

Quadrennial Energy Review

IN RE: QER Public Meeting: Enhancing Energy Infrastructure Resilience and Addressing Vulnerabilities

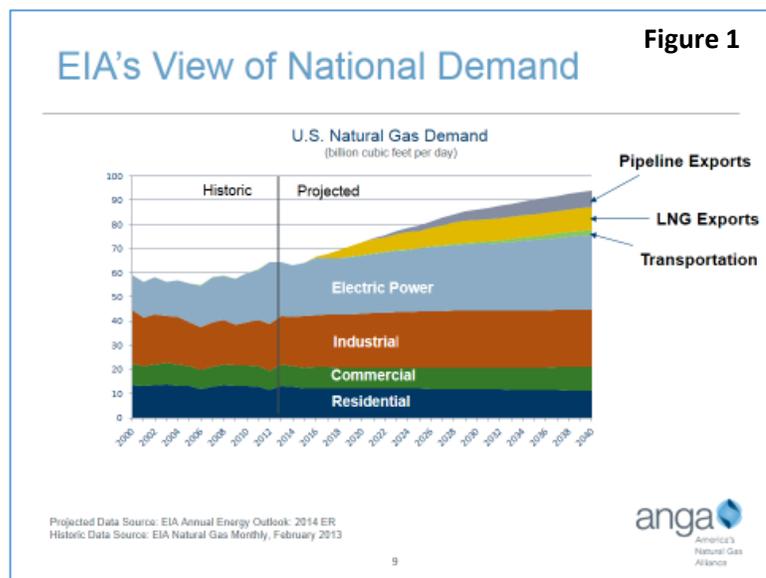
America's Natural Gas Alliance's (ANGA) Comments

Representing North America's leading independent natural gas exploration and production companies, America's Natural Gas Alliance (ANGA) works with industry, government and customer stakeholders to promote increased demand for and availability of our nation's abundant natural gas resources for a cleaner and more secure energy future. The collective natural gas production of the ANGA member companies is approximately eight trillion cubic feet per year, which represents one third of the total annual U.S. natural gas supply.

The safe and environmentally responsible development of our domestic stores of natural gas has been, and increasingly will be, an important component of America's energy supply and economic health. Natural gas is a clean-burning, efficient, abundant, and cost-effective fuel that offers the potential both for significantly decreasing air pollution emissions and promoting America's energy security. ANGA appreciates the opportunity to provide comments and participate in the Quadrennial Energy Review process. ANGA looks forward to continuing to work with the Department of Energy and the administration as it addresses U.S. energy needs. ANGA submits the following comments to underscore the ability of natural gas to continue expanding its role as a reliable and affordable resource for meeting our nation's growing energy needs.

Long-Term Abundance and Price Stability

The story of the natural gas industry's revolutionary surge in resources and supply availability as a result of the development of shale gas has been told frequently over the last several years. It is well established that the nation has enough natural gas at stable and affordable prices, to be able to sustain substantial increases in domestic consumption and a significant level of exports.



