

# Attachments

## Fact Sheet on Natural Gas Transmission Pipelines

5/15/15

### 1. What is natural gas?

Natural gas is 97% methane (chemical formula CH<sub>4</sub>). Methane is a greenhouse gas with an average lifetime of a molecule in the air of 12 years. It is destroyed in the air by a chain of chemical reactions that usually result in carbon dioxide being created. Methane, pound for pound, traps 34 times more heat than carbon dioxide. (Technically this is called the global warming potential, GWP, which accounts for the heat trapping for 100 years compared to the GWP of carbon dioxide taken as 1. If the GWP is taken over 20 years, the GWP becomes 86 (which is a number sometimes quoted).

### 2. Why is natural gas called “clean energy”?

Natural gas is touted as clean energy. It does produce 50% less carbon dioxide per unit of energy produced than coal. However since it is a greenhouse gas in its own right, any leakage of raw, unburned methane reduces its benefit over coal. Estimates of methane leakage from natural gas production and transmission are 25% to 33% of all methane emissions in the United States.<sup>a</sup> This is equivalent to releasing about 50 million tons of carbon dioxide into the atmosphere each year.<sup>b</sup> There are various estimates of how much methane is leaked by gas production, transmission, and distribution, but the most recent estimates show that natural gas produces about 20% more global warming per unit of energy than coal.<sup>c</sup>

a. “Methane Emissions from Modern Natural Gas Development,” PSE Healthy Energy Science Summary, March 2014, [psehealthyenergy.org](http://psehealthyenergy.org).

b. “America Pays for Gas Leaks, Natural Gas Pipeline Leaks Cost Consumers Billions,” Senator Edward Markey and House of Representatives Natural Resources Staff, August 1, 2013, [http://www.markey.senate.gov/documents/markey\\_lost\\_gas\\_report.pdf](http://www.markey.senate.gov/documents/markey_lost_gas_report.pdf).

c. R.W. Howarth, “A bridge to nowhere: methane emissions and the greenhouse footprint of natural gas,” *Energy Science and Engineering* 2(2), (2014).

### 3. Why are gas pipeline expansions being proposed?

The natural gas industry is rapidly increasing the capacity of gas transmission lines in the United States. One of the reasons is to increase the supply of natural gas from hydraulic fracked wells

in Pennsylvania.<sup>a</sup> In 2012, natural gas extracted using hydraulic fracking was 60% of all natural gas production, and this is predicted to increase to 70% by 2035.<sup>b</sup> “The Interstate Natural Gas Association of America has estimated that from 2011 to 2033 the industry must build nearly 15,000 miles of subsidiary lines – each year.”<sup>c</sup>

a. [http://www.northeastgas.org/pipeline\\_expansion.php](http://www.northeastgas.org/pipeline_expansion.php).

b. Energy Information Agency, US Department of Energy, [www.eia.gov/energy\\_in\\_brief/article/about\\_shale\\_gas.cfm](http://www.eia.gov/energy_in_brief/article/about_shale_gas.cfm).

c. Marcia Greenberg, *The Washington Post*, October 17, 2014.

#### **4. What will happen if more natural gas is transmitted and used?**

Natural gas has been proposed as a bridge fuel meaning that replacing coal-fired power plants with gas-fired power plants would lower greenhouse gas emissions. This would make sense if the leakage of methane was drastically reduced. However, the gas industry has had little incentive to do anything. The expansion of natural gas that is taking place will make emissions much worse. A recent study has shown that expanding natural gas production could increase carbon dioxide emissions by 11% by 2050.<sup>a</sup>

a. H. McJeon *et al.*, “Limited impact on decadal scale climate change from increased use of natural gas,” *Nature* **514**, 482 (2014), [http://www.nature.com/articles/nature13837.epdf?referrer\\_access\\_token=M12woI6qbFsA2\\_mby-2xz9RgN0jAjWel9jnR3ZoTv0MPa9R-hb8QnGG9oaO-IVuwCEcD2ITjfca54l8hpMJZmaa\\_bhgwdDar9F\\_NdOvAlwN1UuUiHB2eDLVmJo1q0xBt](http://www.nature.com/articles/nature13837.epdf?referrer_access_token=M12woI6qbFsA2_mby-2xz9RgN0jAjWel9jnR3ZoTv0MPa9R-hb8QnGG9oaO-IVuwCEcD2ITjfca54l8hpMJZmaa_bhgwdDar9F_NdOvAlwN1UuUiHB2eDLVmJo1q0xBt).

