

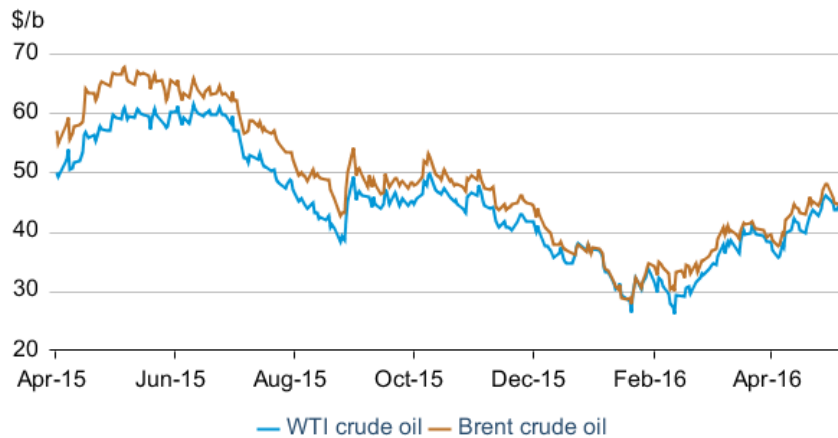


## Short-Term Energy Outlook Market Prices and Uncertainty Report

### Crude Oil

**Prices:** Crude oil prices continued upward and reached the highest levels of the year. The North Sea Brent front-month futures price rose \$6.34 per barrel (b) from April 1 to settle at \$45.01/b on May 5 (**Figure 1**). The West Texas Intermediate (WTI) front-month futures price rose \$7.53/b and settled at \$44.32/b over the same period.

**Figure 1. Historical crude oil front month futures prices**



Early data on petroleum product consumption in 2016 suggest that last year's strong growth may continue this year. U.S. gasoline product supplied grew by 2.9% in January and February combined compared to the same time last year and weekly estimates in March and April suggest this growth continued into the early spring. Estimates for petroleum product consumption in India also show robust year-over-year increases, and upward revisions to the Indian consumption forecast are supported by expectations for strong economic growth in 2016 and 2017. On the supply side, [U.S. production](#) declined for the fifth consecutive month in February and more disruptions to international supply disruptions reduced crude oil production, leading to expectations for a tighter market going forward.

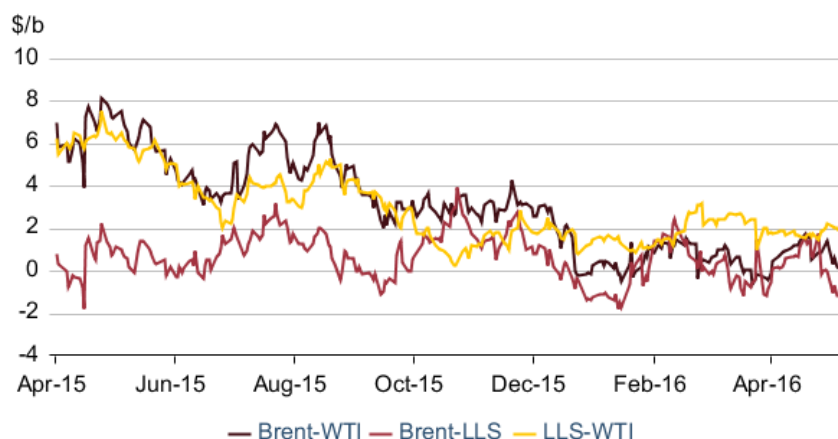
This is a regular monthly companion to the EIA *Short-Term Energy Outlook*

(<http://www.eia.gov/forecasts/steo/>)

