Natural Gas Infrastructure

Advances in drilling and resource extraction technologies have made natural gas one of the fastest growing energy resources in the United States. The abundance of natural gas offers an opportunity for the United States to strengthen its energy independence and security, while providing nearly all sectors of the economy an affordable energy source and feedstock. Substantial investments in natural gas infrastructure — including pipelines and storage and export facilities — are needed to fully capitalize on the benefits that this affordable, abundant domestic energy source has to offer. System statistics include:

- The U.S. natural gas pipeline network includes more than 210 unique pipeline systems and 400 underground storage facilities.[1]
- Approximately 300,000 miles of pipelines, 1,400 interconnection points and 24 market hubs carried more than 32 trillion cubic feet of natural gas from production sites to demand centers in 2016.[2, 3]

The shale gas revolution has sharply increased U.S. natural gas output and fundamentally recast the role of natural gas in America's energy landscape.

- Natural gas from **hydraulically fractured wells accounted for 67 percent of total U.S. natural gas production** in 2015, up from just 7 percent in 2000.[4]
- The rate of U.S. shale gas production is not expected to slow anytime soon. **Domestic production of dry natural gas is projected to grow from 26.5 trillion cubic feet in 2016 to 39 trillion cubic feet** by 2040, with shale gas responsible for nearly all of the increase.[5, 6]
- A projected **167,000 to 209,000 miles of natural gas pipelines** (including gathering and transport lines) will need to be constructed through 2035 to increase the system's carrying capacity.[7]
- Plentiful domestic shale gas has fundamentally changed the fuel mix in the electricity sector. Since 2005, natural gas has increased from 19 percent to **34 percent of net electricity generation.**[8]

This surge in shale gas production has positioned the United States as a significant natural gas exporter, placing new and different demands on the industry's transmission and storage infrastructure.

- Much of the United States' existing natural gas infrastructure is oriented around imports. In addition to pipelines from Canada, the country has 12 existing liquefied natural gas (LNG) import terminals, compared to just two operating LNG export terminals. However, the Federal Energy Regulatory Commission has **approved 11 new export terminals** (seven of which are already under construction) and is reviewing **proposals for 16 additional export terminals as of August 2017.**[9]
- Given the need to substantially expand export capacity, predicted expenditures for LNG and natural gas liquids export facilities range from **$55 billion to $93 billion through 2035.**[10]
- In the northeastern United States, temperature-driven increases in demand for natural gas interact with significant pipeline capacity constraints to produce **sharp seasonal fluctuations in regional gas prices relative to the Henry Hub spot price** (the pricing point for natural gas futures that is used as a benchmark for the U.S. natural gas market).[11]

Natural Gas Infrastructure

In addition to building new infrastructure capacity, the system's aging assets must be updated to keep pace with anticipated supply and ensure that natural gas is transported safely across the country.

- Nearly **50 percent** of the United States' natural gas pipeline infrastructure was built in the 1950s and 1960s.[12]
- Replacing outdated cast iron and bare steel pipes throughout the natural gas distribution system will **cost an estimated $270 billion.**[13]

Investments in natural gas infrastructure have had a significant and positive impact not only on the domestic energy industry but also on the U.S. economy more broadly.

- Construction spending on new natural gas transmission pipelines in 2015 is estimated to have **contributed nearly $34 billion to U.S. gross domestic product.**[14]
- Natural gas infrastructure — including processing facilities, pipelines and distribution systems — supported nearly **1.3 million U.S. jobs and created $165.7 billion in value-added** for the U.S. economy in 2015.[15]
- **New midstream energy infrastructure —** including processing and gathering equipment, oil and gas transport infrastructure, and natural gas storage and export facilities — is projected to support **261,000–349,000 jobs per year between 2015 and 2035, with wages and benefits worth an average of $64,000.**[16]
- The expansion of onshore gas infrastructure to accommodate shale gas production has reduced the share of system infrastructure exposed to storms in the Gulf Coast **from 18 percent in 2005 to just 6 percent in 2013.**[17]

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1 U.S. Energy Information Administration, "About Natural Gas: Transporting Natural Gas," June 2007, with selected updates, accessed July 2017.

2 *Ibid.*

3 U.S. Energy Information Administration, "Natural Gas: Data: Natural Gas Withdrawals and Production," June 2017, accessed July 2017.

4 Tim Boersma, "Natural Gas in the United States in 2016," Energy Security and Climate Initiative at Brookings Institution, July 2016, pp. 1–2.

5 U.S. Energy Information Administration, "Monthly Energy Review," June 2017, Table 4.1: Natural Gas Overview.

6 U.S. Energy Information Administration, "Annual Energy Outlook 2017," January 2017, Table: Total Energy Supply, Disposition and Price Summary.

7 Kevin Petak et al., "North American Midstream Infrastructure through 2035: Leaning into the Headwinds," ICF International prepared on behalf of The INGAA Foundation, Inc., April 2016, Table ES-2.

8 U.S. Energy Information Administration, "Monthly Energy Review," June 2017, Table 7.2a.

9 Federal Energy Regulatory Commission, "Natural Gas: Industry Activities: LNG," updated as of May 2017, https://www.ferc.gov/industries/gas/indus-act/lng.asp.

10 ICF International, "US Oil and Gas Infrastructure Investment through 2035," prepared on behalf of the American Petroleum Institute, April 2017, p. 57.

11 U.S. Energy Information Administration, "Today in Energy: Northeast Natural Gas Spot Prices Particularly Sensitive to Temperature Swings," August 2014.

12 U.S. Department of Energy, "Quadrennial Energy Review: Energy Transmission, Storage, and Distribution Infrastructure," Office of Energy Policy and Systems Analysis, April 2015, p. S-5.

13 *Ibid.*

14 Brendan O'Neil et al., "The Economic Benefits of Natural Gas Pipeline Development on the Manufacturing Sector," IHS Economics on behalf of the National Association of Manufacturers, May 2016, p. 4.

15 ICF, "Benefits and Opportunities of Natural Gas Use, Transportation, and Production," prepared on behalf of the American Petroleum Institute, June 2017, p. 4.

16 Petak et al., "North American Midstream Infrastructure through 2035: Leaning into the Headwinds," Tables 1 and 38, Figure 42. Note: U.S. jobs supported include direct, indirect and induced jobs; average wages associated with supported jobs include jobs created in the United States and Canada.

17 U.S. Department of Energy, "Quadrennial Energy Review: Energy Transmission, Storage, and Distribution Infrastructure," Office of Energy Policy and Systems Analysis, April 2015, p. S-11.