#### **5. Why should we oppose the expansion of natural gas pipelines through Connecticut?**

A. Gas transmission lines are used to transport natural gas large distances. The gas is pressurized between 200 to 1500 psi (15 to 100 times atmospheric pressure) to reduce its volume. The largest transmission line in Connecticut is the Algonquin Pipeline that goes through the middle of Connecticut including going through Andover, Hebron, Coventry, Mansfield, Chaplin, Eastford, Putnam, and Pomfret as shown below. The Algonquin Pipeline is actually two pipelines, a 26 inch diameter pipeline and a 30 inch diameter pipeline running parallel to each other. To keep

the gas at high pressure, they must be pressurized again after 40 to 100 miles of travel.



Branch transmission lines come off the main pipelines and carry gas to metering and regulations stations. The blue squares on the map above represent metering and regulations stations. At these stations, the high pressure of the gas is reduced to about 20 psi for distribution by local gas companies.

There are several compressor stations in Connecticut to maintain the high pressure of the main pipelines. One compressor station is in Cromwell, one in Oxford, and one is located in the Chaplin at 539 Tower Hill Rd. The orange squares on the map above indicate the compressor stations. To lower gas pressure for distribution, there are 13 metering and regulation stations in Connecticut. In Willimantic, there is metering and regulation station at 247 South St. Every five to twelve miles along the pipeline, there are valves in case part of the pipeline has to be isolated.

## 6. How will the expansion occur?

Spectra Energy which owns the Algonquin Pipeline has proposed three expansions projects. The most immediate one that is approved by FERC and started in 2015, is named the Algonquin Incremental Market (AIM) expansion. A second expansion project, which has just begun the approval process, is called Atlantic Bridge. Access Northeast is a third project announced by Spectra Energy that will collaborate with Eversource and is supposed to complement Spectra Energy's previously announced AIM and Atlantic Bridge projects. "Access Northeast would add one billion cubic feet of natural gas capacity to the New England gas transmission system."<sup>a</sup>

a. Luther Turmelle, "Northeast Utilities part of \$3 billion plan to expand natural gas pipeline in Connecticut, New England," New Haven Register, September 16, 2014

A. The AIM project in Connecticut will replace 13.5 miles of six-inch diameter pipe in Lebanon, CT with 16-inch diameter pipe and 4.4 miles of 26-inch diameter pipe in Danbury, CT with 42-inch diameter pipe. The maximum allowable operating pressure would increase to 850 psi for the 42-inch pipe from 674 psi for the 26-inch pipe. The project also includes new 3.3 miles of 12-inch diameter pipe in Montville, CT and, for two miles in Cromwell, a third 36 inch diameter pipe will be put in parallel with the 26 inch and 30 inch diameter pipes.

The Cromwell Compressor Station will have its capacity increased by 15,900 horsepower, and the Chaplin Station's capacity will increase by 7,700 horsepower. Modifications will also be made to 13 existing metering stations (West Danbury, Southbury, Waterbury, North Haven, Guilford, Farmington, Glastonbury, Middletown, Salem, Montville, Willimantic, Pomfret and Putnam, CT), and construction of one new metering station in Oakland Heights (Norwich). Every M & R station will have major modifications and several will be completely re-built, Glastonbury and two others.<sup>a</sup> **The purpose of AIM is to increase the amount of natural gas that can be transported through Connecticut.**

a. <http://www.nae.usace.army.mil/Missions/Regulatory/PublicNotices/tabid/11771/Article/494068/nae-2013-01233.aspx>.

B. The Atlantic Bridge Project, that is still going through the approval process, will not replace any pipes in Connecticut; however it will install an additional 10,915 hp compressor in the Oxford, CT compressor station, install a 6300 hp compressor and replace two compressors with larger 7,700 hp compressors in the Chaplin, CT compressor station (for a total of four compressors), modify the metering and regulation station in Danbury, and construct a new metering and regulation station at Salem Pike in Norwich, CT.<sup>a</sup>

a. "Notice of Intent to Prepare an Environmental Assessment for the Planned Atlantic Bridge Project, Request for Comments on Environmental Issues and Notice of Public Scoping Meetings," Federal Energy Regulatory Agency, April 27, 2015.

b. "Monthly Progress Report, Algonquin Gas Transmission LLC and Maritime and Northeast Pipeline LLC, Atlantic Bridge Project – Docket No. PF15-12-000," Spectra Energy Partners, May 31, 2015.