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Louisiana Light Sweet (LLS) crude oil prices rose more than other crude oils and is trading at a premium to Brent. The Brent-LLS spread settled at  $-\$1.21/\text{b}$  on May 5, with LLS increasing by more than  $\$3/\text{b}$  compared with Brent since mid-April (**Figure 2**). Stronger LLS prices may lead to increased imports into the U.S. Gulf Coast Petroleum Administration for Defense District (PADD 3) in the coming weeks as PADD 3 refineries start to purchase crude oil ahead of the expected seasonal increase in runs to make gasoline for the summer driving season. LLS prices also strengthened against other North American benchmarks, with the LLS-WTI spread settling near  $\$2/\text{b}$  on May 5. Refineries in the Midwest (PADD 2) ran less crude oil in April compared with previous years, with the [four-week average refinery utilization](#) 7 percentage points below the five-year average for the week ending April 29 in PADD 2.

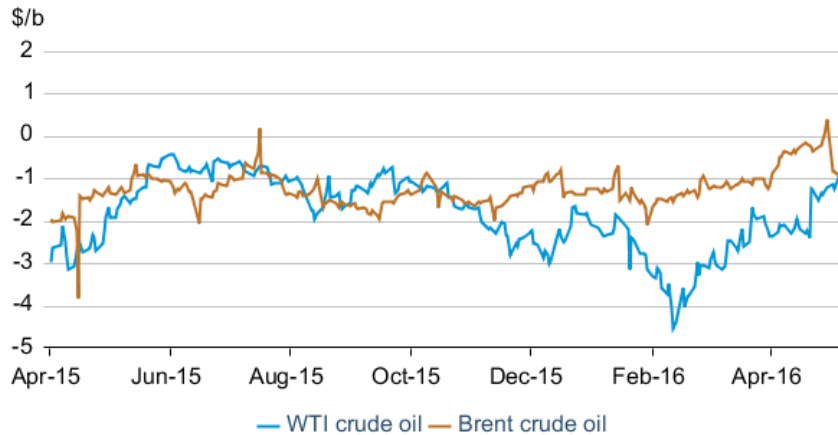
**Figure 2. Historical crude oil differentials**



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The discount of front-month prices to third-month prices for the WTI futures curves narrowed and front-month Brent prices briefly traded at a premium in April. Although global inventories are still building, a [reduction in contango](#) signals a tighter near-term crude oil market compared to earlier this year. The 1st-3rd month differential for Brent and WTI settled at  $-88$  and  $-98$  cents/b, respectively, on May 5, with the discount relatively unchanged for Brent and narrowing  $\$1.40/\text{b}$  for WTI since April 1 (**Figure 3**). For international markets, an uptick in both planned and unplanned supply disruptions, particularly in OPEC countries and more recently from wildfires in Canada, are likely contributing to the tighter conditions. In the United States, the pace of commercial crude oil inventory builds slowed compared to earlier this year. In January and February, commercial crude oil inventories in the United States averaged builds of about 19 million barrels per month but in March and April inventories builds declined to about 14 million barrels per month.

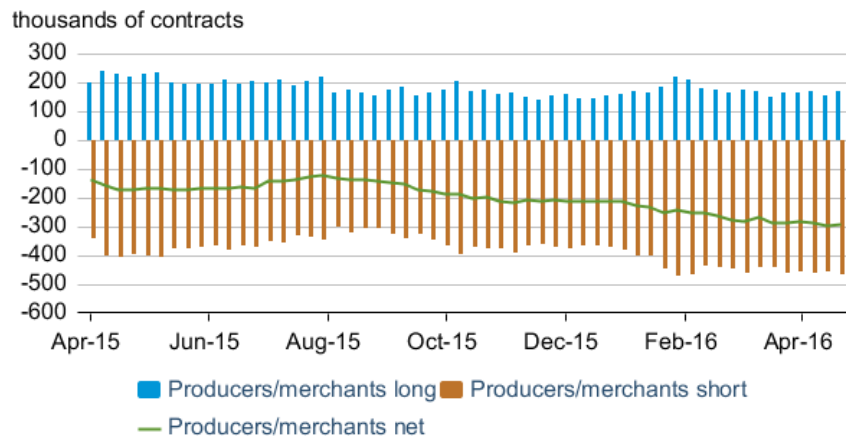
**Figure 3. Crude oil front month - 3rd month futures price spread**



