



## Short-Term Energy Outlook (STEO)

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### Forecast highlights

#### *Global liquid fuels*

- Implied global petroleum and liquid fuels inventories are estimated to have increased by 0.8 million barrels per day (b/d) in 2016. EIA expects the oil market to be relatively balanced in 2017 and 2018, with inventory draws averaging 0.1 million b/d in 2017 and builds averaging 0.2 million b/d in 2018. The revised forecast, which reduces average inventory builds from last month's outlook, resulted from changes to estimates of historical global liquid fuels consumption that created a higher base for consumption during recent years and the forecast period. See [International Data Revisions and the STEO Forecast](#) for more discussion about this change.
- U.S. crude oil production averaged an estimated 8.9 million b/d in 2016. U.S. crude oil production is forecast to average 9.0 million b/d in 2017 and 9.5 million b/d in 2018.
- Benchmark North Sea Brent crude oil spot prices averaged \$55/barrel (b) in January, a \$1/b increase from December. This price was \$24/b higher than the January 2016 average, and it was the highest monthly average for Brent spot prices since July 2015.
- EIA forecasts Brent crude oil prices to average \$55/b in 2017 and \$57/b in 2018. West Texas Intermediate (WTI) crude oil prices are forecast to average about \$1/b less than Brent prices in 2017. The NYMEX contract values for April 2017 delivery traded during the five-day period ending February 2 suggest that a range from \$45/b to \$65/b encompasses the market expectation of WTI prices in April 2017 at the 95% confidence level.
- U.S. regular gasoline retail prices are expected to decrease from an average of \$2.35/gallon (gal) in January 2017 to an average of \$2.27/gal in February and then rise to \$2.33/gal in March. U.S. regular gasoline retail prices are forecast to average \$2.39/gal in 2017 and \$2.44/gal in 2018.

#### *Natural gas*

- U.S. dry natural gas production is forecast to average 73.7 billion cubic feet per day (Bcf/d) in 2017, a 1.3 Bcf/d increase from the 2016 level. This increase reverses a 2016

production decline, which was the first decline since 2005. Natural gas production in 2018 is forecast to increase by an average of 4.1 Bcf/d from the 2017 level.

- In January, average Henry Hub natural gas spot prices fell by 29 cents per million British thermal units (MMBtu) from December levels to \$3.30/MMBtu. Mild January temperatures, which were the warmest since 2006, contributed to lower prices.
- Increasing capacity for natural gas-fired electric generation, growing domestic natural gas consumption, and new export capabilities contribute to the forecast Henry Hub natural gas spot price rising from an average of \$3.43/MMBtu in 2017 to \$3.70/MMBtu in 2018. NYMEX contract values for April 2017 delivery traded during the five-day period ending February 2 suggest that a price range from \$2.42/MMBtu to \$4.38/MMBtu encompasses the market expectation of Henry Hub natural gas prices in April 2017 at the 95% confidence level.

### *Electricity, coal, renewables, and emissions*

- Total U.S. electricity generation from utility-scale plants averaged 11,150 gigawatthours per day in 2016. Forecast U.S. generation declines by 0.1% in 2017, then grows by 1.5% in 2018.
- EIA expects the share of U.S. total utility-scale electricity generation from natural gas will fall from 34% last year to an average of 32% in 2017 as a result of higher expected natural gas prices. The forecast natural gas share is forecast to rise slightly to 33% in 2018. Coal's generation share rises from 30% in 2016 to average 31% in both 2017 and 2018. Nonhydropower renewables are forecast to provide 9% of electricity generation in 2017 and 10% in 2018. The generation share of hydropower is forecast to be relatively unchanged from 2017 to 2018, and the nuclear share declines slightly in 2018.
- The U.S. residential electricity price averaged 12.3 cents per kilowatthour (kWh) in January 2017 and is expected to average 12.5 cents/kWh in the first quarter of 2017. EIA expects the annual average U.S. residential electricity price to increase by 3.0% in 2017 and by 2.4% in 2018.
- U.S. coal production is estimated to have declined by 158 million short tons (MMst) (18%) in 2016 to 739 MMst, which would be the lowest level since 1978. EIA expects growth in coal-fired electricity generation to contribute to a 3% increase in coal production in 2017. Coal production is expect to increase by 1% in 2018.
- [Coal exports](#) in November 2016 totaled 6.6 MMst, which was 35% higher than in October and 39% higher than coal exports in November 2015. Despite the monthly and year-over-year increases, EIA estimates that U.S. coal exports declined by 20% in 2016