C. Preliminary information has been released on the Access Northeast Project.<sup>a</sup> The present plan is to replace the 26 inch diameter pipe with a 42 inch diameter pipe starting from the 42 inch pipe installed at Danbury in the AIM project and going 11.3 miles into Southbury, replace the 26 inch pipe starting at the Oxford Compressor Station with a 42 inch pipe going 12.3 miles into Prospect and Cheshire, put a 36 inch diameter pipe in parallel with the 26 inch and 42 inch pipes going from Rocky Hill for 13.1 miles through Glastonbury, Hebron, and Andover, and put a 36 inch pipe in parallel with the 26 inch and 42 inch pipes starting in Chaplin and going 9.3 miles through Eastford and Pomfret. This plan indicates that more compressors will be added to the Chaplin and Oxford Compressor Stations and that the Cromwell Compressor Station will be modified. Access Northeast is supposed to increase the gas transmitted up to one billion cubic feet per day.

<sup>a</sup>"Access Northeast Project: Frequently Asked Questions," Spectra Energy Partners, June 30, 2015.

### **7. Why are there so many projects proposed for the expansion of one pipeline?**

Spectra Energy seems to be following a process called segmentation. The Federal Energy Regulatory Agency (FERC) has to consider the environmental impact of each project before granting approval. Segmentation allows a major project such as expanding the Algonquin Pipeline to be broken up into several smaller projects. That way the environmental impact of the entire project does not have to be considered. Each separate, smaller project could be ruled to have a small environmental impact.

### **8. What do scientists say about the burning of fossil fuels including natural gas?**

A recent paper (C. McGlade and P. Ekins, “The geographical distribution of fossil fuels unused when limiting global warming to 2°C,” *Nature* **517**, 187-190 (2015)) states “that to have a 50 per cent chance of limiting warming below 2°C throughout the twenty-first century, cumulative carbon emissions between 2011 and 2050, need to be limited to about 1,100 gigatonnes of carbon dioxide (Gt CO<sub>2</sub>).” A gigatonne is the same as a billion tons. Most scientists have agreed that limiting warming to 2°C is the maximum that our civilization could stand without major damage to health, food and water supplies, the survival of many species, and livable habitats. The results of the paper “suggest that, globally, a third of oil reserves, half of gas reserves and 80 per cent of coal reserves should remain unused from 2010 to 2050 in order to meet the target of 2°C.” **Since the world is currently producing emissions of over 30 Gt CO<sub>2</sub> per year, we need to reduce fossil fuel use not increase it.**

### **9. Why should we oppose new gas compressors?**

The new compressors that come with the AIM expansion will increase greenhouse gases. Compressors are the cause of most leakages of methane into the air from natural gas production. About 57% of the leaked methane comes from the compressors used in transmission pipelines.<sup>a</sup> Since natural gas production is responsible for about 25% of all methane emissions, compressors are an important source of methane emissions.

a. Report for Oil and Gas Sector Compressors, U S EPA Office of Air Quality Planning and Standards, April 2014.

### **10. What are the hazards of more natural gas use?**

A. Besides the increase in global warming from the use of natural gas, gas transportation pipelines are an explosion hazard. They do not occur very often, about two to three explosions in the US each year. When they occur, though, are extremely hazardous. Since the gas is at high pressure, the fireball from the explosion goes hundreds of feet into the air; the only way to put out the fire is to valve off the section where the fire is and let the gas burn up.

B. Most of the gas going through the pipeline will come from fracked gas that contains radon, an inert, radioactive gas. Radon has a short halflife of 3.8 days; thus in 30 days, it has essentially disappeared. The venting of natural gas that occurs at compressor stations and metering and regulation stations puts any leftover radon into the air where it will rapidly disperse. A bigger

threat from radioactivity is that the radon decays into radioactive lead-210; lead-210 has a half-life of 22 years so it will be around for about 100 years. The radioactive lead is a solid so it forms a scale on the pipe. Even though there may only be a small amount of radon going through the pipe, where it decays the radioactive lead will build up on the inside of the pipe. Periodically, the scale is cleaned off the pipeline. There are no Federal regulations for disposing of the radioactive scale, so we are depending on the gas company to dispose of it properly. When the replacement of the existing pipes with the bigger pipes occurs, what will happen to the old, radioactive pipes?