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**Producer/merchant open interest:** While front-month crude oil prices are well above levels at the beginning of 2016, prices for delivery of crude oil further in the future are little changed since the start of the year, and increased short positions from crude oil producers may be applying downward pressure. Short positions held by market participants in the producers/merchants category reached 461,000 contracts on April 26, 86,000 more short positions than were held at the start of the year (**Figure 4**). The December 2017 WTI futures contract settled at \$48.28/b on May 5, 60 cents/b higher compared to January 4. Trade press and quarterly financial filings suggest that producers recently increased hedges on future production, potentially reinforcing current market prices in the low to mid-\$40/b range as an equilibrium point for the near future. In the May STEO forecast, WTI prices are not expected to exceed \$45/b until fourth quarter 2016.

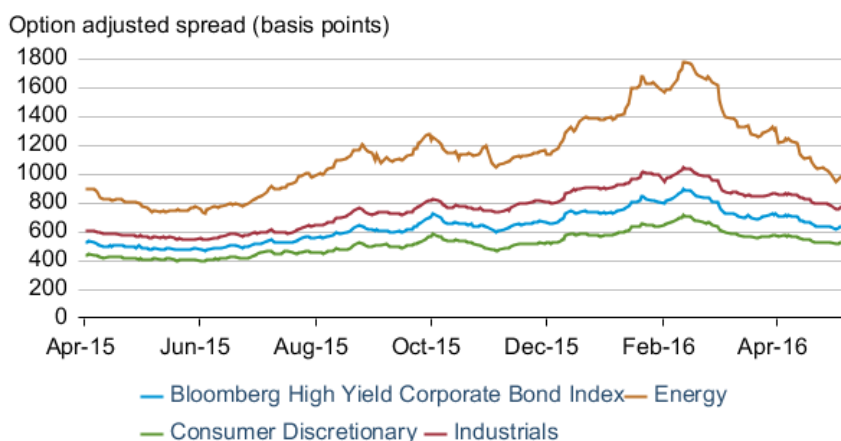
**Figure 4. Producer / merchant open interest in WTI futures contracts**



eia CFTC Commitment of Traders Report

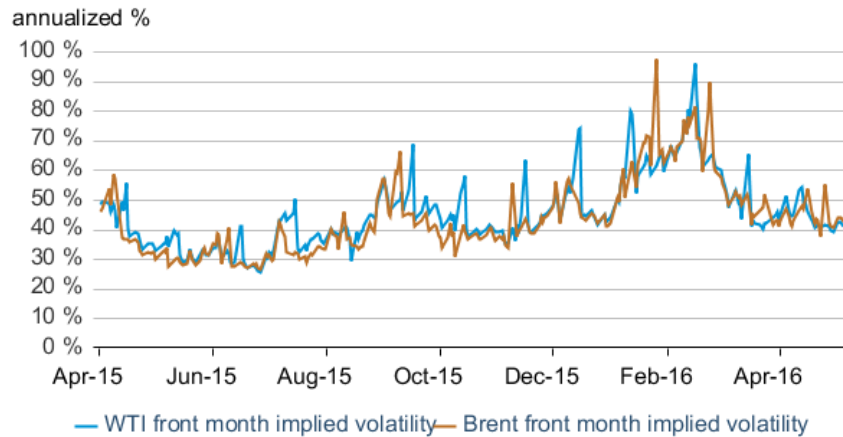
**Energy company bond yields:** The Bloomberg High Yield Corporate Bond Index measures the yield of corporate bonds below investment grade compared to the yield of risk-free bonds, such as U.S. Treasury bonds. Increasing/decreasing bond yield spreads indicate a greater/lesser risk of default by the bond issuer. Spreads for high-yield energy companies declined to the lowest level since August 2015 as higher crude oil prices reduced the nonpayment risk associated with bonds issued by oil producers. The spread declined to just under 10 percentage points on May 5 after peaking at about 18 percentage points in mid-February (**Figure 5**). Spreads for high yield debt from other sectors also broadly declined from late February, reflecting an overall appetite for risk by market participants, but the decline in spreads for energy related companies was greater, reflecting a specific market reaction to higher oil prices.