to 59 MMst, the lowest level since 2009. Exports are expected to average 51 MMst in 2017 and 50 MMst in 2018.

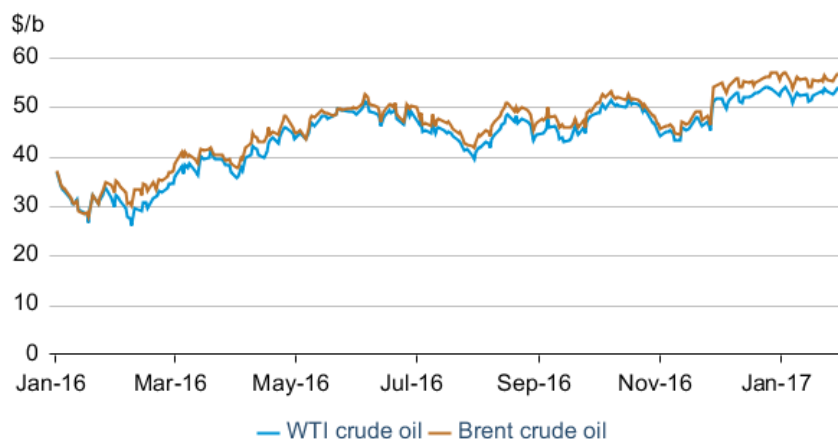
- Wind energy capacity at the end of 2016 was 81 gigawatts (GW). EIA expects capacity additions in the next two years will bring total wind capacity to 94 GW by the end of 2018.
- After declining by 1.7% in 2016, energy-related carbon dioxide (CO<sub>2</sub>) emissions are projected to increase by 0.3% in 2017 and by 1.4% in 2018. Energy-related CO<sub>2</sub> emissions are sensitive to changes in weather, economic growth, and energy prices.

## Petroleum and natural gas markets review

### Crude oil

**Prices:** Global crude oil prices traded within a relatively narrow range in January compared with recent history. Brent crude oil prices increased by \$1.09 per barrel (b) from January 3 to settle at \$56.56/b on February 2. U.S. benchmark crude oil West Texas Intermediate (WTI) increased \$1.21/b over the same period, settling at \$53.54/b (**Figure 1**). Brent and WTI average spot prices in January were both about \$1/b higher compared with December averages.

**Figure 1. Crude oil front-month futures prices**



eia Bloomberg L.P.

The relatively stable prices in January came as oil market participants assessed news and data on the status of supply from countries participating in the production cuts by the Organization of the Petroleum Exporting Countries (OPEC) and non-OPEC countries. The [Joint Ministerial Monitoring Committee \(JMMC\)](#), a body of three representatives from OPEC and two representatives from non-OPEC countries established to monitor compliance with the agreement to reduce crude oil production by 1.8 million barrels per day (b/d), met on January 22. At the meeting, the countries affirmed commitments to shoulder their share of the production cuts originally announced in November and December. The JMMC plans to provide

monthly updates on each country's production data and to monitor adherence to the agreed-upon production levels. In addition to statements from OPEC and non-OPEC officials announcing that production targets were met, oil tanker traffic data also indicate a possible reduction in oil being exported from the Middle East to customers in Asia, although official data will not be available for several months. With petroleum product demand forecast to grow at a faster rate in 2017 than in 2016, global oil markets appear closer to balance than at any time in the recent past.

