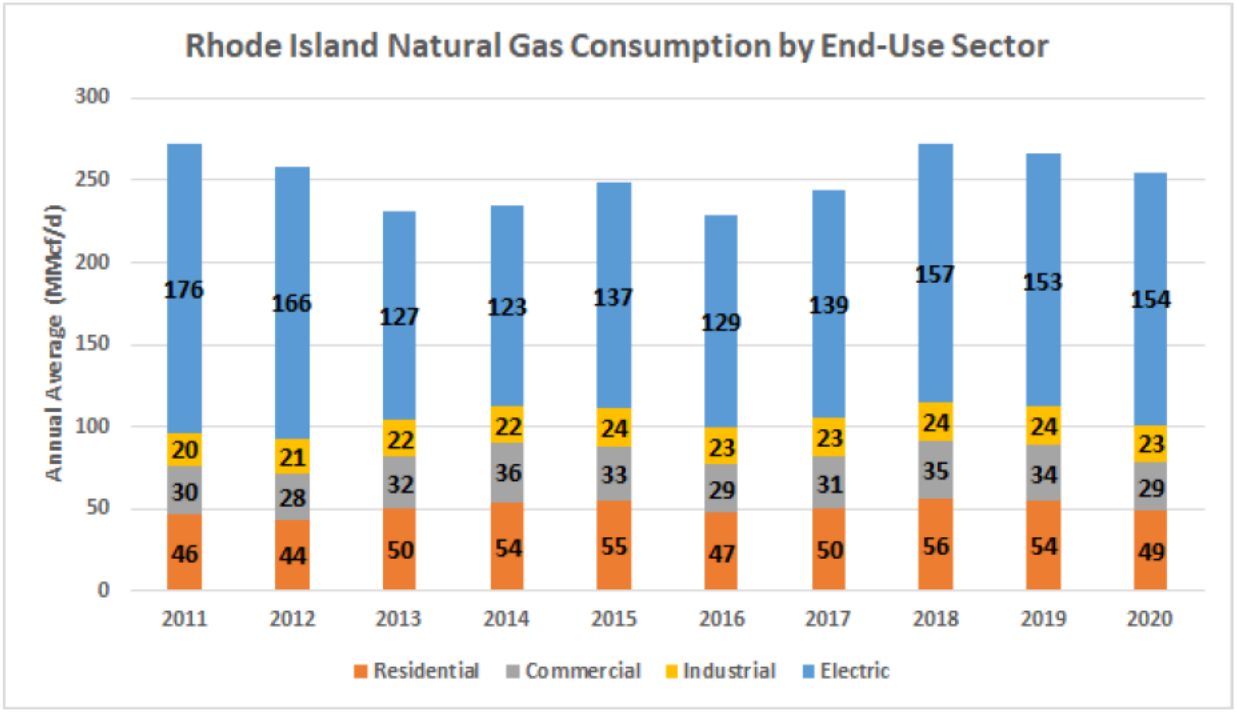



Sources: Energy Information Administration 2018 State Energy Profiles and Annual Energy Outlook 2021

