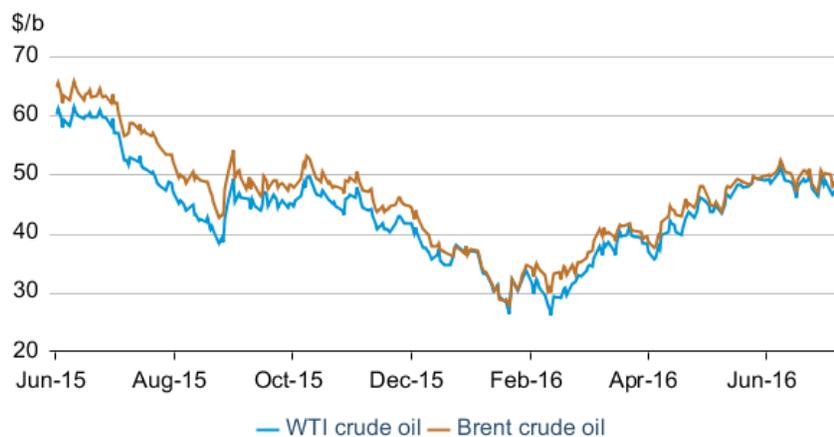


Short-Term Energy Outlook Market Prices and Uncertainty Report

Crude Oil

Prices: Despite some price volatility in June and early July, crude oil prices remained in a narrow trading range near recent highs. The front-month Brent crude oil price decreased \$3.32 per barrel (b) since June 1, settling at \$46.40/b on July 7 (**Figure 1**). The West Texas Intermediate (WTI) crude oil price settled at \$45.14/b, declining \$3.87/b over the same time.

Figure 1. Historical crude oil front-month futures prices



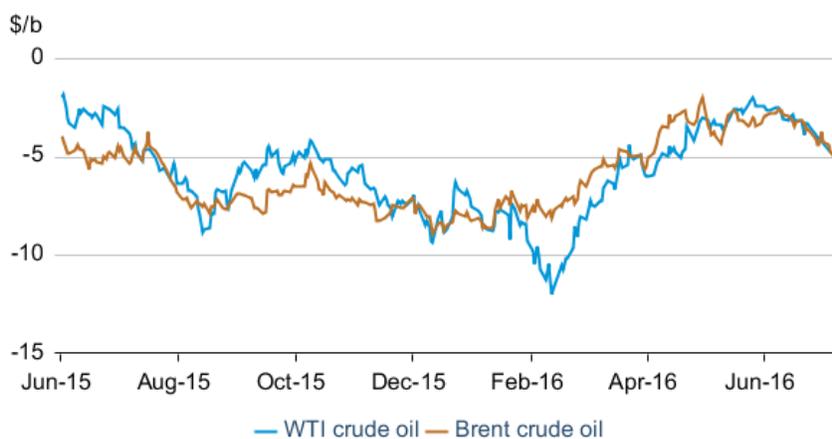
Drilling activity in the United States, as measured by the Baker Hughes oil rig count, increased by 25 rigs in June, the first monthly increase in nearly a year, suggesting renewed activity in U.S. onshore production. Other supply-side factors that provided downward pressure to crude prices in June include some reductions in unplanned supply outages, with Canadian producers restarting production after an initial evacuation from wildfires in Alberta. News that the Nigerian government reached a tentative ceasefire with militant groups in oil-producing regions may also alleviate the threat of continued supply outages in the area. Prices initially sold off at the end of June as the United Kingdom voted to leave the European Union, but largely recovered the following week.

This is a regular monthly companion to the EIA *Short-Term Energy Outlook* (<http://www.eia.gov/forecasts/steo/>)

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Alleviation of some supply disruptions likely reduced the amount of crude oil withdrawn from global inventories, which contributed to a wider discount of front-month prices compared with longer-dated ones. The 1st-13th spread settled at -\$5.19/b and -\$5.04/b for Brent and WTI, respectively, on July 7, a decrease of \$2.21/b and \$2.49/b, respectively, since June 1 (**Figure 2**). In the United States, crude oil refinery inputs in the Petroleum Administration for Defense District (PADD) 3 [were relatively unchanged](#) compared with March, a departure from the average March to June increase of 479,000 barrels per day (b/d) [in 2011 to 2015](#). Global crack spreads are below the same level as summer 2015, which could be contributing to reduced crude runs and purchases by refiners, putting downward pressure on near-term prices.

