

2017-2018 Winter Outlook for Natural Gas

Markets Matter

Executive Summary

The Natural Gas Supply Association's (NGSA) *2017-2018 Winter Outlook for Natural Gas* summarizes the association's view of natural gas market conditions and fundamentals. The analysis covers the key points that can affect supply and demand dynamics, which ultimately impact all consumers of natural gas.

Based on publicly available information, NGSA forecasts whether natural gas prices will be subject to upward, downward or level pressure for the upcoming winter of 2017-2018 compared to the winter of 2016-2017, but the association does not forecast actual prices.

Based on an analysis of the weather, economy, consumer demand, production and storage, NGSA expects flat price pressure on the natural gas market in winter 2017-2018 compared to last winter, when the average wholesale price for natural gas at the Henry Hub was \$3.01 per MMBtu – which was the third lowest average winter price in more than a decade.

Colder weather, increased exports and surging production are the most significant factors impacting this winter's forecast for record natural gas demand. Our expectation for neutral winter-over-winter price pressure is based on a forecast for record demand due to 13 percent colder winter weather combined with growth in natural gas exports – however rising production, together with robust storage inventories, will easily match the record demand.

Winter-over-winter increases in demand are also forecasted in the electric sector, primarily driven by more natural gas-fired electric capacity than last winter. A small increase in industrial demand will also contribute, the result of new natural gas-intensive industrial projects and capacity expansions scheduled to come online.

A glance at the natural gas market's major pressure points for winter 2017-2018 reveals:

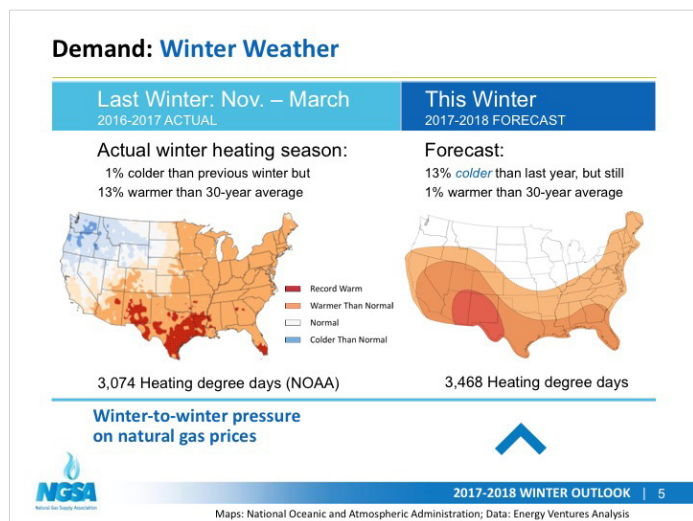
- **WEATHER:** Based on the National Oceanic and Atmospheric Administration (NOAA), Energy Ventures Analysis (EVA) predicts that the continental United States will on average experience a winter that will be 13 percent colder than last winter and 1 percent warmer than the 30-year average. NOAA places last year's five-month winter heating season as the sixth warmest on record. Comparing winter-over-winter, total heating degree days (HDDs) are estimated to be significantly greater this winter than the previous winter, leading to a projection that colder weather will place **upward pressure** on prices.
- **ECONOMY:** Public data anticipates the economy will continue to strengthen, but forecasted GDP growth rate of 2.5 percent is similar enough to last winter's 1.9 percent growth rate that it translates to **neutral pressure** on prices compared to last winter.
- **DEMAND:** When all sectors are combined, **overall natural gas demand** is projected to be 7.3 Bcf/day – about 8 percent – more than the winter of 2016-2017, thus, customer demand is expected to place **upward pressure** on natural gas prices.
 - EVA expects colder weather to increase demand from the *residential and commercial* sectors by 2.8 Bcf/day, an 8 percent increase.
 - EVA forecasts pipeline exports to Mexico, combined with net LNG exports, to increase by 2 Bcf/day.
 - EVA projects an additional 1.6 Bcf/day from the *electric* sector as more new natural gas-fired electric capacity goes into service.
 - EVA further expects slight *industrial* demand growth of 0.3 Bcf/day. Industrial growth is linked to the construction of major gas-intensive facilities and capacity expansions in the petro-chemical and fertilizer industries.
- **STORAGE:** The natural gas industry is on track to reach a robust level by late October or early November, although not quite matching the record end-of-injection season storage level seen last year. Storage is forecasted to place **neutral pressure** on prices.
- **SUPPLY:** EVA projects a substantial increase in total supply of 5.7 Bcf/day due to surging production. The forecasted winter-over-winter increase in supply is expected to result in **downward pressure** on natural gas prices. NGSA emphasized that winter supply, combined with record amounts of natural gas in storage, is ample to meet record winter demand.