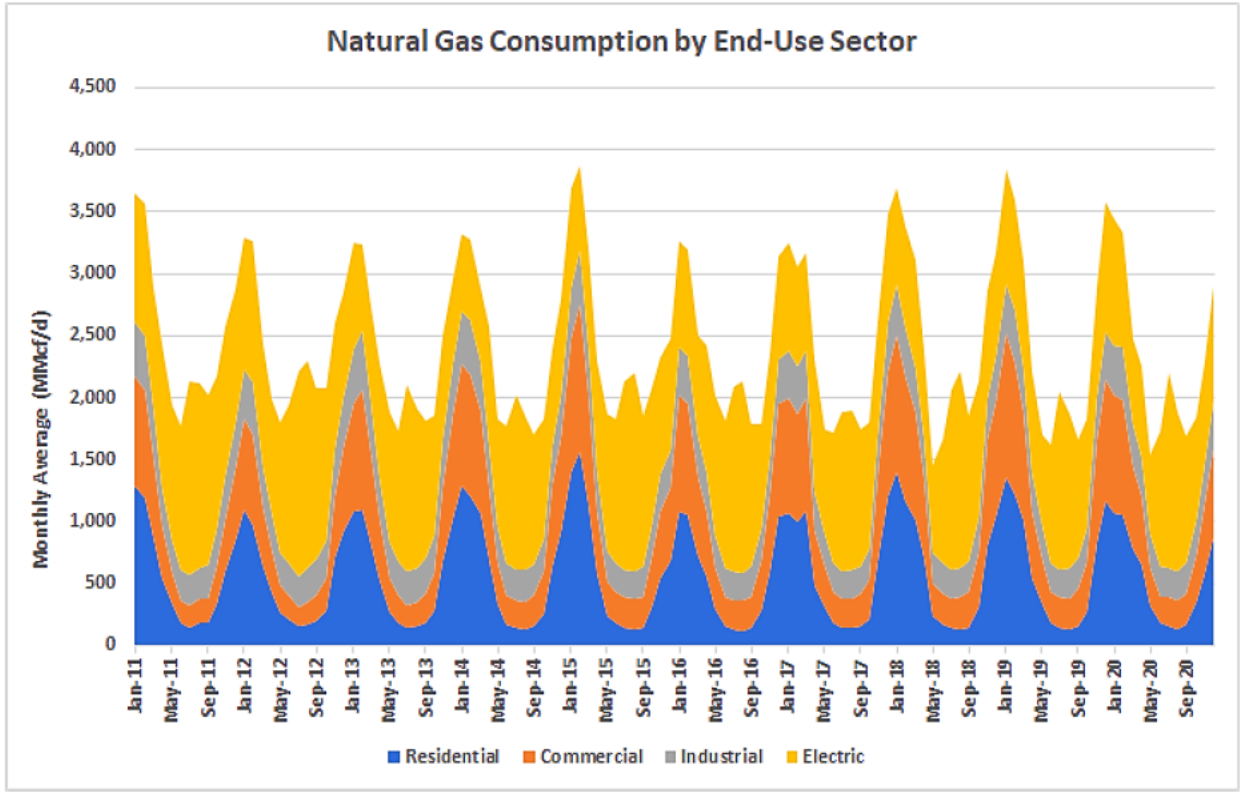
# Natural Gas Consumption in New England and Rhode Island has Been Flat to Slightly Declining