**Figure 5. Bloomberg High Yield Corporate Bond Index**



**Volatility:** Crude oil implied volatility fell from highs in February with the market’s waning perception of risks related to economic growth and storage capacity constraints. Volatility levels stabilized at a lower level in April. Implied volatility for Brent and WTI settled at 43% and 41%, respectively, on May 5, relatively unchanged to levels at the beginning of April (**Figure 6**).

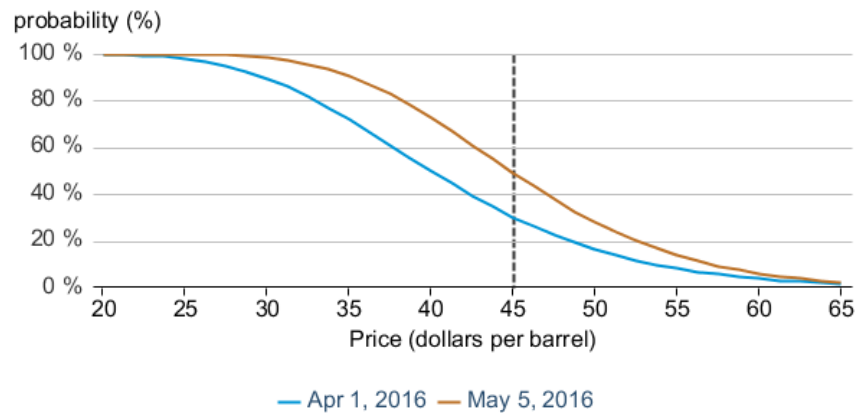
**Figure 6. Crude oil implied volatility**



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**Market-Derived Probabilities:** The August 2016 WTI futures contract averaged \$45.62/b for the five trading days ending May 5 and has a 49% probability of exceeding \$45/b at expiration. The same contract for the five trading days ending April 1 had a 30% probability of exceeding \$45/b (Figure 7).

**Figure 7. Probability of the August 2016 WTI contract expiring above price levels**



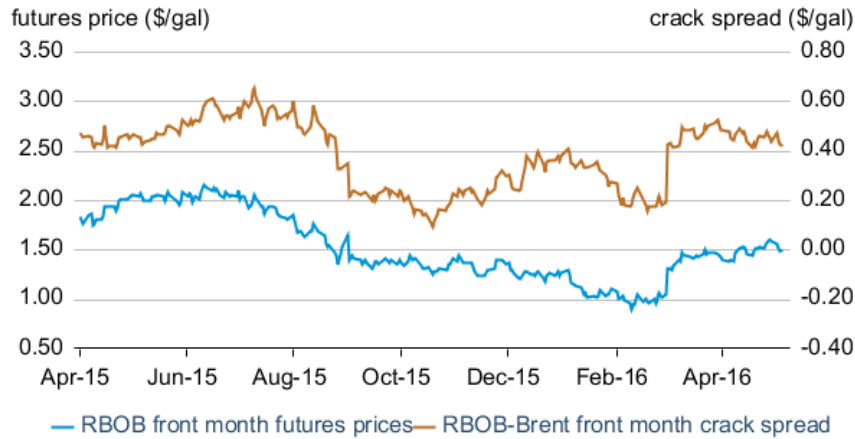
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## Petroleum Products

**Gasoline prices:** The reformulated blendstock for oxygenate blending (RBOB, the petroleum component of gasoline) front-month futures price increased 9 cents per gallon (gal) from April 1 to May 5, settling at \$1.49/gal (Figure 8). The RBOB-Brent crack spread, however, declined 6 cents/gal over the same period, settling at 42 cents/gal.