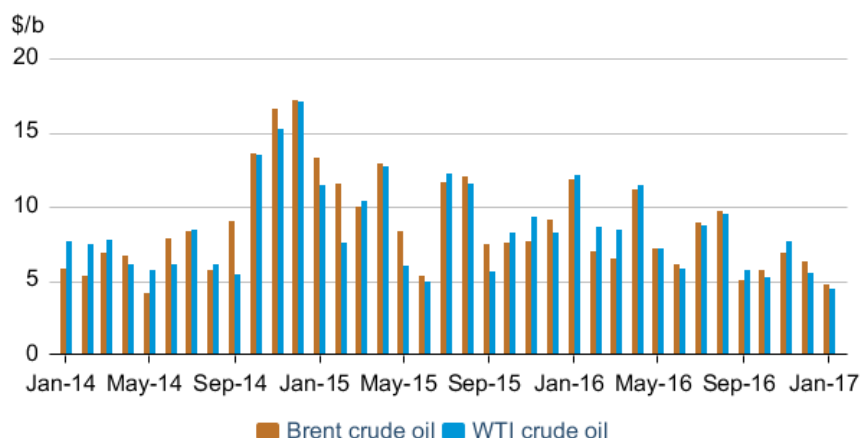
For this STEO, EIA incorporated [significant revisions to historical liquid fuel consumption](#) and supply. These revisions, from 2013–14, create a higher baseline from which 2015–16 STEO consumption is estimated. Notably, the revisions include an upward adjustment to 2016 Chinese oil consumption and supply of 0.7 million b/d and 0.4 million b/d, respectively, as well as other revisions to consumption outside the Organization for Economic Cooperation and Development (OECD).

These revisions were incorporated into the historical data in this month's STEO and are contributing to forecasts of tighter supply and demand balances. EIA now estimates that global liquid fuels inventories increased by an average of 0.8 million b/d in 2016, down from the previous estimate of 0.9 million b/d. More importantly, EIA now expects the global oil market to be largely in balance in 2017 and 2018 with implied global inventories forecast to draw by 0.1 million b/d and build by 0.2 million b/d in those years, respectively. Previously, EIA had forecast small annual average builds in both 2017 and 2018, notwithstanding draws during the third quarters of both years.

The historical revisions to consumption and the projection of a balanced market sooner compared with the previous STEO do not significantly change the crude oil price projection. This implies that current crude oil price levels are near the point where the market balances, allowing U.S. and OPEC production to increase to meet higher demand in 2017 and 2018. The current Brent crude oil price projections of \$55/b and \$57/b in 2017 and 2018, respectively, contribute to a roughly balanced market through the projection period.

Crude oil price volatility declined in December and continued declining in January. All front-month crude oil transactions traded in the mid-\$50/b range in January, with Brent crude oil prices trading in the narrowest range since May 2014 and WTI prices trading in the narrowest range since December 2006 (**Figure 2**). The narrow trading range further suggests buyers and sellers increasingly agree that a mid-\$50/b oil price is sufficient to balance the oil market, as global demand continues growing at a robust pace and producers begin to increase investments in new production. EIA forecasts a 0.2 million b/d decline in global inventories in the first quarter of 2017, in contrast to the estimated 1.5 million b/d stock build during the same period in 2016.

**Figure 2. Monthly crude oil price trading ranges**



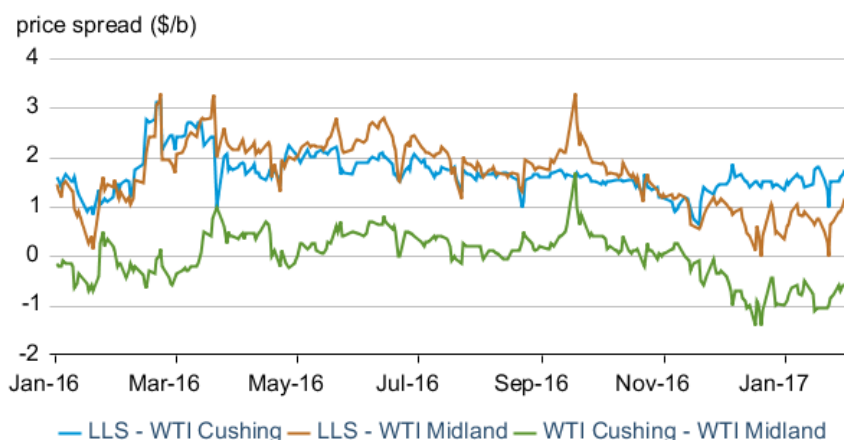
eia Bloomberg L.P.