All of these projected pressure points are interrelated and a deviation in one affects the other assumptions in this equation.

The following pages provide more detailed information about each of the five factors analyzed in NGSA's 2017-2018 Winter Outlook, as well as a look at possible "wild card" factors and a discussion of natural gas industry trends that transcend this winter.

Weather/Demand

Based on NOAA's current projections for colder winter temperatures, EVA forecasts that on a national average, the winter months will be 13 percent colder than the winter of 2016-2017 – which was the sixth warmest winter heating season on record – and 1 percent warmer than the 30-year average.



On a regional basis, NOAA's weather forecast divides the country into thirds, as pictured in the map above. The northernmost tier, which stretches from western Pennsylvania across the United States to Oregon and Washington state, is forecasted to be cold; the Northeast and middle band of the country is forecasted to be warmer than average; and the southernmost tier covers the bottom half of the country and is projected to be much warmer than average. As a nation, over the full five-month winter heating season (November 2017-March 2018), EVA is forecasting 3,468 heating degree days (HDDs) this winter, compared to a mere 3,074 HDDs last winter. The number of heating degree days is defined as the difference between 65 degrees Fahrenheit and the average outside temperature for that day. Based on the difference in winter-over-winter heating degrees, the forecast is for **weather to put upward pressure** on natural gas prices.

Economy/Demand

This winter, public forecasts anticipate a strengthening economy that will improve on last winter's sluggish growth rate.

A key component of economic health is the Gross Domestic Product (GDP). According to IHS Markit, a nationally recognized economic forecasting firm, the GDP is expected to increase 2.5 percent compared to the winter of 2016-2017, when GDP expanded by 1.9 percent. The difference is not expected to be significant enough to exert pressure on natural gas prices.

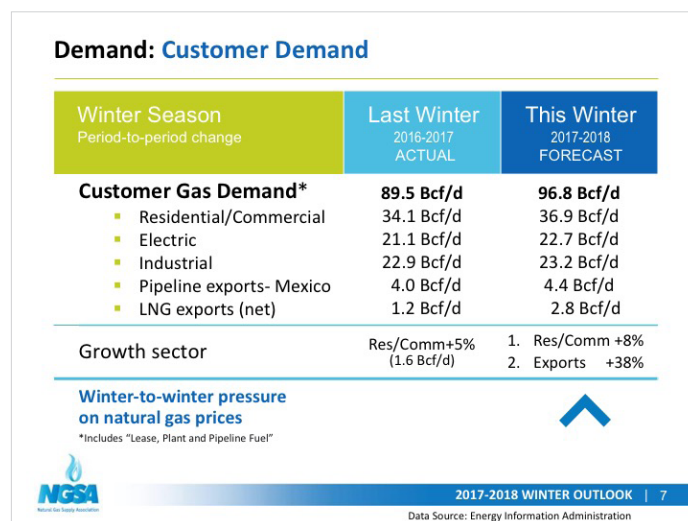
IHS Markit also predicts that manufacturing, an important influence on the GDP, will grow 1.8 percent compared to the winter of 2016-2017, which is a welcome improvement compared to last winter's weak growth of 0.5 percent.

