



White Paper

Supporting Pipeline Development in a Shifting Market

By Michael Sloan and Eric Kuhle

Shareables

1. Natural gas markets are transitioning from a supply-driven market characterized by falling prices to a demand-driven market with rising prices.
2. The value of pipeline capacity is expected to increase with rising prices, seasonal storage values, and volatility.
3. The benefits of new infrastructure to end users are often dramatic but will be achieved only if utilities and end users are able to step up to the plate.

Executive Summary

Today, the North American natural gas market is at an inflection period. The market is transitioning away from being supply driven and characterized by falling prices to a market that will be driven by demand growth and characterized by rising prices. As a result of the shift in marketplace behavior, ICF expects there to be a changing paradigm in natural gas pipeline development.

For the past five years, most of the boom in natural gas infrastructure development has been supported by producers seeking access to markets for growing production. However, gas markets cannot continue to count on producers to support additional infrastructure development.

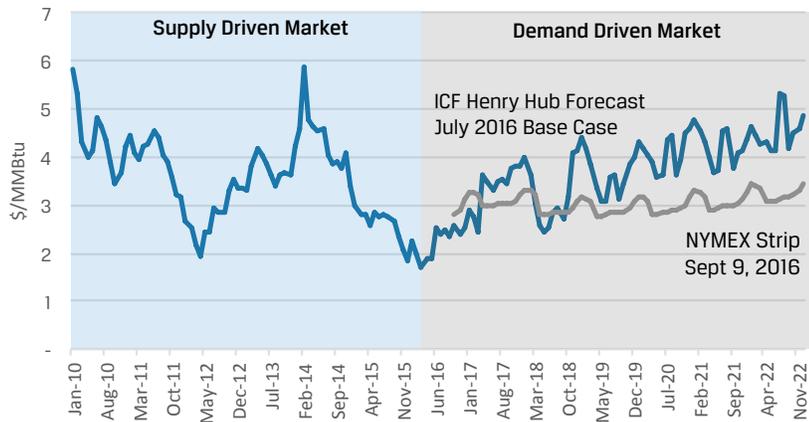
Despite high costs and increasing challenges to pipeline development, ICF's view is that in a majority of new pipeline developments, the balance between costs and benefits is highly favorable to new pipeline capacity from the public interest perspective. In order for local distribution companies (LDCs) and end users to successfully make the case to regulators and other stakeholders to sign up for new pipeline capacity, the full benefits from new pipeline development will need to be supported—including the broad impacts on public interest in addition to the narrower, albeit more traditional criteria related to supply cost, reliability, and diversity.

Pipeline Development Shifting from Producer-Driven to Consumer-Driven Expansions

During the past five years, the expansion of natural gas pipeline capacity has been largely supported by producers that were seeking market access for rapidly growing gas production. New pipeline capacity offered these companies the ability to bypass the constrained local supply areas and sell into demand centers to capture higher realized prices.

The combination of low prices and high levels of investment has resulted in producers possessing weakened balance sheets and reduced liquidity. Weakened balance sheets are making it more difficult for producers to commit to new projects, and downgraded credit scores are reducing the number of producers considered to be creditworthy counterparties by pipeline developers. In addition, the buildout of pipeline capacity, particularly from the Marcellus and Utica regions, is reducing the price impact of any single new pipeline project on individual producers, lowering the benefits to producers associated with holding pipeline capacity.

FIGURE 1. ICF'S HENRY HUB PRICE FORECAST



Sources: NYMEX, ICF Natural Gas Strategic Outlook

This shift away from producer-led pipeline development is also occurring at the same time that the market has reached an inflection point and is beginning to transition to a market that will be more focused on the pace and extent of demand growth. In this demand-driven market, which will be characterized by rising prices, increased seasonal spreads, and increased volatility, LDCs and end users will increasingly benefit from new pipeline expansions. However, given the expected decline in support from producers, development of new pipeline capacity will become increasingly dependent on support from these gas consumers.



Benefits of New Pipeline Development to LDCs and End Users

The benefits associated with new pipeline development cover a broad range and include both indirect and direct benefits to the capacity holder as well as associated benefits to the region's energy consumers and economy. As LDCs and end users begin to take a more prominent role in the development of gas pipelines, a full review of the benefits associated with the pipeline will serve to help to make the case for contracting new pipeline capacity to reduce gas procurement costs.