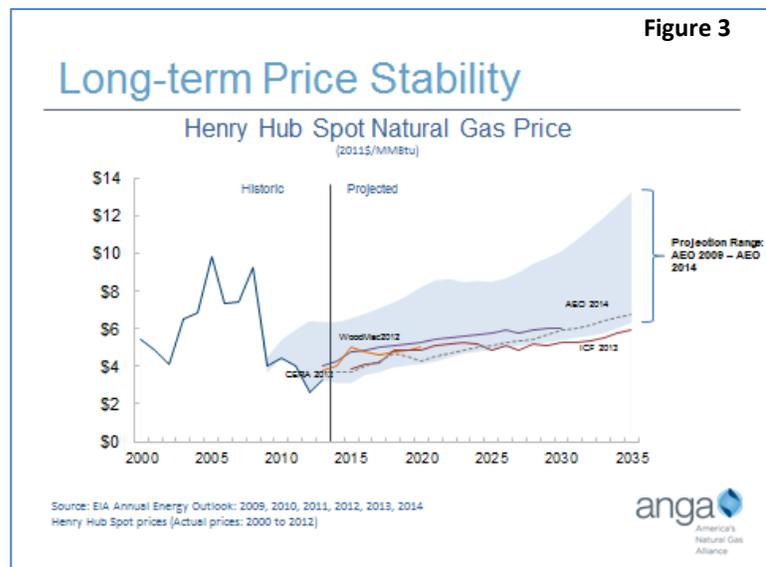
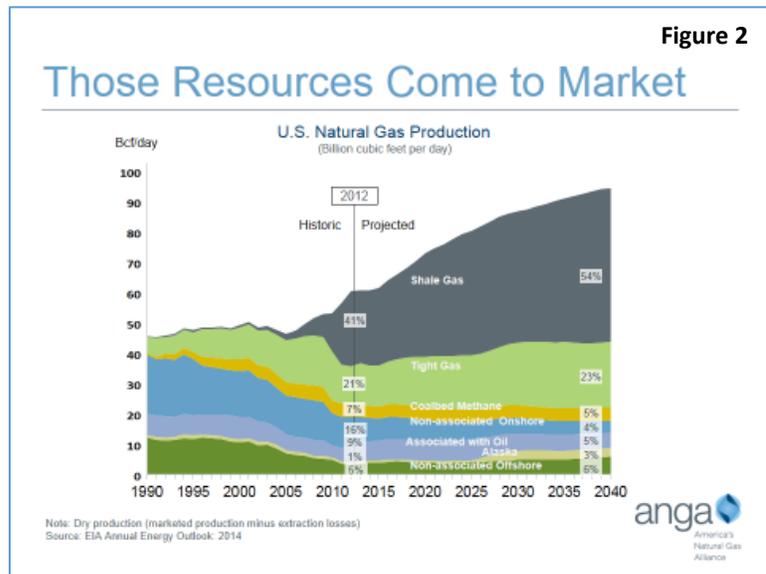
Figures 1 through 3 establish the current national view from the perspective of the U.S. Energy Information Administration (EIA).

Figure 1 shows EIA’s estimate of national demand through 2040, moving from a current level of approximately 65 billion cubic feet per day (Bcf/d), to 93 Bcf/d. This includes significant growth in industrial use, power generation use, exports of liquefied natural gas (LNG), and net exports by pipeline.

Figure 2 depicts EIA’s most recent estimate of the supply response to that demand growth, showing the enormous importance of shale gas. The increasing natural gas is balanced by increasing domestic production with the majority of production in 2014 coming from shale gas resources.

The end result of this supply-demand balance is set forth in EIA’s long-term price projection, depicted in Figure 3. This chart compares the 2014 EIA projection of Henry Hub spot prices in constant 2011 \$ per million Btus (the dotted line) with forecasts made by other prominent analysts including Wood McKenzie, ICF International, and IHS CERA. As may be seen, the EIA and third-party forecasts all exhibit great stability compared to historic prices experienced up until 2008, never exceeding \$6.00 (real) through 2040.

Additionally, Figure 3 compares these forecasts with the progression of EIA forecasts from 2009 forward, represented by the shaded area. The 2009 forecast was at the top of that area, and each successive year’s estimate has been lower, as the true impact of shale economics made their way into the analytical process.