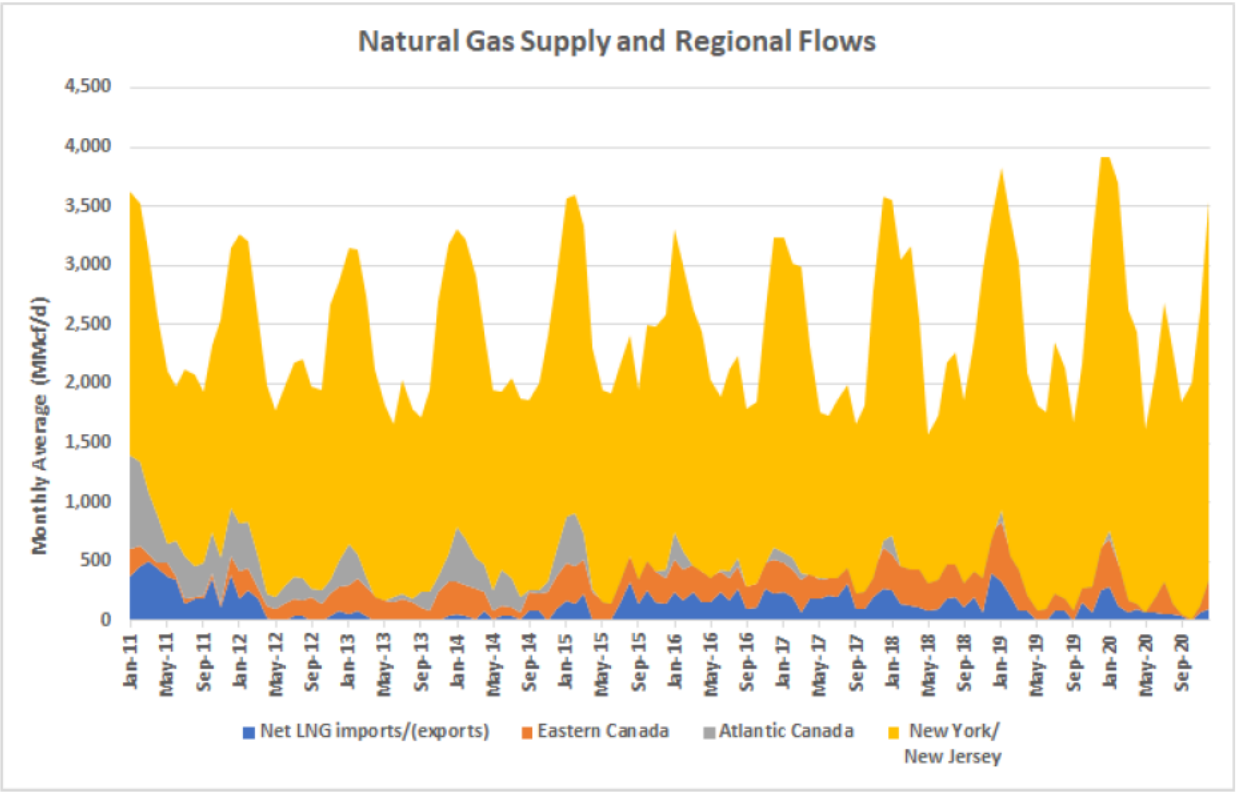



Sources: IHS compilation of Energy Information Administration and EIA Natural Gas Consumption by End Use statistics

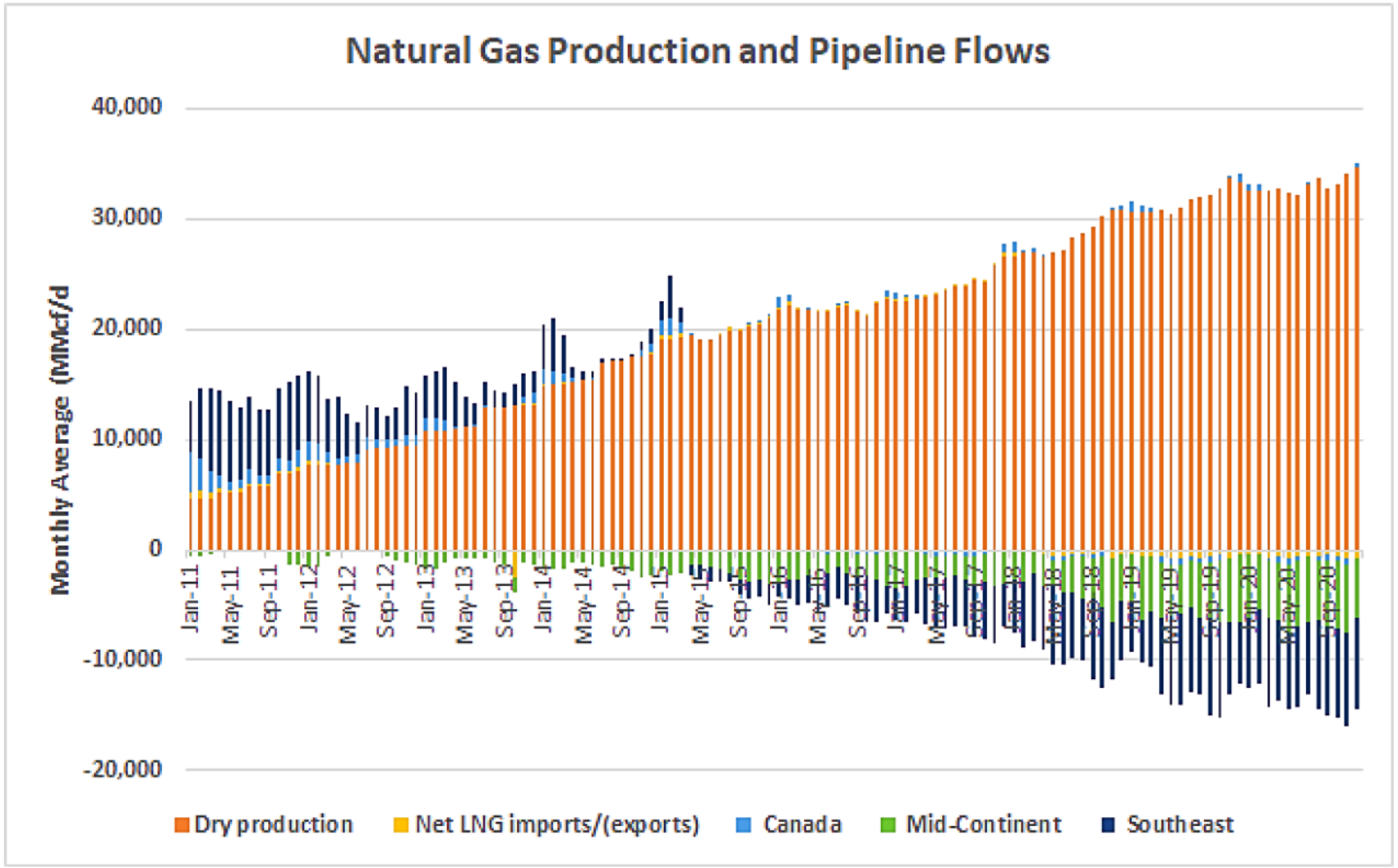
# New England has Seasonal Load, Peak Winter Demand, and has Relied on LNG Imports