The shift in traditional supply and pipeline flows as a result of the rapid production growth from the Marcellus and Utica regions has created an opportunity for LDCs to re-optimize their supply portfolios to access new low-cost supply areas. The support of new pipeline capacity can result in significant cost reductions to an LDC's supply purchases by accessing the growing low-cost supply areas and displacing higher cost supply sources in their portfolio.

While reductions to a capacity holder's gas supply portfolio are a primary focus, they are not the only benefit. LDCs and end users will experience additional benefits from the contracting of new pipeline capacity:

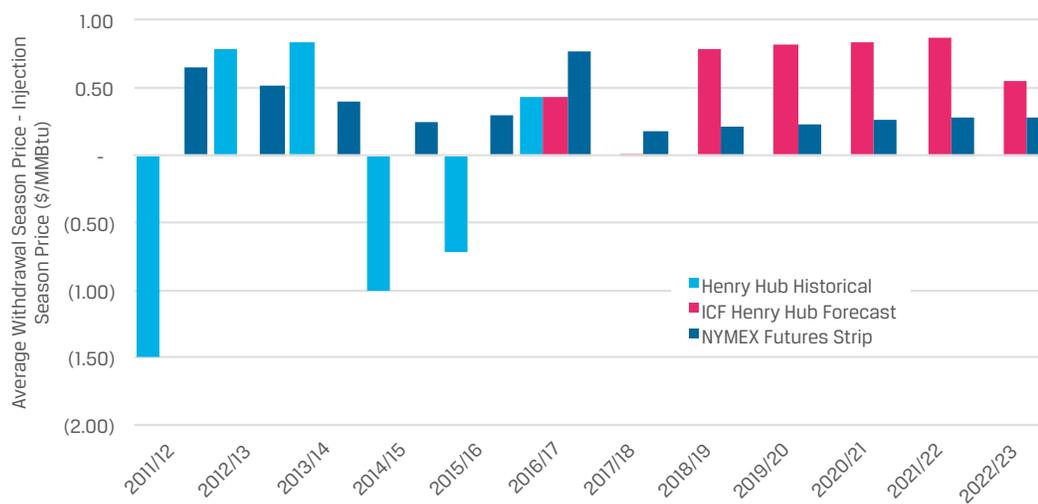
- **Lower gas supply costs to all regional gas consumers.** New pipeline capacity typically results in a decline in regional natural gas prices, which will benefit other area consumers as well as the capacity holder.
- **Gas/electric system integration.** In regions with growth in natural gas power generation demand, higher gas deliverability associated with incremental pipeline capacity may be required to support grid stability and reduce the potential for outages.
- **Electric pricing impacts.** Lower local natural gas prices benefit natural gas power producers and electric consumers who would see lower electricity costs.
- **Reduction in gas price volatility.** New pipeline capacity and access to less volatile supply regions will likely result in reduced regional pricing volatility.
- **Economic growth associated with lower energy prices.** The decline in natural gas and electricity prices can result in a significant boost to the regional economy.
- **Environmental and societal benefits.** There are environmental benefits from the increased use of natural gas over coal in the power sector. Additional gas deliverability is often needed to support the increased penetration of renewable energy, which for reliability purposes may require the quick dispatch capabilities of natural gas.

The Comeback in Seasonal Values to Support Pipeline Values

Since 2011, the futures market has attributed a low value to seasonal gas pricing differentials, trending significantly lower than the observed value from 2010 to 2015. As the natural gas market transitions away from a supply-driven to a demand-driven market, ICF expects that the seasonal value and market for natural gas storage will experience a recovery from the lows of the past few years, as shown in Figure 2, on the following page. In contrast to the NYMEX forward-price forecast, which generally reflects a continuation of recent historical behavior, ICF's price forecast for Henry Hub indicates that seasonal price differentials will grow from 2018 to 2022, exceeding \$1.00 per MMBtu in 2021/2022. Market region seasonality is expected to exceed the seasonality at Henry Hub.

The value of pipeline capacity is expected to increase with the seasonal value of gas and expected level of market area gas price volatility.



FIGURE 2. SEASONAL VALUE OF NATURAL GAS AT HENRY HUB (ICF BASE CASE VS. NYMEX)¹

Sources: NYMEX, ICF Natural Gas Strategic Outlook

The Challenges and Costs of Pipeline Development

Despite broad benefits to the development of new pipeline capacity for LDCs and end users, there are significant risks to contracting for capacity that each participant must weigh against the benefits:

- Signing a long-term capacity agreement creates an immediate fixed-cost commitment and financial burden, which can be a substantial portion of an LDC's non-commodity related expenses.
- Uncertainty regarding the future gas prices and basis can result in the possibility that capacity costs will exceed the LDC or end user's natural gas supply cost savings.
- Given the impacts from different environmental regulations and policy changes, uncertainty over the long-term gas demand can lead to questions on the long-term need for the incremental pipeline capacity.