Figure 2. Crude oil front-month - 13th month futures price spread



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International crude oil prices increased compared with domestic ones in June. The Brent-Light Louisiana Sweet (LLS) differential increased 50 cents/b since June 1, settling at -54 cents/b, while the Brent-WTI spread increased 33 cents/b over the same time to settle at 56 cents/b (**Figure 3**). The four-week average of crude oil imports into PADD 3 was 314,000 b/d higher than this time last year, reflecting a monthly average discount of Brent to LLS of -67 cents/b in June 2016, the widest for the month of June since 2013. Recent increases in the Brent-LLS spread, however, could reduce imports into the Gulf Coast in the near future. The LLS-WTI spread, settling at \$1.80/b on July 7, remained in the same stable range, around \$2.00/b, since April. The stability of the spread suggests unconstrained crude oil movements to the Gulf Coast.

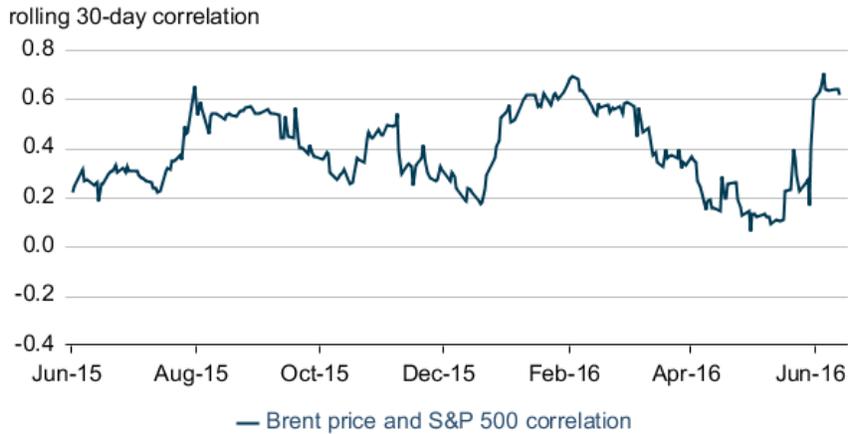
Figure 3. Historical crude oil differentials



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Brent crude oil and equity price correlation: The rolling 30-day correlation between Brent crude oil prices and the S&P 500 index reached 0.70 at the end of June, its highest level since 2012 and surpassing the high correlation that occurred in February of this year (**Figure 4**). Crude oil prices tend to correlate with equity prices when the major price drivers are demand-side factors, such as expectations on global economic growth. Concerns over global growth increased in June when the United Kingdom held a referendum and voted to leave the European Union. Uncertainty over how disruptive the British exit might be, whether other European countries will also vote to leave, and whether global trade and investment will slow all contributed to significant volatility in risk assets like commodities and equities. The price correlation is also affected by market participants' demand for risk assets. The surprise vote led to a selloff for all risk assets, but most rebounded the week after, keeping the Brent and S&P 500 correlation at elevated levels in the first week of July.

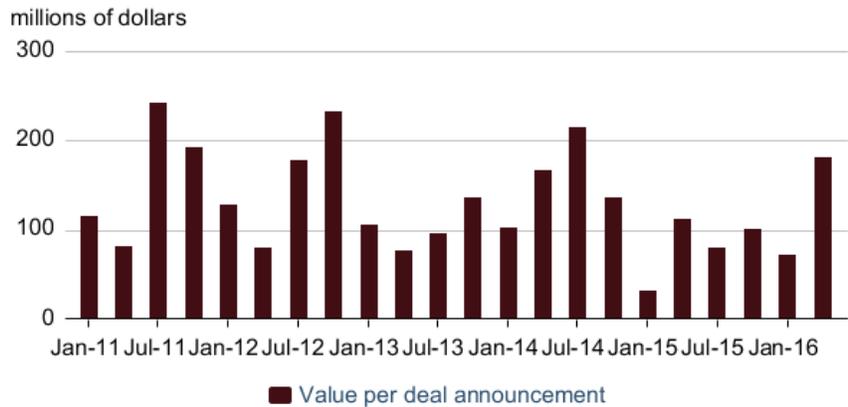
Figure 4. Brent price and S&P 500 correlation



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Merger and acquisition activity: The average deal value of mergers and acquisitions (M&A) for U.S. exploration and production companies in the second quarter reached the highest level since third-quarter 2014, averaging \$182 million per deal (Figure 5). Some notable activity this quarter included Range Resources acquisition of Memorial Resource Development as well as Devon Energy’s sales of assets in the Midland Basin and Anadarko Basin. An increase in the average value per deal suggests an improved outlook for crude oil prices, which rebounded substantially since the beginning of the year. Companies with strong financials—particularly ones that use cash to purchase other companies—and the continued ability to raise cash through debt or equity markets has also allowed for their completion of asset purchases.