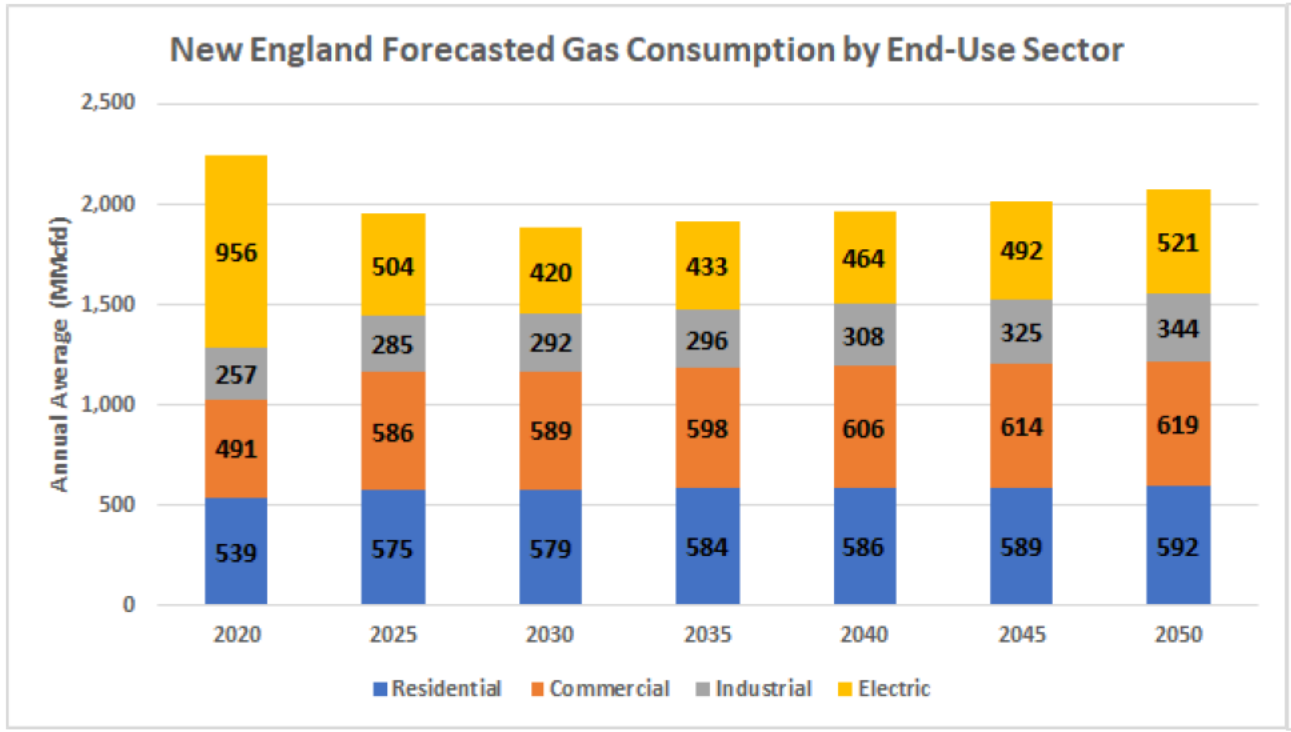

Sources: IHS compilation of Energy Information Administration, Statistics Canada, and pipeline flow data. Totals may not be identical due to different data sources.