**Crude oil supply and price spreads:** Total OPEC supply is expected to increase by 0.2 million b/d in 2017 and by 0.5 million b/d in 2018. Recent estimates of production from Libya, which is not subject to any production target under the OPEC production cut agreement, average almost 0.7 million b/d in January, the country’s highest production level since 2014. Saudi Arabia recently announced it is meeting its production target, and the country is estimated to have produced slightly less than 10.0 million b/d in January.

U.S. crude oil production is expected to increase by 0.1 million b/d in 2017 year-over-year and by 0.5 million b/d in 2018. The U.S. oil-directed rig count increased by 41 rigs in January, the eighth consecutive monthly increase and the first year-over-year increase since December 2014, according to Baker Hughes.

Prices for WTI Midland, a crude oil produced in West Texas, strengthened compared with similar light sweet crude oils at different delivery hubs, as represented by a decline in the WTI Cushing-WTI Midland differential and Light Louisiana Sweet (LLS)-WTI Midland differential (**Figure 3**). Recent movements in U.S. crude oil price differentials could be reflecting infrastructure developments and changes in oil market trade flows. Trade press reports that since a new export terminal opened at Ingleside, Texas (at the Port of Corpus Christi in the third quarter of 2016), producers in the Midland area of Texas have been able to ship crude oil directly to the export terminal via the Cactus pipeline, bypassing the Cushing storage and pipeline hub. Four-week average U.S. exports of crude oil [increased 0.2 million b/d since the beginning of December](#), with trade press reporting an increase in exports to Europe and Latin America. Increased flexibility in exporting directly out of the Port of Corpus Christi could keep the low price difference of WTI Cushing compared with WTI Midland unless barrels are needed for Midcontinent refineries. WTI Midland prices reached parity with LLS crude oil prices in December and January, which suggests that buyers are increasingly able to purchase WTI Midland for delivery out of the new export terminal directly.

**Figure 3. U.S. crude oil price differentials**



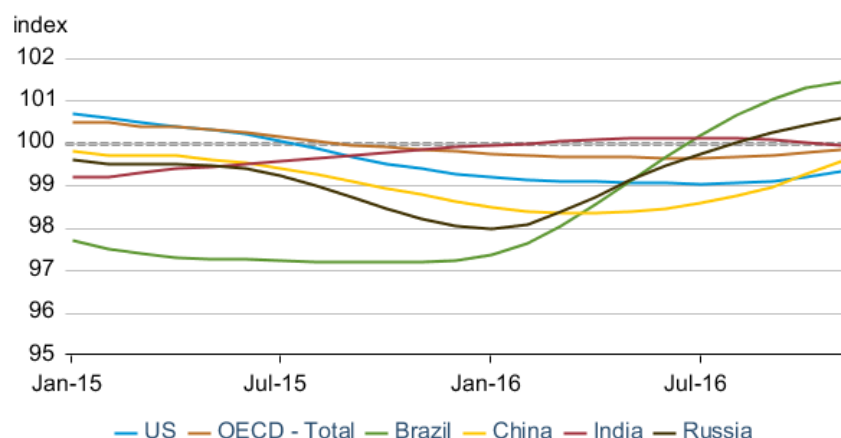
eia Bloomberg L.P.