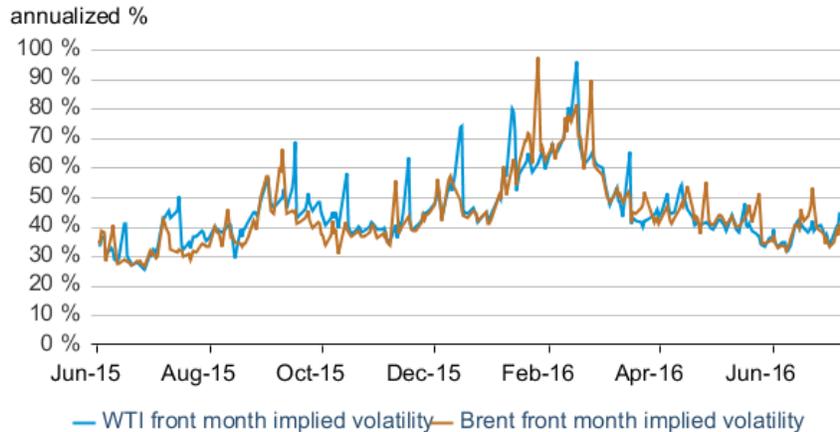
Figure 5. United States exploration and production merger and acquisition activity



eia Evaluate Energy

Volatility: Brent and WTI implied volatility increased 3.9 and 5.5 percentage points, respectively, since June 1, settling at 41.1% and 44.8%, respectively, on July 7 (**Figure 6**). Implied volatility remains at levels higher than last year, but below those reached in the first quarter of 2016. There was a modest increase in volatility around the time of the United Kingdom vote, but volatility returned to lower levels in the following days.

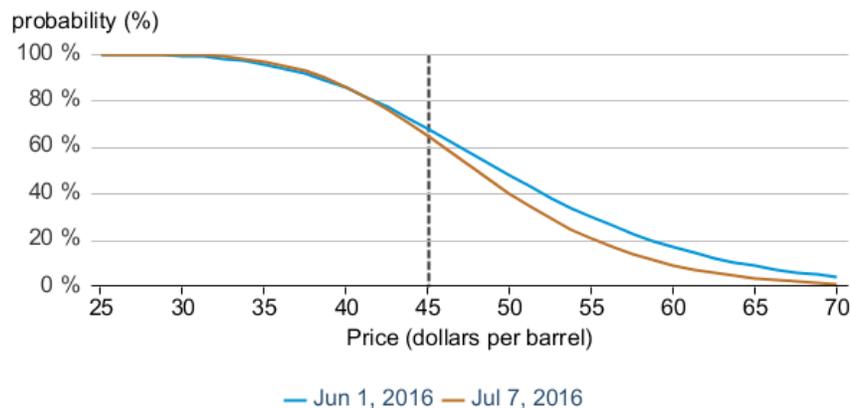
Figure 6. Crude oil implied volatility



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Market-Derived Probabilities: The October 2016 WTI futures contract averaged \$48.59/b for the five trading days ending July 7 and has a 65% probability of exceeding \$45/b at expiration. The same contract for the five trading days ending June 1 had a 68% probability of exceeding \$45/b (**Figure 7**).

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



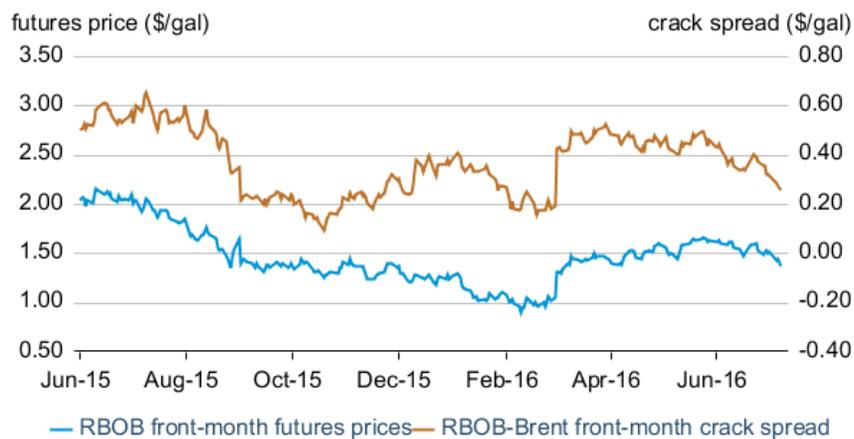
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Petroleum Products

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 25 cents per gallon (gal) from June 1 to July 7, settling at \$1.36/gal (**Figure 8**). The RBOB-Brent crack spread fell by 17 cents/gal over the same period, settling at 26 cents/gal.