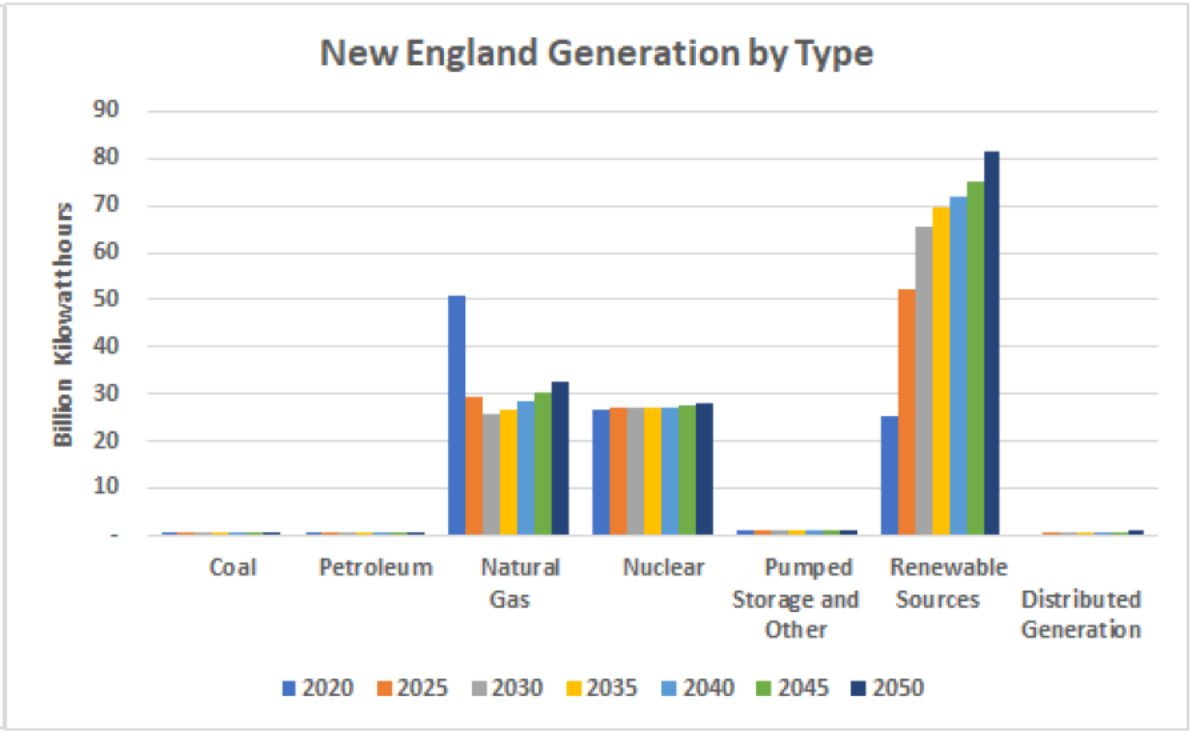
# The Northeast, Mid-Atlantic, and Appalachian Regions Have in Total Become an Exporter of Natural Gas to the Mid-Continent and Southeast




Sources: IHS compilation of Energy Information Administration, Statistics Canada, and pipeline flow data

# Renewable Generation in the Electric Sector is Projected to Limit Regional Natural Gas Demand Growth




Source: Energy Information Administration Annual Energy Outlook 2021

# New England Interstate Natural Gas Overview

## Natural Gas and the Transition to a Low-Carbon Economy

# Changing Electric Generation Resource Mix Places Different Demands on Natural Gas

**Local Distribution Companies (LDC)**

- Primarily space heating: homes, businesses, public installations
- Hourly usage typically follows a consistent pattern
- Daily usage dependent largely on temperature