Although the gasoline crack spread declined slightly through April, likely reflecting marginal increases in gasoline stocks, U.S. gasoline margins remain stronger than they have been in several years. The average gasoline crack spread in April was the highest for the month since 2007. Gasoline consumption plus exports in April were 0.4 million b/d above the previous five-year high for that month and are expected to remain high through the [summer driving season](#).

**Figure 8. Historical RBOB futures prices and crack spread**

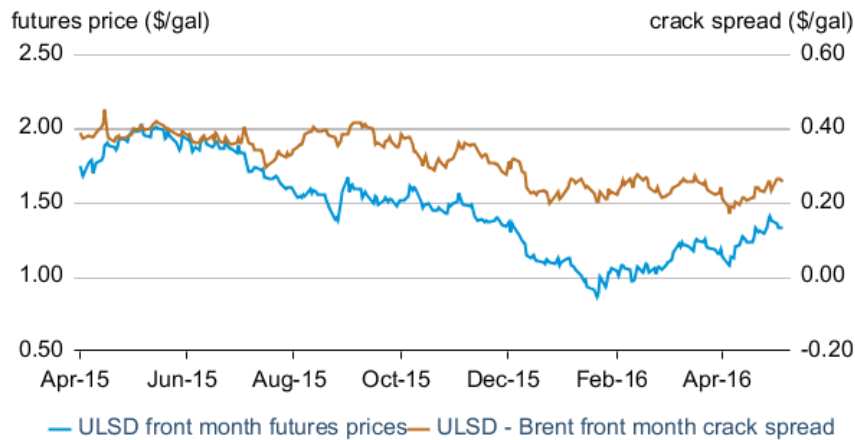


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**Ultra-low Sulfur Diesel Prices:** The front-month futures price for the New York Harbor Ultra-low Sulfur Diesel (ULSD) contract increased 20 cents/gal from April 1 to settle at \$1.33/gal on May 5 (**Figure 9**). The ULSD-Brent crack spread rose 5 cents/gal over the same period to settle at 26 cents/gal.

The increase in ULSD prices and crack spreads was likely in response to a counter-seasonal decline in [distillate production](#) in April compared with March, resulting in a 4.2 million barrel [stock draw](#) month-over-month. However, distillate markets remain well supplied overall as distillate inventories stand 14 million barrels above the five-year high as of April 29, despite the recent drawdowns. The average distillate crack spread over the past month was the lowest since 2010.

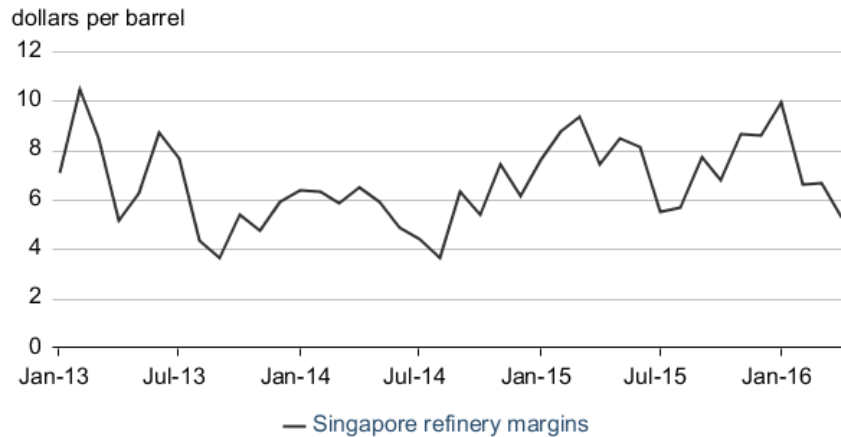
**Figure 9. Historical ULSD futures price and crack spread**