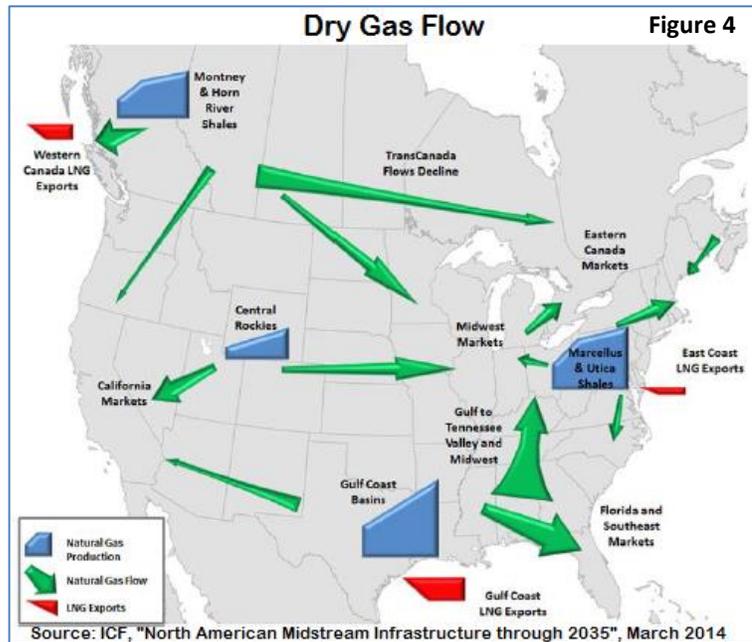
Infrastructure

Another important aspect of the natural gas story is the infrastructure needed to bring this abundant supply to market. End users must have assurance that the pieces fit together, that the supply will come forth when needed, and that the appropriate infrastructure can be expected to be in place to connect supply with consuming markets. The United States has more than 300,000 miles of natural gas pipelines — the largest pipeline network in the world — which enables producers to reliably deliver gas to markets throughout the U.S. But as demand for natural gas and natural gas liquids continue to increase, so will the need to expand the nations pipeline network.

To better understand the investments needed in infrastructure through 2035, ANGA partnered with the INGAA Foundation to update their 2011 midstream infrastructure study¹. ICF International conducted the study, which found that dry gas infrastructure needed similar levels of investment as found in the previous study. However, ICF also found that the now greater levels of oil and NGL production leads to a greater oil and liquids infrastructure investment need.

Due to the changing production areas, flows through natural gas pipelines and NGL pipelines are also adjusting. Figure 4 focuses on dry gas supply movements. The Marcellus shale play is providing dry gas supplies to the Northeast with incremental supplies to the Midwestern and Southeastern gas markets. These incremental supplies are expected to grow as Marcellus production continues to increase and supply looks for a home outside of the region. As a result, flows through the Tennessee Valley that originate from the Gulf decline over time. Additional dry gas production in the Gulf remains in the region to support new petrochemical manufacturing facilities, as well as LNG exports. The incremental Rocky Mountain production moves to the West Coast which offsets the declines in transport from Western Canada and the Permian Basin in Texas.

From a quantitative perspective, as shown in Figure 5, new natural gas



Originating Region	2014-2020	2021-2025	2026-2030	2031-2035	2014-2035	Average Annual 2014-2035
U.S. and Canada	24.2	6.9	8.4	3.4	42.9	1.9
U.S.	23.2	5.9	7.9	2.9	39.9	1.8
Canada	1.0	1.0	0.5	0.5	3.0	0.1
Central	5.0	-	1.4	0.8	7.2	0.3
Midwest	3.0	0.5	-	-	3.5	0.2
Northeast	6.0	2.3	1.9	-	10.1	0.5
Offshore	-	-	-	-	-	-
Southeast	4.4	0.7	1.7	1.1	7.9	0.4
Southwest	4.8	2.0	2.9	0.5	10.2	0.5
Western	-	0.5	-	0.5	1.0	0.0
Arctic	-	-	-	-	-	-

Source: ICF, "North American Midstream Infrastructure through 2035", March 2014

¹ICF International, "North American Midstream Infrastructure through 2035: Capitalizing on Our Energy Abundance", March 2014.

supplies will require approximately 43 bcf/d of incremental mainline capacity from 2014 to 2035 with over 800 miles per year of new gas transmission mainline and 14,000 miles per year of new gas gathering line. Further, an additional 800 miles per year of new laterals to/from power plants, processing plants, and storage fields will also be required. Regionally, the Northeast, and Gulf (noted as Southwest in figure 5) areas show the most capacity additions due to the significant production growth in the Marcellus and Utica shale's, the significant load growth in the Gulf from petrochemical manufacturing, and LNG terminals and gas exports to Mexico.