**Electric generation share increasing**

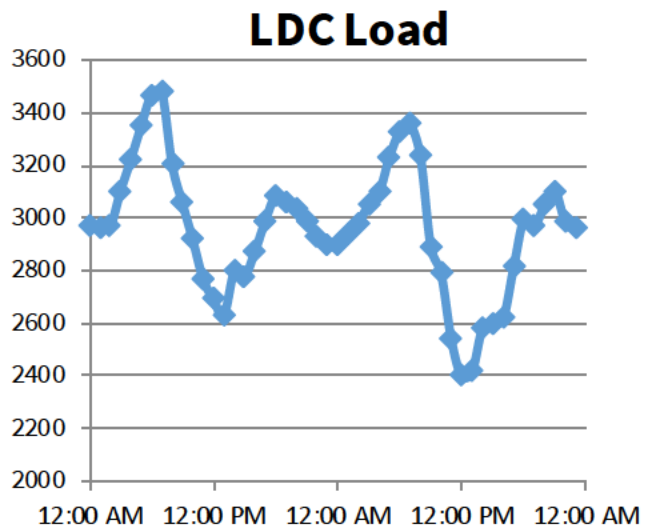
- Nearly instantaneous ramps, up and down
- Hourly usage pattern can vary significantly on the day, e.g., unanticipated loss of coal or nuclear generation

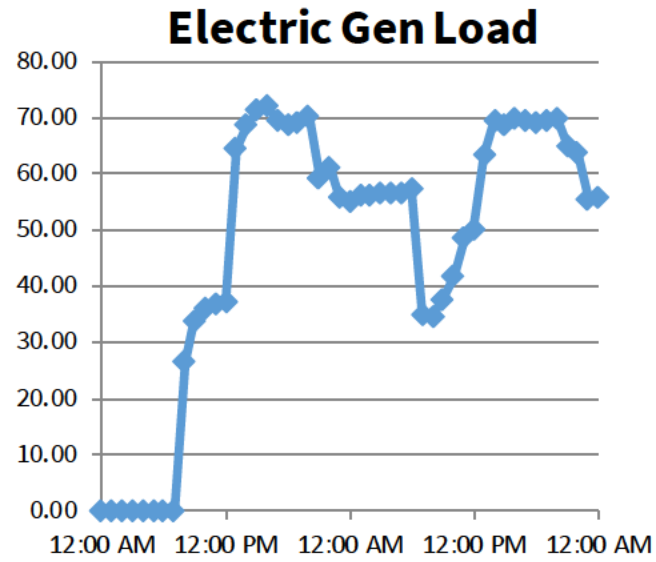
**As renewable penetration increases**

- Can exacerbate historical demand profiles as reflected primarily through electric generation load
- Base load decreases and load following requirements increase
- May be provided by quick starting gas-fired generation

**Load following requires:**

- Additional capacity above the average daily rate
- Use of linepack and market-area storage
- Hourly and no-notice services