There are also ongoing challenges to pipeline development. These challenges can include:

- **Reduced ability and desire from producers to fund development.** Low prices and reduced liquidity will limit producers' ability to fund expansions, and some already possess sufficient capacity.
- **Market challenges to contract structuring.** Pipeline projects will experience challenges to securing the firm contracts necessary to justify their construction. In particular, the growth of natural gas demand in the power sector can create challenges due to the more intermittent nature of demand.
- **Increased environmental and political opposition.** There has been a higher degree of scrutiny and legal challenges to recent pipeline development. We expect to see increased opposition to pipeline projects from environmental groups that are strategically targeting midstream development.

LDCs and power utilities that may want to contract for new capacity face additional regulatory and public interest scrutiny related to new capacity agreements. Very few if any end users will be willing to

¹ See the July 2016 ICF Report, *The Big Comeback in Natural Gas Storage*, for additional details on the value of storage.

make long-term commitments to new pipeline capacity in the absence of regulatory assurance of cost recovery. Communication with regulatory authorities of the full benefits and broad impacts on public interest will be an essential competency for LDCs and power utilities in this new market paradigm.

ICF Case Studies on the Benefits of New Pipeline Capacity

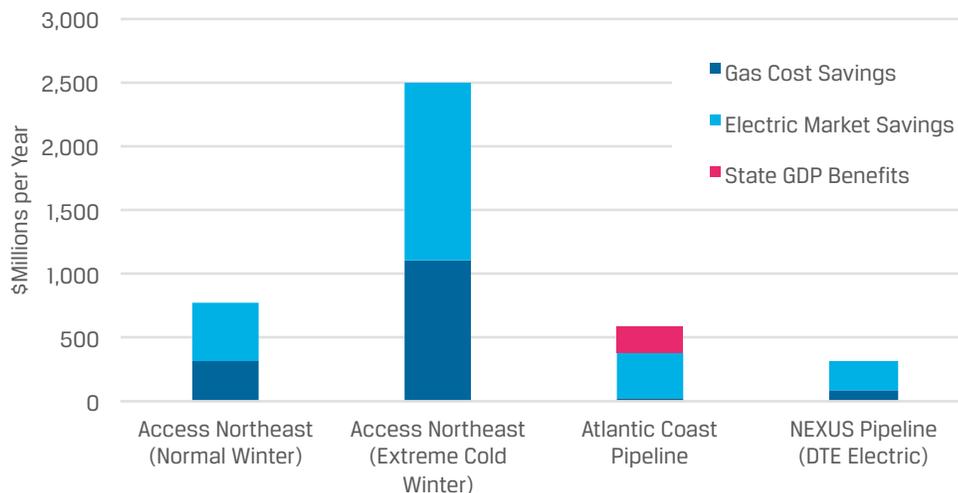
Over the past year, ICF has assessed the costs and benefits of several proposed natural gas pipeline projects, including the NEXUS Pipeline, the Access Northeast Pipeline, and the Atlantic Coast Pipeline. All three of these projects are supported by end users and involve accessing Marcellus and Utica gas supplies for their respective markets in Michigan/Ontario, New England, and the Mid Atlantic.

Each of these projects is projected to result in substantial savings associated with lower gas supply costs for the capacity holders as well as greater savings to the broader group of energy consumers in the markets served by the pipelines.

Figure 3 shows each project's average annual cost savings from gas supply costs and reduced fuel costs in power generation. ICF's analysis of the benefits from the new pipeline indicates that the Access Northeast Pipeline results in an average annual savings to New England energy consumers from \$780 million per year during a year with normal weather and low volatility up to \$2.5 billion per year during a year with extreme cold weather. The Atlantic Coast Pipeline results in an average energy cost savings of \$377 million per year for Virginia and North Carolina consumers as well as about \$218 million per year in incremental economic growth resulting from the lower energy prices. The NEXUS Pipeline results in an average savings of \$315 million per year to Michigan consumers, exclusive of benefits to consumers in other markets served by the pipeline.

The benefits from increased gas/electric reliability, reductions to the area's gas and power price volatility, and associated environmental benefits also add to the direct energy cost benefits shown below.