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*Asian refinery margins:* Asian refinery margins, calculated using benchmark Singapore product prices, declined to \$5.26/b in April (**Figure 10**), the lowest since August 2014. Refinery margins were affected by weakening crack spreads in both the Singapore diesel and gasoline markets. Diesel crack spreads globally are on a general decline since 2015 because of a combination of increased exports from the Middle East and China along with lower demand from emerging market economies. Recently, Singapore gasoline crack spreads also declined after reaching nine-year highs in the beginning of 2016. As refineries across Asia increased runs to take advantage of the gasoline crack spread, gasoline inventories at Singapore's onshore storage hub rose to a record high. Trade press reports that several product tankers are waiting offshore to unload gasoline. As a result of high gasoline inventories, the Singapore gasoline crack spread fell sharply, declining 18 cents/gal from January to April, affecting overall Asian refining margins on top of already weak distillate crack spreads.

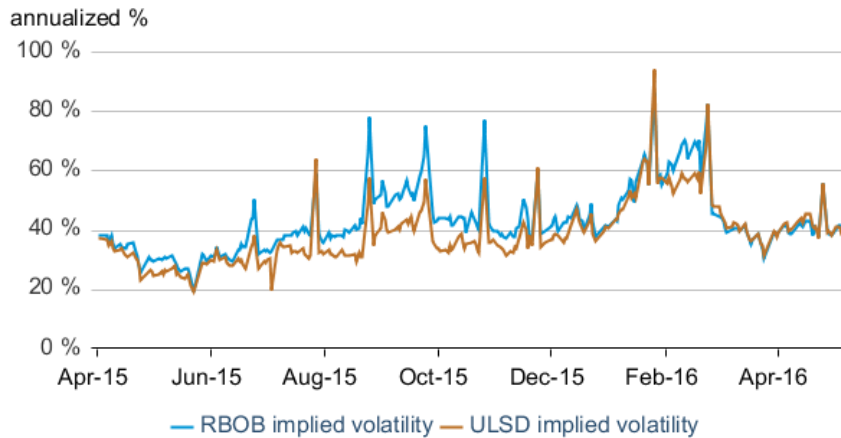
**Figure 10. Singapore refinery margins**



eia Thomson Reuters

**Volatility:** The implied volatility for the front-month RBOB and ULSD futures contracts were nearly stable, each changing by just 1 percentage point since April 1 to settle at 40% and 38%, respectively, on May 5 (**Figure 11**). Movement in implied volatility for product markets were similar to those in the crude oil market.

**Figure 11. RBOB and ULSD implied volatility**

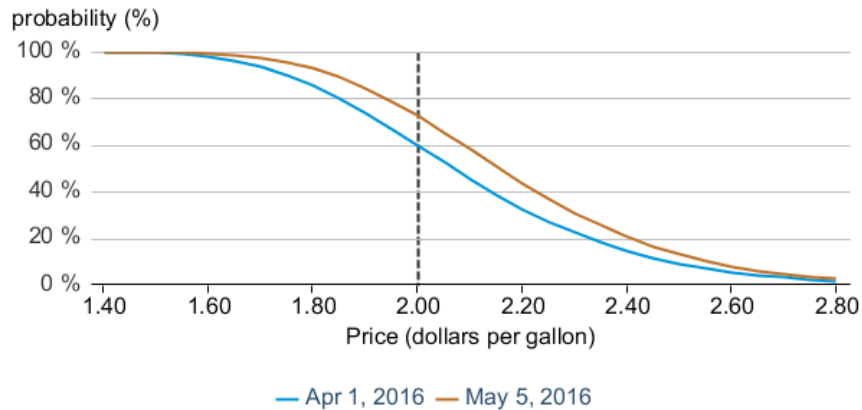


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**Market-Derived Probabilities:** The August 2016 RBOB futures contract averaged \$1.53/gal for the five trading days ending May 5 and has a 72% probability of exceeding \$1.35/gal (typically leading to a retail price of \$2.00/gal) at expiration. The same contract for the five trading days ending April 1 had a 60% probability of exceeding \$1.35/gal (**Figure 12**).