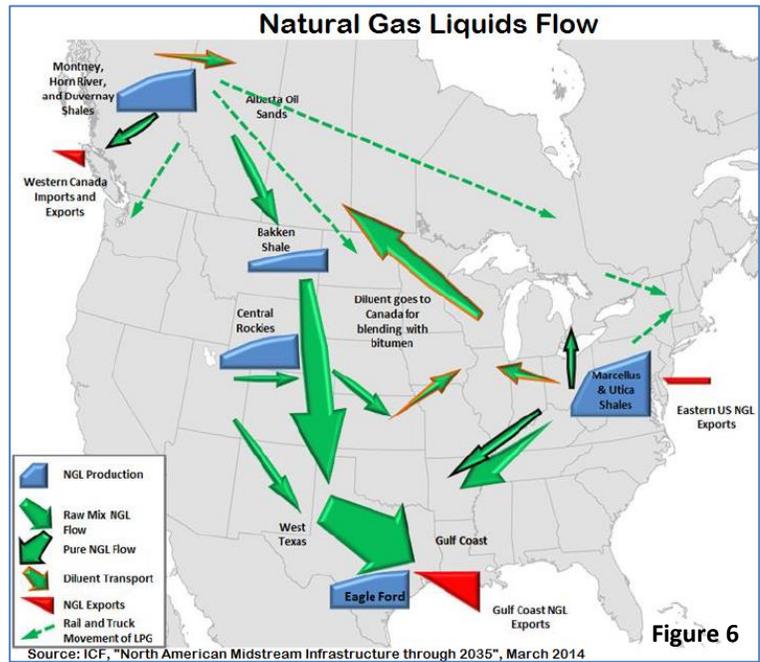


Figure 6

For NGLs, production increases are the greatest in the Marcellus shale play with growth also occurring in the Bakken, Niobrara and Eagle Ford shale plays, as shown in figure 6. Most all NGLs flow towards Mont Belvieu, TX including the NGL streams coming from the Marcellus and those coming from the Midcontinent, such as the Bakken and Niobrara. The Gulf houses most of the petrochemical manufacturing capacity as well as export infrastructure; hence, the massive flow of NGLs to the area.

Similarly to natural gas pipeline capacity, NGL pipeline capacity will also grow significantly over the next two decades, as shown in figure 7. The greatest increase in capacity will occur within the next 10 years as production growth ramps up to serve the new petrochemical capacity. The regions with the most capacity expansion include the Northeast, Midcontinent and Gulf (noted as Southwest in figure 7) as new supplies connect to expanding demand markets.

Originating Region	2014-2020	2021-2025	2026-2030	2031-2035	2014-2035	Average Annual 2014-2035
U.S. and Canada	3.2	0.2	0.3	-	3.6	0.2
U.S.	2.8	-	0.3	-	3.1	0.1
Canada	0.3	0.2	-	-	0.5	0.0
Central	1.0	-	-	-	1.0	0.0
Midwest	0.3	-	0.1	-	0.4	0.0
Northeast	0.9	-	0.2	-	1.1	0.0
Offshore	-	-	-	-	-	-
Southeast	-	-	-	-	-	-
Southwest	0.7	-	-	-	0.7	0.0
Western	-	-	-	-	-	-
Arctic	-	-	-	-	-	-