Meanwhile, the latest Consumer Sentiment Index (CSI) shows that consumers feel generally positive about the economy, with the CSI tracking at 97 percent, reflecting consumer optimism that is likely the result of a strong labor market (4.3 percent unemployment), low inflation and a stronger GDP. The Consumer Sentiment Index is a gauge of consumer confidence in the economy conducted for more than 40 years by the University of Michigan.

While these economic indicators generally reflect good news for consumers, the changes are not quite large enough to pressure natural gas prices, although an unexpected upshift in GDP could change the direction of the arrow from flat to upward. NGSA anticipates the **economy will place level winter-over-winter pressure** on natural gas prices.

Overall Customer Demand

An independent demand analysis performed by EVA notes that total demand for natural gas will reach a record that exceeds even the Polar Vortex winter of 2013-2014. EVA forecasts overall winter 2017-2018 demand for natural gas at 96.8 billion cubic feet per day (Bcf/d) compared to 89.5 Bcf/d last winter. A sector-by-sector breakdown follows.

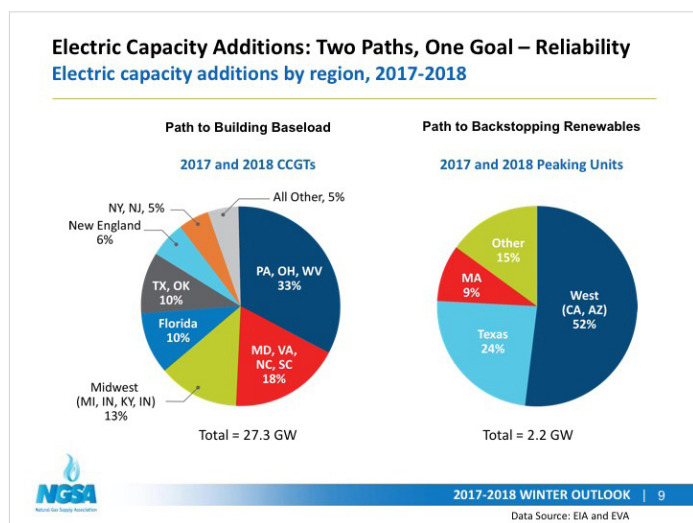


RESIDENTIAL/COMMERCIAL DEMAND: Energy Ventures Analysis (EVA) expects that most of the increased demand will come from the **residential and commercial** sectors, where colder weather is projected to spur a solid increase in demand of 2.8 Bcf/day, which is an 8 percent increase compared to last winter.

ELECTRIC DEMAND: EVA further projects a steady increase in **electric** demand of 1.6 Bcf/day, primarily due to colder weather and an increase in new natural gas-fired electric capacity compared to last winter. Approximately 29.5 Gigawatts of new natural gas-fired electric capacity is in service or projected to go into service in 2017 and 2018. More than 90 percent of that new capacity is in the form of highly-efficient and reliable

combined-cycle gas turbines (CCGTs), with the remaining 7 percent represented by natural gas “peaking” plants that can quickly ramp up and down to backstop renewable energies, which are more dependent on changing weather.

EVA also expects that this winter will mark the tenth consecutive winter that some temporary, economically-driven coal-to-gas switching will occur. Coal-to-gas switching, also known as fuel switching, occurs when electric utilities choose to run natural gas-fired power plants rather than coal plants to generate electricity. Switching is a short-term, temporary decision that is purely an economic choice based on the current price of the competing fuels. Fuel switching is projected to continue this winter, but at about 9 percent less than last winter. Prior to the shale revolution, coal-to-gas switching had never lasted longer than a few days at a time. In contrast, switching has now persisted for nine consecutive years since 2008.