Even as gasoline consumption plus exports in May and June set back-to-back record highs of 10.1 million b/d, the average RBOB-Brent crack spread from May to June declined by 8 cents/gal to 37 cents/gal, the lowest for June since 2013. The decline in the RBOB crack spread reflects a gasoline market that continues to be well supplied despite rising gasoline demand. Because refineries [increased gasoline yields](#) over the past year, gasoline production has consistently set new five-year highs so far in 2016. Gasoline production in June was the second-highest on record for any month at 10 million b/d and is likely putting downward pressure on gasoline prices.

Figure 8. Historical RBOB futures prices and crack spread

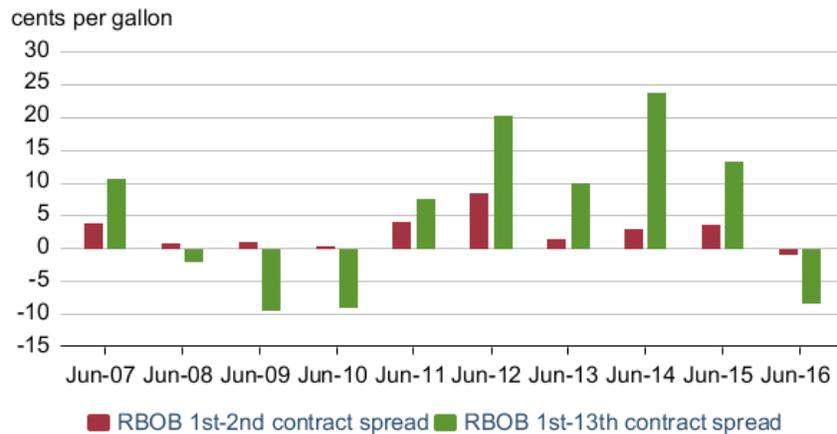


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RBOB futures curve: The RBOB futures curve is typically backwardated (when near-term futures prices are higher than longer-term ones) during the summer months, as U.S. [gasoline consumption](#) reaches its seasonal high. However, this year, the RBOB futures curve is in contango (when near-term futures prices are lower than longer-term ones) because gasoline inventories are relatively high compared with recent years. In June, the average RBOB 1st-13th spread was -8 cents/gal, the first contango in June since 2010 (**Figure 9**). Using a shorter horizon, the average RBOB 1st-2nd spread was -1 cent/gal, the first contango in June since the RBOB futures contract began trading. The contango in the RBOB futures curve reflects the high level of U.S. gasoline inventories that arose this year as gasoline production increased. As of July 1, total [U.S. motor gasoline inventories](#) were 15 million barrels above the five-year high and have remained

above the five-year high through the first half of 2016. Similarly, [gasoline inventories in PADD 1B](#), where the New York Harbor delivery point of the RBOB futures contract is located, stood 6 million barrels above the five-year high. Trade press reports that because of high inventories in New York Harbor, some tankers are waiting to offload gasoline blending components, while other tankers were rerouted to less-congested U.S. ports in PADD 1C (Lower Atlantic) and PADD 3 (Gulf Coast).

Figure 9. RBOB futures contract spreads



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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 declined 8 cents/gal from June 1 to settle at \$1.41/gal on July 7 (**Figure 10**). The ULSD-Brent crack spread declined 1 cent/gal over the same period to settle at 31 cents/gal.

ULSD prices generally followed crude oil prices in June, as shown by a nearly stable ULSD crack spread. In recent months, distillate consumption plus exports have recovered from the [lows earlier this year](#) and are now in line with last year's levels. Some of the increase in domestic distillate consumption may be because of increasing activity in the U.S. manufacturing sector. The Institute for Supply Management's manufacturing purchasing managers' index rose to 53.2 in June, the fastest rate of expansion in U.S. manufacturing activity since February 2015. However, ULSD prices and crack spreads will likely continue to be weighed down by high [distillate inventory levels](#), which remain 5 million barrels above the five-year high.