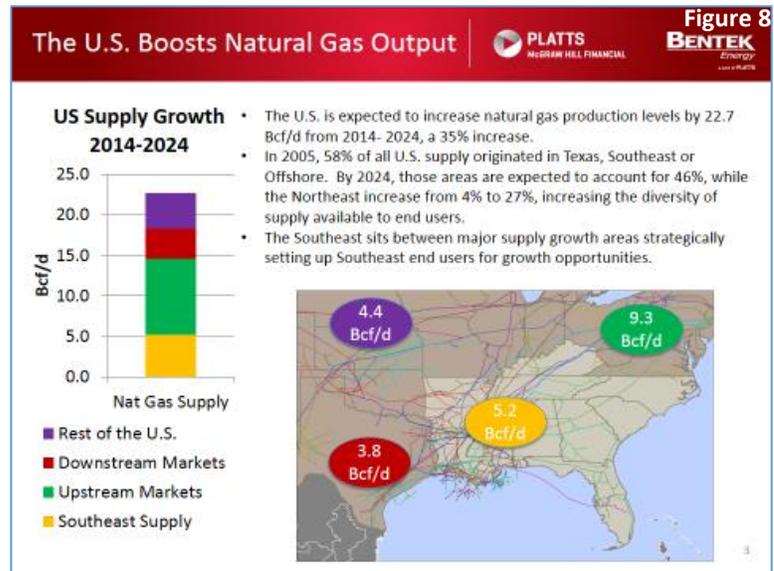
Source: ICF, "North American Midstream Infrastructure through 2035", March 2014

Figure 7

Regional Infrastructure Focus

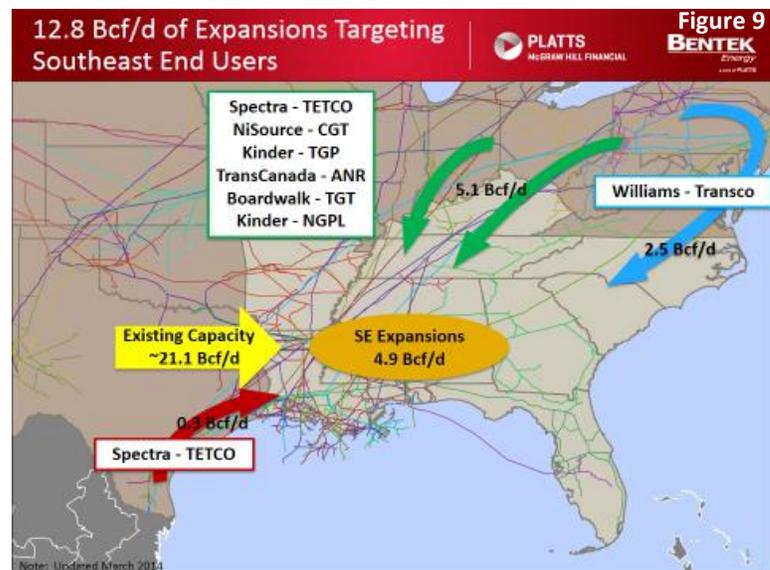
Southeast

In a study just completed for ANGA by Bentek Energy, analysts evaluated present and future supply/demand dynamics in the Southeast². Figure 8 shows that between 2014 and 2024, Bentek anticipates an increase in US natural gas production of 22.7 Bcf/d, a 35% increase. Of that, 18.3 Bcf/d comes from the Southeast (including offshore), from Texas, and from the Northeast where it exceeds local demand and connects with the



Southeast through long-line pipelines. The magnitude of the demand growth expected; and the multitude of supply options emerging around the nation, means that there is a need for substantial increases in interregional infrastructure—ironically, allowing for gas to move from north to south, as opposed to the longstanding history of south-to-north movement—as well as for intra-regional expansions to accommodate growth.

The pipeline industry has responded to this need with a large slate of new projects. Existing pipeline capacity into Louisiana, for example, is currently 21.1 Bcf/d. Announced pipeline projects by the companies listed in figure 9 is 12.8 Bcf/d, which will be needed to meet Louisiana’s projected consumption. These projects include 0.3 Bcf/d from Texas, 4.9 Bcf/d within the Southeast itself, 2.5 Bcf/d from northern production down the East Coast, and 5.1 Bcf/d coming from the western side of that northern production, as well as from the various pipeline traversing the upper Midwest.