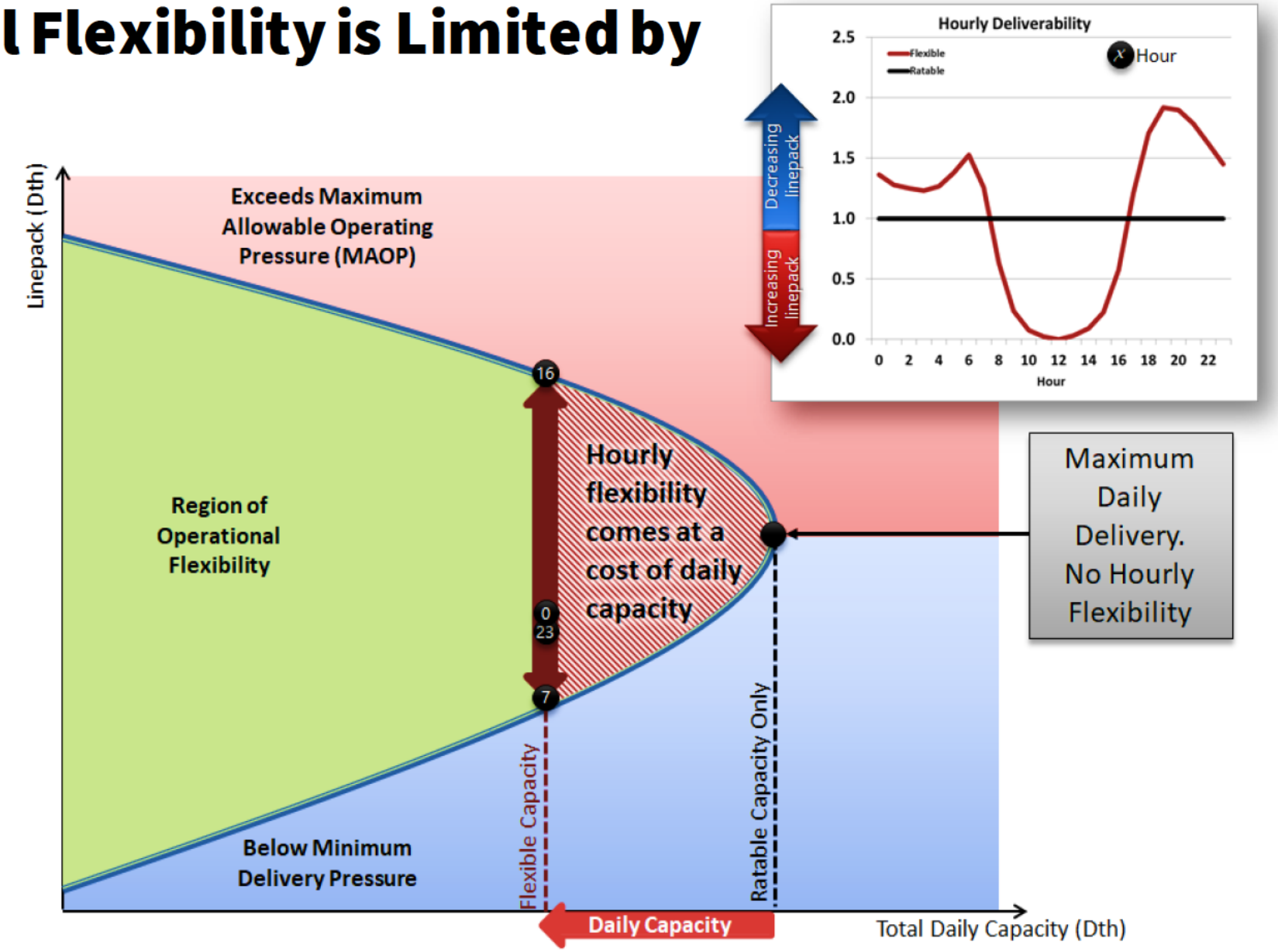



Source: Kinder Morgan staff presentation

# Pipeline Operational Flexibility is Limited by Pressure

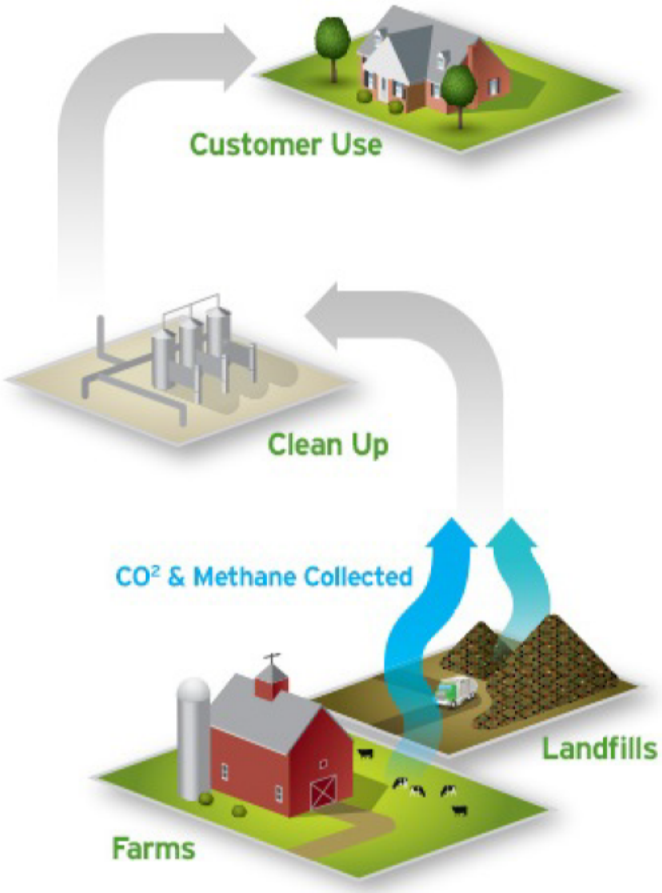
- Linepack: amount of gas in the pipeline at any point in time
- Gas is compressible
  - As linepack increases, pressure increases
  - As linepack decreases, pressure decreases
- Pressure limits
  - Safety: MAOP
  - Reliability: delivery pressures
- Capacity utilization
  - Move gas – transport capacity
  - Store gas – higher linepack