**Figure 12. Probability of August 2016 retail gasoline exceeding different price levels at expiration**

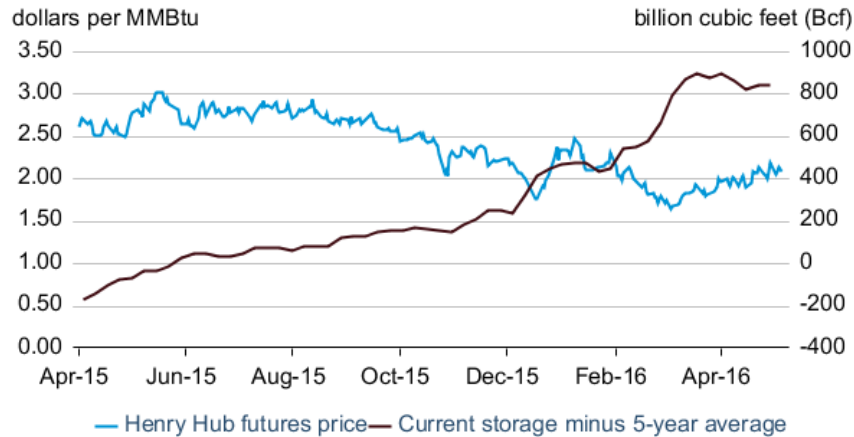


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## Natural Gas

**Prices:** The natural gas front-month futures price for delivery at Henry Hub increased 12 cents per million British thermal unit (MMBtu) since April 1, settling at \$2.08/MMBtu on May 5 (**Figure 13**). Injections into underground storage in April—traditionally the start of the natural gas storage injection season—averaged 36 billion cubic feet (Bcf) per week, about 12 Bcf per week less than the five-year average build for April, although stocks remain well above the five-year average. Some producing areas in Texas and Louisiana that were closed in March remained offline in April because of flooding. In addition, EIA’s latest *Drilling Productivity Report* shows consecutive monthly declines in Marcellus area output, suggesting U.S. Lower-48 production [fell below last year’s levels](#) in April, contributing to lower storage injections and reducing downside price pressure. If lower rates of injection persist this season, the 843 Bcf inventory surplus compared to the five-year average for the week ending April 29 would likely be reduced in the future.

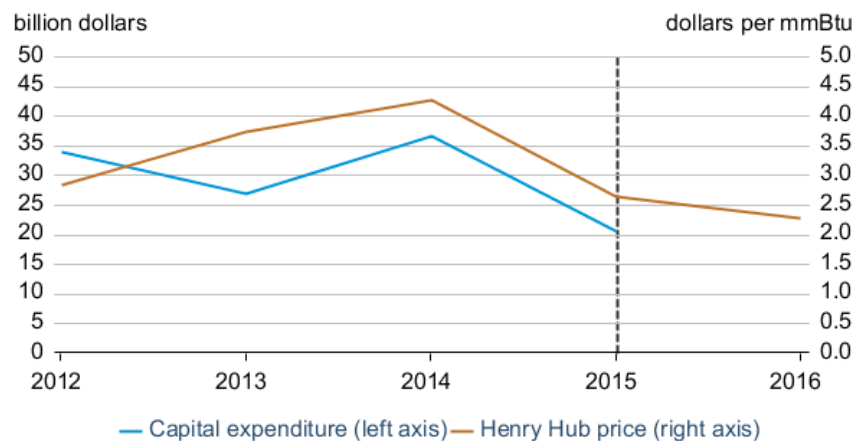
**Figure 13. U.S. natural gas prices and storage**



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**Capital Expenditure:** Capital expenditure for 23 natural gas producers active in the United States declined 44% in 2015 compared with the previous year —from \$37 billion to \$21 billion—commensurate with natural gas prices falling 38%, from \$4.26/MMBtu to \$2.63/MMBtu (Figure 14). The decline in prices reduced cash flow 43%, from \$20 billion to \$11 billion in 2015, contributing to the decline in investment in new exploratory well drilling and development of reserves. Although 2015 U.S. natural gas production grew compared to 2014, production tends to lag changes in prices and capital expenditures as companies maintain production levels by drilling the most productive fields. The lack of investment and new drilling could lower U.S. production in the future compared with previous forecasts, given that natural gas prices tested 20-year lows in the first and second quarter of 2016.