²Bentek Energy, “Southeast Market Study”, June 2014.

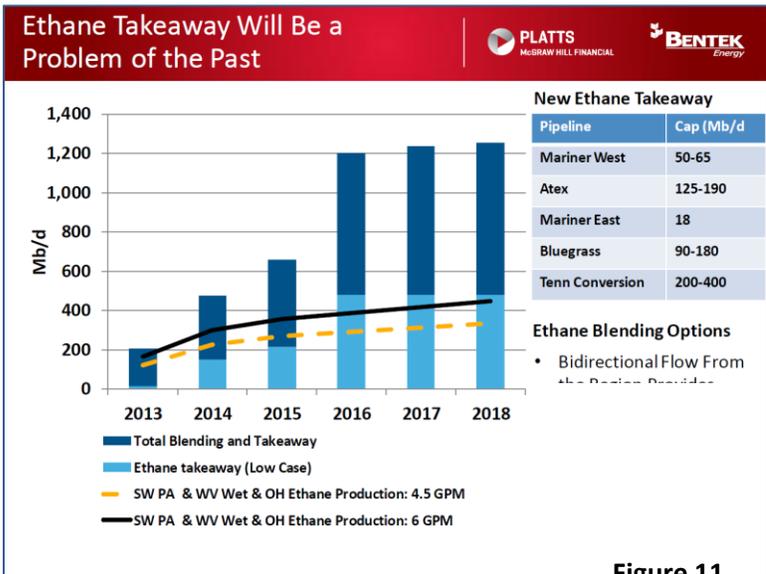
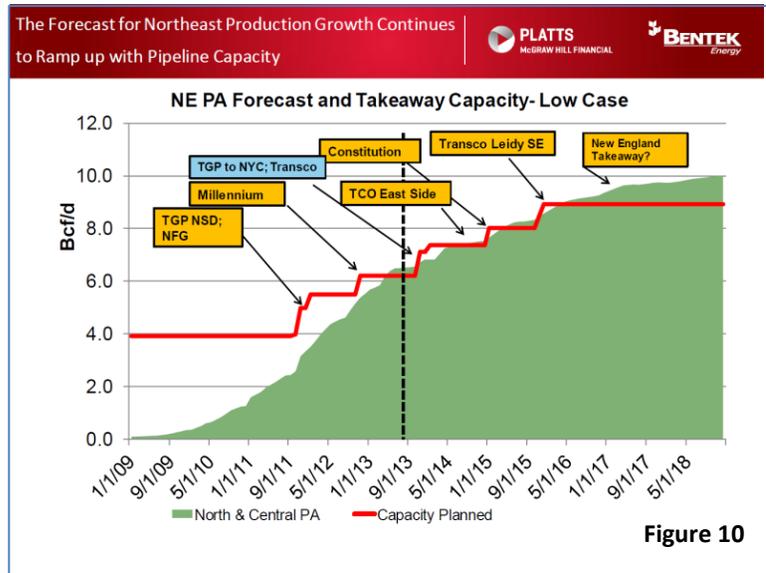
Northeast

Bentek, on behalf of ANGA, also completed a Northeast focused infrastructure study in September 2013³. Over 16 Bcf/d of planned or under construction pipeline infrastructure will link end users with producers to support continued production growth in the Northeast. Substantial opportunity exists for local end use markets to benefit from supply growth in the Northeast region, as well as, other regional demand markets such as the Southeast. Additionally, short term opportunities exist for economic dispatch of gas load prior to more structural shifts in demand expectations as market participants adjust to the realities of production growth.

From an NGL perspective, ethane takeaway capacity is currently being resolved and projections indicate additional capacity will be abundant to process ethane production growth. Bidirectional pipeline capacity from the region provides additional blending options in addition to producers being able to blend down volumes with dry production from the region.