FIGURE 3. AVERAGE ANNUAL COST SAVINGS FROM NEW PIPELINES^{2,3,4}



Source: ICF

² ICF (2015), "The Economic Impacts of the Atlantic Coast Pipeline," used in public filings by Dominion Transmission.

³ ICF (2015), "Access Northeast Project—Reliability Benefits and Energy Cost Savings to New England Consumers" (cost savings value references the normal weather case), used in public filings by Eversource.

⁴ ICF (2015), "Impact of the NEXUS Pipeline on Michigan Energy Markets," used in public filings by DTE Electric.



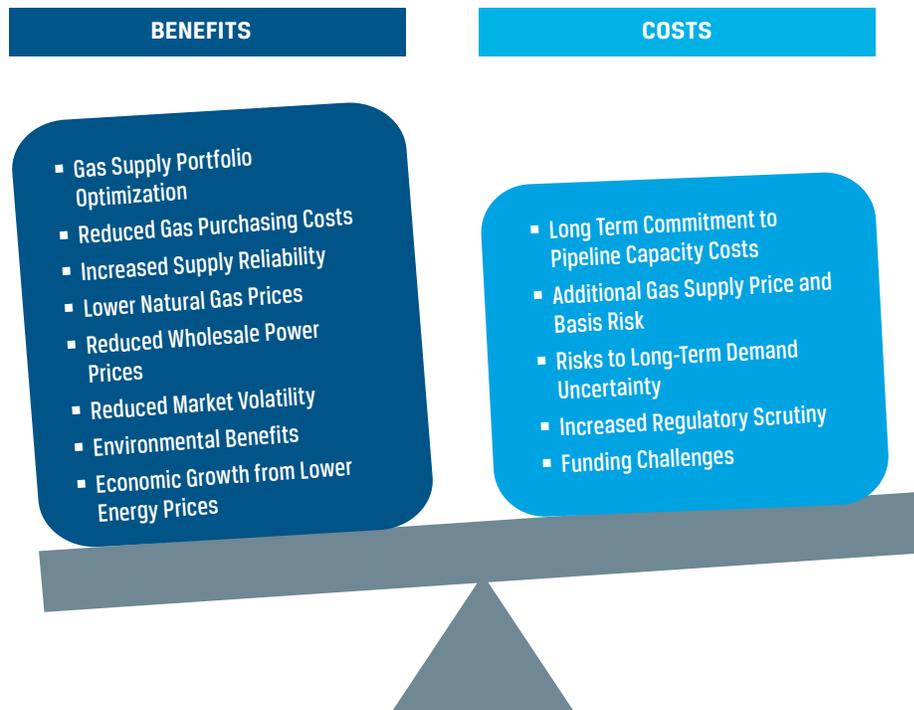
Balancing the Costs and Benefits of Pipeline Development

Changes in natural gas markets are driving a shift in midstream development trends, where producers are becoming less able and less willing to support new infrastructure development through long-term contracts. At the same time, the environmental community and other outside stakeholders are increasingly challenging the value of new pipeline construction. However, the benefits of new pipeline capacity to natural gas consumers continue to be significant.

Despite high costs and increasing challenges to pipeline development, ICF's view is that new pipeline capacity generally provides significant long-term benefits to energy consumers when capacity into regional demand markets is increased. This changing paradigm will result in LDCs and end users needing to take a more active role to support new infrastructure projects if these new projects are to proceed.

In order for LDCs and other regulated end users to successfully make the case that regulators should sanction new pipelines and other infrastructure projects, the full costs and benefits from new pipeline development will need to be considered, including the broad impacts on public interest in addition to the narrower, albeit more traditional criteria related to supply portfolio costs, reliability, and diversity.

FIGURE 4. COSTS AND BENEFITS OF NEW PIPELINE DEVELOPMENT



About ICF

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About the Authors

Michael Sloan has more than 30 years of experience in the energy field. He provides a wide variety of market trend analysis and demand forecasting services to the propane industry, including U.S. propane supply outlook; propane demand assessments at the national, state, and county levels; and market trend analyses on issues related to use per customer, new construction market share, and propane

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Eric Kuhle is a manager with ICF's Energy Advisory Group who works on projects related to NGL and Natural Gas Markets. He has over 8 years of experience in energy related research and consulting and most recently worked at Halliburton's Production Enhancement group in strategy and planning before joining ICF in 2016. Mr. Kuhle has expertise covering the forecasting of natural gas and

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