Source: Kinder Morgan staff presentation

# Renewable Natural Gas (RNG) can be used as a Fuel and Transported in Pipeline Infrastructure

- RNG is natural gas derived from organic waste material. Biogas consists of methane and carbon dioxide, with traces of other elements. The most common source of biogas is the biological breakdown of organic waste at facilities such as wastewater treatment plants and landfills. Biogas is cleaned to remove non-methane elements to produce RNG. It can be delivered by the pipeline infrastructure.
- According to estimates, the US could produce approximately 2 to 5 trillion cubic feet of RNG annually by 2040, equal to 6% to 15% of current US production.
- Within the context of interstate natural gas transmission, a tariff is a set of conditions and requirements that a company petitions/negotiates with FERC. Among these conditions are specifications for natural gas quality. RNG related gas quality issues have started to increasingly appear before the Commission. Presently, exceptions or language specific to RNG are not included under current FERC tariffs. As a result, the requirements and specifications vary between pipeline networks.
- Depending upon the source of biogas, quantities of compounds such as ammonia, hydrogen, siloxanes, fluorine, chlorine, mercury, arsenic, and copper may be present. These constituents are captured under the category, "Other Trace Constituents and Objectionable Matter" in the tariff. Including greater quantities of these compounds in FERC pipelines could require modification of gas quality provisions in a pipeline's tariff and would require coordination with shippers and other pipelines. This coordination of pipeline and shipper interests is an ongoing FERC expertise, and the existing regulatory regime may provide efficiencies to the transportation of RNG.




Sources: Federal Energy Regulatory Commission, Environmental Protection Agency, American Gas Association, and SoCal Gas

# Hydrogen may Potentially be Blended With Natural Gas in Pipeline Infrastructure

- The generation of hydrogen uses an electrical current to separate hydrogen from oxygen in water. If this electricity is obtained from renewable sources, it will produce energy without emitting carbon dioxide. The resulting hydrogen can be stored and burned when needed.
- Gas utilities around the world are evaluating blending hydrogen into the natural gas grid to reduce emissions. Blending hydrogen into the existing natural gas pipeline network has been proposed as a means of increasing the output of renewable energy systems. If implemented with relatively low concentrations, less than 5%–15% hydrogen by volume, this strategy of storing and delivering renewable energy to markets appears to be viable.
- Replacing natural gas with hydrogen has issues, starting with how it affects the pipelines it travels in and the appliances that use it. On the pipeline front, "hydrogen embrittlement" can weaken metal or polyethylene pipes and increase leakage risks, particularly in high-pressure pipes.
- Including greater quantities of hydrogen on FERC pipelines could require modification of gas quality provisions in a pipeline's tariff.
- It may be challenging to find cost-effective uses for hydrogen. Its combination of low energy density, relatively high cost, and low concentration use in pipelines may limit applications to decarbonizing challenging sectors such as industrial uses, shipping, and long-distance trucking.


Sources: National Renewable Energy Lab, Rocky Mountain Institute, Green Hydrogen Coalition-comments at NARUC Winter Policy Summit, and Iberdrola

# New England Interstate Natural Gas Overview

## Key Takeaways

# Key Takeaways

- New England, historically said to be "at the end of the pipe," is now located next to the  Marcellus and Utica Shale basins, among the most prolific in the US, and having the potential to reduce New England’s energy costs and reliability concerns.
- Volumetrically, natural gas demand in New England is projected to be flat.  However peak day planning will continue to be challenging, given  the tight infrastructure.