Polar Vortex

There is broad consensus that natural gas is critical to enabling a diverse mix of energy resources while ensuring reliable energy supplies. There was significant public attention this past winter on the Polar Vortex and the challenges that grid operators faced in the wake of an extended period of very cold temperatures across a wide swath of the country. During the polar vortex, the “forced outage rate” in the PJM market was two to three times higher than PJM’s typical winter forced outage rate, resulting in tight system conditions, although power supplies were never interrupted. On January 7, 2014 at 7 p.m., an unprecedented 22 percent of power plants (40,200 MW) in PJM were forced out of service by problems such as equipment breakdowns, prolonged operations in extremely cold



³ Bentek Energy, “Southeast Market Study”, June 2014.

temperatures, and fuel supply limitations.⁴ The majority of problems, however, were not an issue of natural gas availability. PJM, in response to questions about the polar vortex from members of the U.S. House Committee on Energy and Commerce, said:

Although there has been much focus on gas issues associated with interruptible transportation, overall the gas interruptions were not the major driver of the high forced outage rates experienced in the PJM region. Natural gas interruptions, although significant, removed less than five percent of the total capacity required to meet demand on January 7, while equipment issues associated with both coal and natural gas units made up the far greater proportion of forced outages.⁵

More than three quarters, or 30,900 MW, of the forced outages were associated with equipment breakdowns, startup failures, and other problems related to operating generating facilities in extremely cold temperatures. These problems impacted all generation types, including 14,000 MW of coal capacity, 9,700 MW of natural gas capacity, 1,400 MW of nuclear capacity, and 6,100 MW of other capacity (including hydropower and oil). January 7th, almost 6,500 MW of coal outages, 1,800 MW of nuclear outages, and only 600 MW of natural gas outages were reported. Expanding natural gas infrastructure in specific areas will help to alleviate these problems.

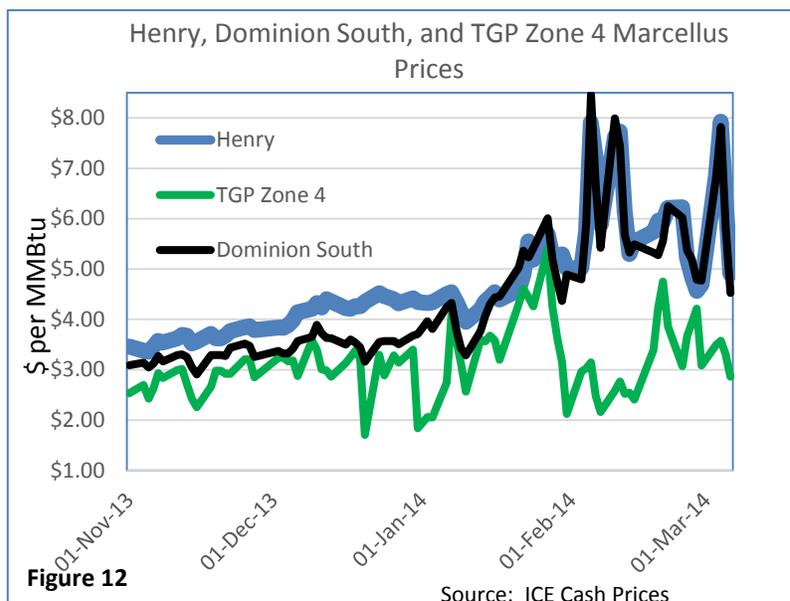
During the polar vortex when very high prices were occurring in New York and New England, Pennsylvania saw prices tracking at Henry Hub or below.

These trading points sit atop the Marcellus shale, so infrastructure was not an issue. On the day the New York price went above \$120, the price in Western Pennsylvania was \$4.30.

Additionally, where constraints did occur this winter (and have occurred in many previous

winters), planned pipeline expansions are already underway. In 2013, 2014, and 2015 – a full 57% of total U.S. investment in new pipeline infrastructure will be targeting the Northeast.