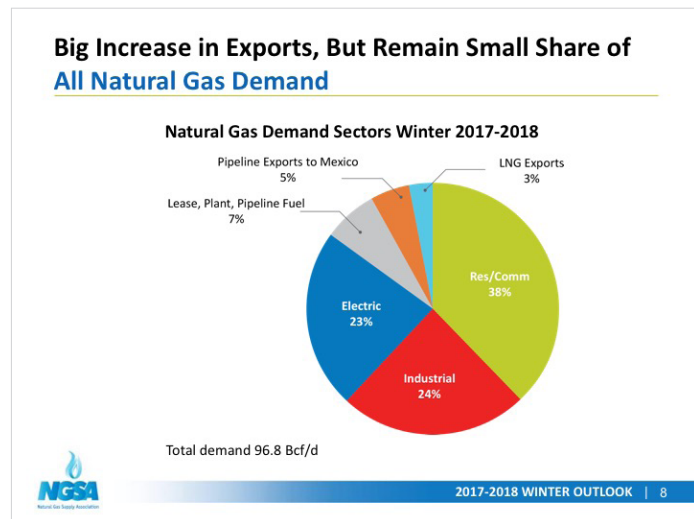


INDUSTRIAL DEMAND: In contrast to winter-over-winter growth in the other sectors, EVA expects to see a relatively small increase in **industrial** demand of 0.3 Bcf/day this winter. While a small winter-over-winter increase, nevertheless overall industrial demand for natural gas is record-setting. This winter’s growth in industrial demand is linked to the completion of major natural gas-intensive facilities and capacity expansions in the petro-chemical and fertilizer industries, primarily due to industries expanding to take advantage of affordable, natural gas in the United States.

EVA’s analysis of **industrial** demand includes a look beyond this winter at projected demand from new industrial builds and capacity. EVA forecasts that from 2016-2022, natural gas will spur industrial investment of \$135 billion to build 59 new projects and 11 expansions, primarily in the petrochemical, fertilizer, steel and gas-to-liquids sectors, which would be an overall increase of 4.3 Bcf/day in demand by 2022. This increased demand from new industrial projects does not include the 48 new projects already completed between 2010 and 2015, which by themselves represent an investment of \$28 billion and additional industrial consumption of 1.6 Bcf/day.

EXPORTS: The last and most historic demand factor is winter **exports** of natural gas. In addition to exporting an anticipated

4.4 Bcf/day by pipeline to Mexico this winter, the U.S. is also forecasted to be a net exporter of 2.8 Bcf/day of liquefied natural gas (LNG). Although a historic shift, the amount of LNG to be exported is projected to remain merely a small (3%) slice of overall demand. EVA projects LNG exports to reach 7 Bcf/day by 2019.



When customer demand from *exports*, the *electric*, *industrial*, and *residential/commercial* sectors are combined, overall demand averages 7.3 Bcf/day – about 8 percent – more than last winter.

Overall customer demand is expected to place upward pressure on prices this winter.

Storage/Supply

Traditionally, underground natural gas **storage** has allowed companies to purchase and physically stockpile natural gas supplies in the spring and summer for use during the winter when demand for natural gas space heating is at its peak.

Going into the winter heating season, it is projected that 3,850 Bcf of natural gas will be in storage. This level is similar enough to last winter’s level of 3,986 Bcf in storage to have little impact on prices. Storage always serves as an important hedging and reliability tool during the winter heating season. The similarity in abundant storage levels is expected to place **neutral pressure** on natural gas prices this winter.

Winter Sources/Production and Imports

Turning to natural gas winter supply, EIA expects domestic **production** to increase substantially compared to last winter, reflecting increased drilling activity. As a result, domestic natural gas supply this winter is forecasted to be 76.4 Bcf/day, an 8 percent increase over last winter’s 70.7 Bcf/day.

Robust production levels are reflective of continuous improvement in technology and drilling efficiencies.

The 2017-2018 Winter Outlook also predicts a moderately-sized, but important, contribution from Canadian imports of 5.5 Bcf/day.