**Liquid fuels consumption and economic leading indicators:** In the February STEO, global liquid fuels consumption is expected to grow by 1.6 million b/d in 2017 and by 1.5 million b/d in 2018. The projection for real oil-weighted world GDP growth is 2.7% in 2017 and 3.0% in 2018. Many economic and financial data series point to improved future economic growth for both developed and emerging market economies, which supports the oil consumption growth outlook.

The OECD provides [monthly composite leading indicators](#) for the economic growth of every member OECD country and several emerging market economies. Each composite leading indicator is composed of data series unique to each respective country, with an index of 100 representing that country's long-term economic growth. These indicators are constructed so that peaks and troughs in the series could [signal a change in the country's business cycle](#) six to nine months ahead of time.

The composite leading indicator for OECD countries as a group has been rising since June 2016 (**Figure 4**), implying that economic activity for those countries collectively could strengthen in the near term. The composite leading indicators for emerging markets, with the exception of India, have been rising since late 2015 and early 2016. The leading indicators for Brazil and Russia are above 100, potentially signaling that economic activity could be above their long-term average this year as their economies begin to recover from recessions.

**Figure 4. OECD Composite Leading Indicators**



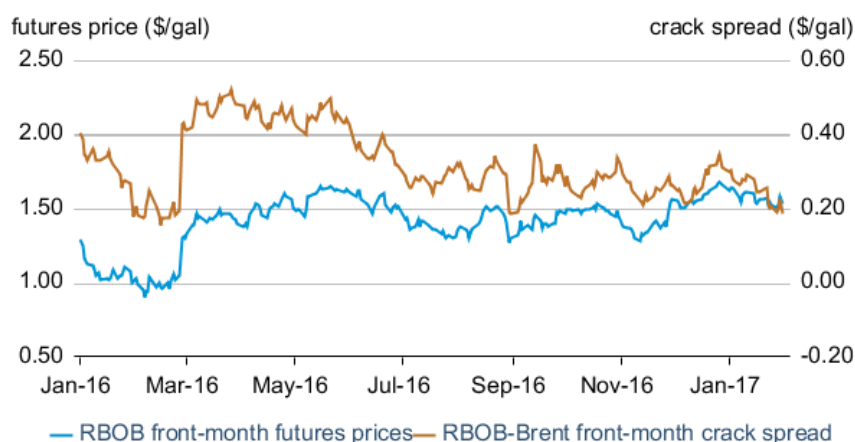
eia Organization for Economic Cooperation and Development

## Petroleum products

**Gasoline Prices:** The front-month futures price of reformulated blendstock for oxygenate blending (RBOB, the petroleum component of gasoline used in many parts of the country) declined 9 cents per gallon (gal) from January 3 to settle at \$1.53/gal on February 2 (**Figure 5**). The RBOB-Brent crack spread (the difference between the price of RBOB and the price of Brent crude oil) declined by 11 cents/gal over the same period.

The RBOB-Brent crack spread declined from December to January for the first time since 2011, as [lower domestic gasoline consumption](#) and rising gasoline inventory levels contributed to lower RBOB prices. U.S. gasoline consumption typically falls to its seasonal low in January. However, EIA estimates the decline in gasoline consumption this year between December and January was 57% larger than the average decline over the past five years, falling by almost 0.6 million b/d. [Total U.S. gasoline stocks](#) rose to 257 million barrels for the week ending January 27, the second highest for any week based on data going back to 1990.

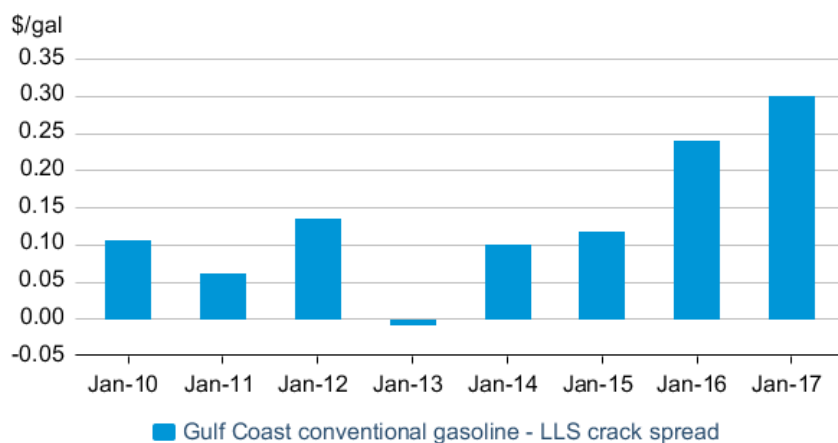
**Figure 5. Historical RBOB futures prices and crack spread**