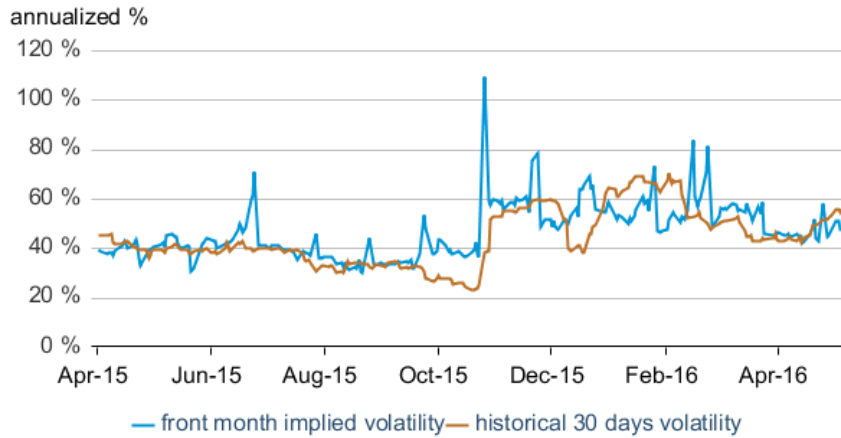
**Figure 14. Capital expenditure and Henry Hub price**



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**Volatility:** Implied and historical volatility for the front-month natural gas futures contract increased since April 1. Implied volatility rose 2 percentage points to settle at 48% on May 5, while historical volatility increased 13 percentage points over the same time period to settle at 56% (Figure 15). Volatility also remained elevated at the start of injection season in 2012, the last time a warm winter left inventories high and increased uncertainty about prices during the summer.

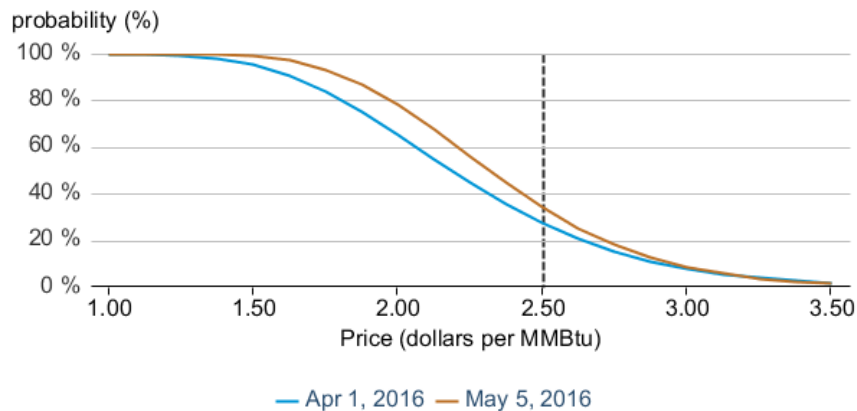
**Figure 15. Natural gas historical and implied volatility**



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**Market-Derived Probabilities:** The August 2016 Henry Hub futures contract averaged \$2.36/MMBtu for the five trading days ending May 5 and has a 34% probability of exceeding \$2.50/MMBtu at expiration. The same contract for the five trading days ending April 1 had a 27% probability of exceeding \$2.50/MMBtu (Figure 16).

**Figure 16. Probability of the August 2016 Henry Hub contract expiring above price levels**



eia U.S. Energy Information Administration, CME Group