Over the next three years, 2014 – 2017, these announced projects center around bringing the Marcellus shale supplies in Appalachia to market, not only for New York, but also for New England. These projects are designed to help further increase regional natural gas capacity, deliverability, flexibility, and reliability as well as to provide economic and environmental benefits to the region.

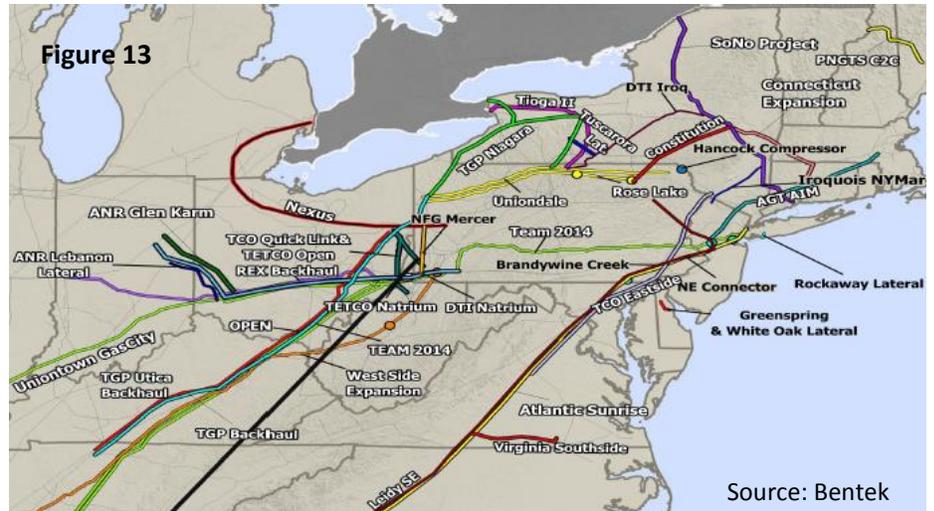


⁴ Glazer, Craig A. (PJM). PJM Response to Committee Questions re: Polar Vortex Impact on PJM. (April 18, 2014), available at: <http://www.pjm.com/sitecore%20modules/web/~media/documents/other-fed-state/20140418-pjm-response-to-committee-questions-polar-vortex-impact-on-pjm.ashx>.

⁵ Ibid. p. 7.

Three important examples:

- The Rockaway Lateral and Northeast Connector are expected to be in service by the fourth quarter of this year - adding 3.2 miles of new Transco pipeline and related facilities in NY, as well as equipment to increase compression at three existing facilities in NJ and PA.
- Expansion of Algonquin pipeline (shown just left of center in figure 13 in aqua blue) will add 342 MMcf/d into Boston by the fourth quarter of 2016.
- The Constitution pipeline will bring the product of ANGA members Cabot and Southwestern Energy into NY.



The Northeast's natural gas industry is striving to move forward with infrastructure projects designed to meet growing market demand. There is substantial growth in natural gas supplies within the Marcellus Shale basin on the border of the Northeast region (NY, NJ and New England). Even so, getting these new supplies to market necessitates further natural gas pipeline infrastructure investments, which requires incremental contract commitments.

These supply and pipeline developments have the potential for transforming the traditional paths of supply sourcing into the region, creating a more diverse supply mix and a more varied delivery network. This bodes well for regional supply security and economic competitiveness.

Conclusion

ANGA appreciates the work that the Department of Energy is doing to ensure an affordable, clean, and secure energy future, and believes that natural gas is a critical and necessary part of that future. Thus, ANGA looks to the administration and to the Department of Energy to support policies that enable the expansion of our pipeline systems. ANGA seeks to encourage state and federal policies that increase this country's pipeline network in order to ensure that all regions have ample access, not only for the abundant supplies at stable prices that natural gas can afford, but also for the economic development, job growth opportunity, environment improvement impact, trade deficit reduction, and energy security liberation that an affluent natural gas infrastructure can generate for the U.S.

Thank you again for the opportunity to partake in the Quadrennial Energy Review process and ANGA is available to address any questions or concerns that the Department may have.