eia Bloomberg L.P., RBOB=reformulated blendstock for oxygenate blending

**Gulf Coast gasoline crack spreads:** Because of lower domestic gasoline consumption, gasoline crack spreads in the futures market and in the New York Harbor spot market (the delivery hub of the RBOB futures contract), are below levels seen last year at this time. In contrast, gasoline crack spreads on the U.S. Gulf Coast are higher than last year because strong international demand is countering weak domestic demand. Most of the gasoline exported from the United States is [exported from the U.S. Gulf Coast](#). Since the second half of 2016, [U.S. gasoline exports](#) have increased significantly, reaching more than 1 million b/d during some weeks in December and January. Despite recent lower domestic gasoline consumption, increased overseas demand has pushed gasoline crack spreads on the U.S. Gulf Coast to a record high for the month of January. The Gulf Coast conventional gasoline–LLS crack spread averaged 30 cents/gal in January (Figure 6), 6 cents/gal higher than last January when domestic gasoline consumption was comparatively stronger.

**Figure 6. Gulf Coast conventional gasoline - LLS crack spread**



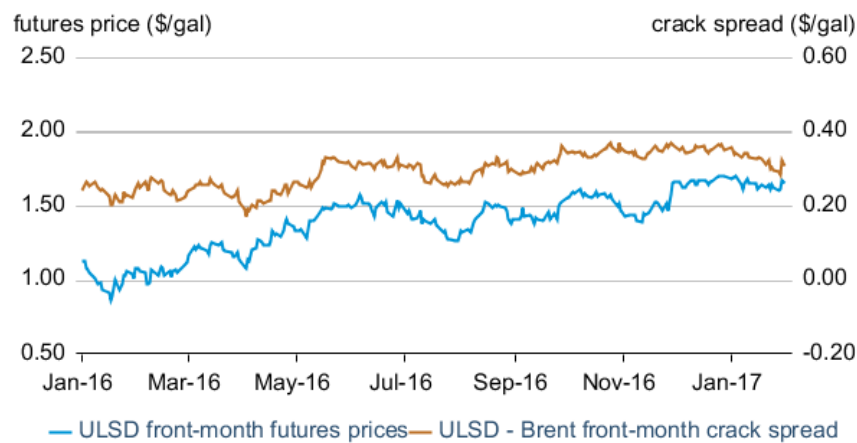
eia Bloomberg L.P.



**Ultra-low Sulfur Diesel Prices:** The front-month futures price for the New York Harbor ultra-low sulfur diesel (ULSD) contract declined 2 cents/gal from January 3 to settle at \$1.65/gal on February 2. The ULSD-Brent crack spread also declined over the same period (**Figure 7**).

With [warmer-than-normal January temperatures](#) in much of the United States, distillate consumption declined because of lower demand for home heating. EIA estimates distillate consumption averaged 3.8 million b/d in January, the third lowest level for that month in the past 15 years. Both total [U.S. distillate stocks](#) and distillate stocks in the U.S. Northeast, the region that uses the most distillate for home heating, set new five-year highs in January.