Supply: Winter Production and Imports

| Winter Season Period-to-period change | Last Winter 2016-2017 ACTUAL | This Winter 2017-2018 FORECAST |
|--|---------------------------------|--------------------------------------|
| Winter average production (Lower 48) | 70.7 Bcf/d | 76.4 Bcf/d |
| Canadian imports (net) | 5.5 Bcf/d | 5.5 Bcf/d |

Winter-to-Winter pressure
on natural gas prices



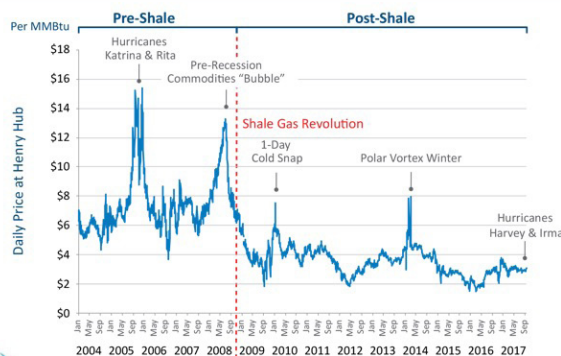
2017-2018 WINTER OUTLOOK | 12
Data Source: Energy Ventures Analysis

In summary, robust winter production and imports will place **downward pressure** on natural gas prices compared to the winter of 2016-2017.

Hurricanes Harvey and Irma

NGSA's forecast also examined the impact of Hurricanes Harvey and Irma on natural gas production, finding that market impacts were generally limited to the demand side, instead of the supply side, which quickly rebounded. The chart below contrasts the remarkable difference in the impact of hurricanes on the natural gas market since the shale revolution.

Comparison of Hurricane Impact on Daily Prices What a Difference a Decade Makes



2017-2018 WINTER OUTLOOK | 14
Data Source: Gas Daily

NGSA emphasized that winter supply remains ample to meet customer demand, with natural gas storage providing further responsiveness and flexibility in the market.

"Wild Card" Market Factors

There are always a few "wild card" factors that can influence the market, in addition to the fundamentals addressed in this Outlook.

This winter's wild cards include:

- Unexpected cold – or warm – snaps could affect residential/commercial demand and electric demand;
- Geopolitical events that affect the economy.

Summary of Key Factors

In conclusion, NGSA's analysis of varying data indicates **overall flat pressure on natural gas prices this winter compared with last winter's average Henry Hub price of \$3.01 per MMBtu**. A recap of the five major pressure points reveals:

- Colder winter weather than last winter. — UPWARD PRESSURE
- Overall demand — residential/commercial demand expected to grow 8 percent, electric demand to grow 8 percent, industrial demand only slightly, and Mexican and LNG exports to increase by a combined 2 Bcf/day. — UPWARD PRESSURE
- Supply surges compared to last winter, due to increased drilling activity. — DOWNWARD PRESSURE
- Economy grows steadily, but not hugely. — NEUTRAL PRESSURE
- Storage at robust inventories, like last winter. — NEUTRAL PRESSURE

OVERVIEW: Responsive Flexible Natural Gas Market

- Record demand to surpass Polar Vortex winter 2013-2014
 - Residential/commercial demand increases
 - Exports – LNG and pipeline—increase, but remain small slice of overall demand; provide stability in market demand
 - Growth in electric and industrial sectors buoyed by new plants and expansions
- Robust winter supply and storage ample to meet demand
 - Efficiencies in drilling and production continue to make wells productive at low cost
 - Diverse supply sources contribute to greater flexibility and resilience post-Harvey and Irma
 - Storage provides further flexibility

The Natural Gas Supply Association (NGSA) represents integrated and independent companies that produce and market natural gas in the United States. Founded in 1965, NGSA is the only national trade association that solely focuses on producer-marketer issues related to the downstream natural gas industry.

For more information, please visit www.ngsa.org or contact us directly.

Markets Matter: Representing America's Major Producers and Suppliers of Natural Gas Since 1965.



Representing America's Major Producers and Suppliers of Natural Gas Since 1965
1620 Eye Street, NW » Suite 700 » Washington, D.C. 20006 » www.ngsa.org
202.326.9314 » Scott Moore, Chairman » Dena Wiggins, President and CEO