**Figure 7. Historical ULSD futures price and crack spread**

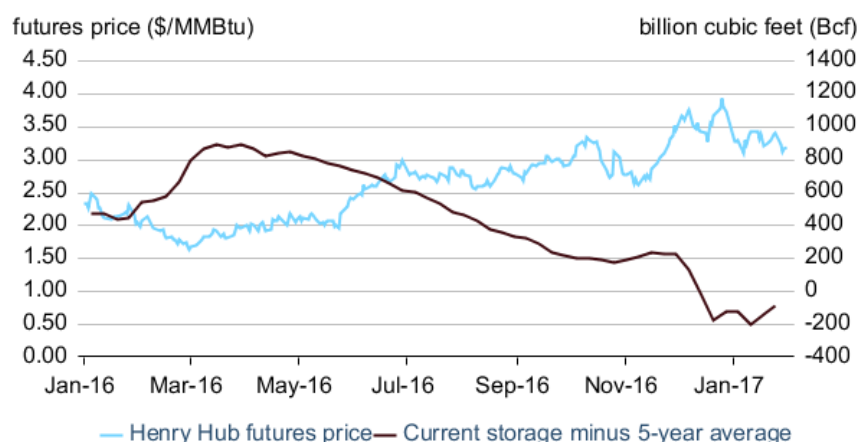


 Bloomberg L.P., ULSD=ultra-low sulfur diesel

## Natural gas

**Prices and inventories:** The front-month natural gas contract for delivery at Henry Hub decreased by 14 cents per million British thermal units (MMBtu) from January 3 and settled at \$3.19/MMBtu on February 2 (**Figure 8**). The monthly average natural gas spot price in January decreased by 29 cents/MMBtu from the December average.

**Figure 8. U.S. natural gas prices and storage**

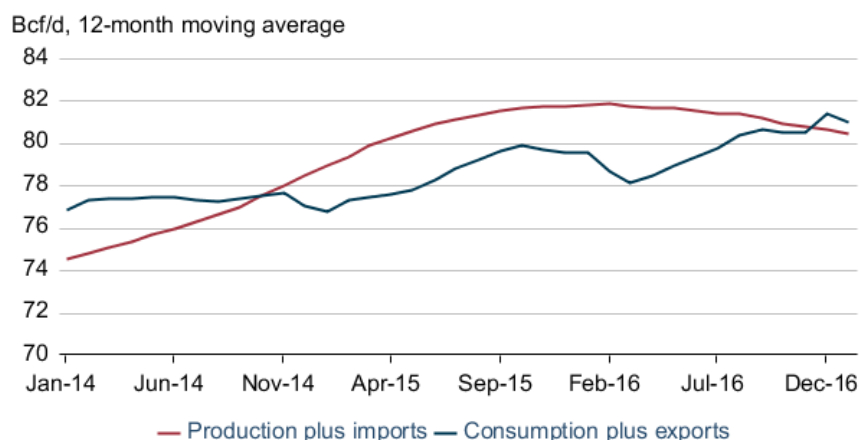


eia U.S. Energy Information Administration, Bloomberg L.P.

Prices traded in a more narrow range in January compared with December because of milder weather across the Lower 48 states, which put downward pressure on prices, while tightening supply-demand fundamentals kept upward pressure on prices. U.S. population-weighted heating degree days (HDD) were 16% below normal, the warmest January since 2006. At the same time, reduced natural gas production and increased export volumes relative to last year contributed to lower inventory levels. Lower 48 inventories fell below the five-year average in the week ending December 23, 2016 for the first time since May 2015 and remained below the five-year average until January 27, 2017.

**Market fundamentals:** The 12-month moving average of natural gas consumption plus exports surpassed that of production plus imports in December 2016 for the first time since September 2014 (**Figure 9**). EIA projects this trend to continue through June 2018, keeping upward pressure on natural gas prices. Lower natural gas prices in the summer of 2016 contributed to both a slowdown in production and [increased consumption of natural gas in the power generation sector](#). In addition, [new export capabilities](#) led to expanded natural gas exports.

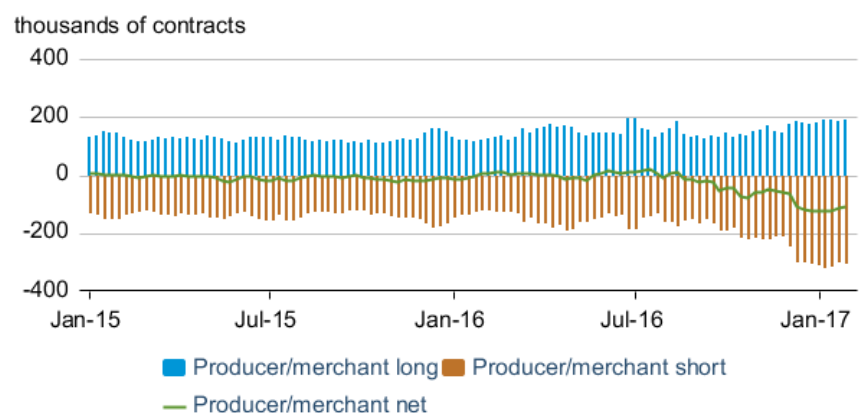
**Figure 9. Natural gas market fundamentals**



eia U.S. Energy Information Administration

**Producer/merchant open interest:** A tightening market and higher natural gas prices have contributed to greater interest by producers in increasing natural gas production. Short positions held by producers and merchants rose to 317,565 contracts on January 10, 2017, the highest level since at least June 2006 (**Figure 10**). A [short position](#), or the selling of a futures contract, allows the holder to lock in a future price for a commodity today, which producers can use as a way to hedge or mitigate price risk. Increased short positions may indicate that current futures prices are seen as sufficient to generate positive returns from drilling projects. According to Baker Hughes, the U.S. natural gas rig count rose to 145 for the week ending February 3, 79% above the record low point in August 2016.

**Figure 10. Producer/merchant open interest in natural gas futures contracts**



eia U.S. Energy Information Administration, U.S. Commodity Futures Trading Commission, Bloomberg L.P.

## Notable forecast changes

- Implied global petroleum and liquid fuels inventories are estimated to have increased by 0.8 million barrels per day (b/d) in 2016. EIA expects the oil market to be relatively balanced in 2017 and 2018, with inventory draws averaging 0.1 million b/d in 2017 and builds averaging 0.2 million b/d in 2018. The revised forecast, which reduces average inventory builds from last month's outlook, resulted from changes to estimates of historical global liquid fuels consumption that created a higher base for consumption during recent years and the forecast period. See [International Data Revisions and the STEO Forecast](#) for more discussion about this change.
- Indonesia's membership in OPEC was suspended as of the group's November 30, meeting. In this STEO, Indonesia's production volumes have been removed from OPEC total for both history and the forecast.
- EIA forecasts U.S. Lower 48 crude oil production to average 6.88 million b/d in 2017 and 7.29 million b/d in 2018, which are 70,000 b/d and 310,000 b/d higher, respectively, than in the previous forecast. The higher forecast reflects slightly higher forecast oil prices and higher rig efficiencies. Based on revised assumptions related to the decline rates of producing fields and to projections related to announced discoveries, Gulf of Mexico crude oil production is expected to average 1.63 million b/d in 2017, 100,000 b/d lower than previously expected. The 2018 Gulf of Mexico crude oil production forecast of 1.77 million b/d in 2018 is down by 90,000 b/d from the previous forecast. The net result of these changes is that EIA expects total U.S. crude oil production to average 8.98 million b/d in 2017 and 9.53 million b/d in 2018, levels that are 20,000 b/d lower and 230,000 b/d higher, respectively, than previously forecast.
- Natural gas plant production of hydrocarbon gas liquids (HGL) is 50,000 b/d higher in 2017 and 110,000 higher in 2018 than in the previous forecast, which results in higher HGL export growth and inventory levels compared with the previous forecast. Given a wider spread between natural gas prices and crude oil prices in this STEO, producers are expected to be more focused on natural gas resources with a higher concentration of liquids, which contributes to higher natural gas plant production throughout the forecast period. Stronger growth in natural gas production is expected to further increase HGL production in 2018.
- For more information, see the [detailed STEO table of forecast changes](#).

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