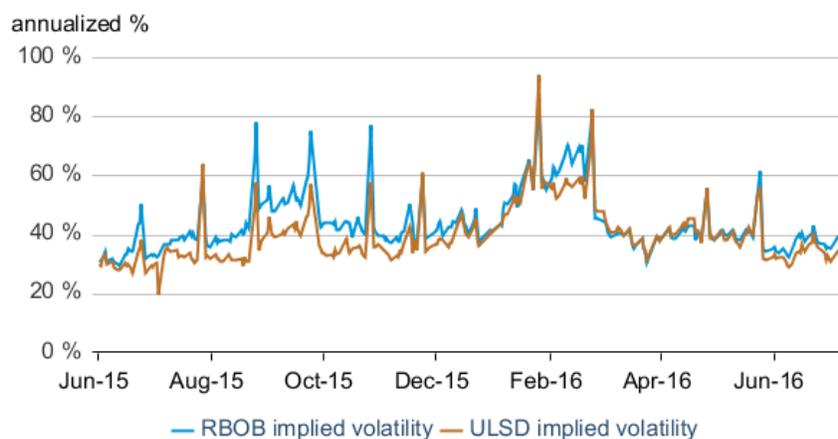
Figure 10. Historical ULSD futures price and crack spread



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Volatility: The implied volatility for the front-month RBOB and ULSD futures contracts increased by 5 and 3 percentage points to 41% and 36%, respectively, from June 1 to July 7 (**Figure 11**). The average implied volatilities of RBOB and ULSD in June were the lowest since June and July 2015, respectively.

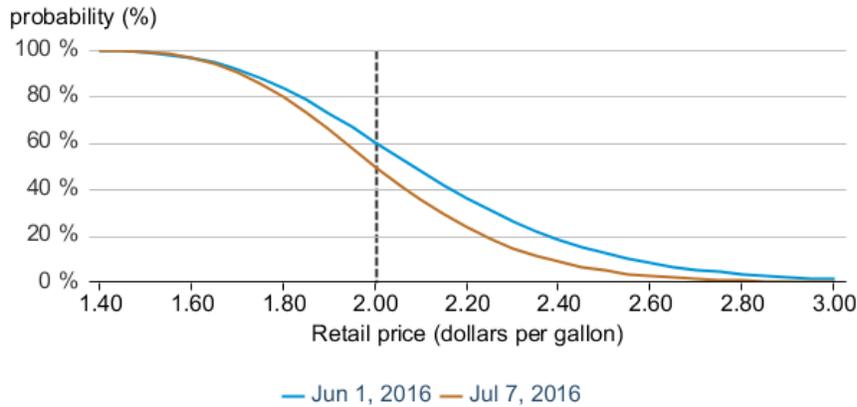
Figure 11. RBOB and ULSD implied volatility



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Market-Derived Probabilities: The October 2016 RBOB futures contract averaged \$1.37/gal for the five trading days ending July 7 and has a 50% 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 June 1 had a 60% probability of exceeding \$1.35/gal (**Figure 12**).

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



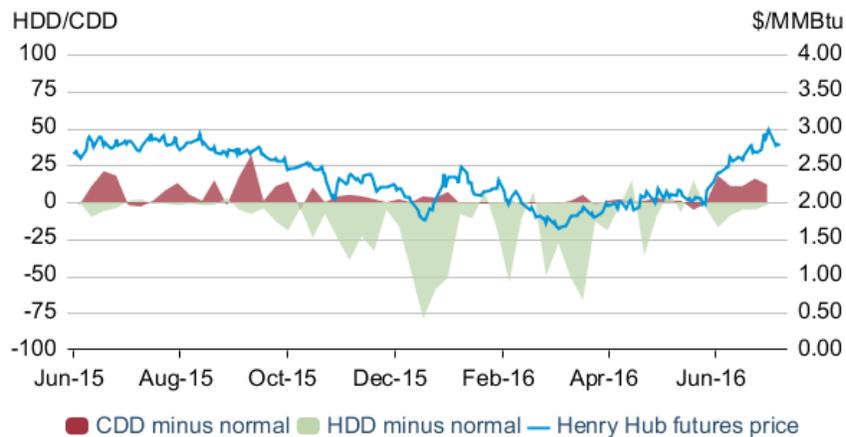
eia U.S. Energy Information Administration, CME Group

Natural Gas

Prices: Natural gas prices continued to move higher in June. The front-month futures price for delivery of natural gas to Henry Hub settled at \$2.78 per million British thermal units (MMBtu) on July 7, an increase of 40 cents/MMBtu from June 1 (**Figure 13**).

Warmer temperatures and above-normal cooling degree days (CDD) are likely supporting natural gas prices. CDD are nearly 12 days above the five-year average for this time of year, pushing overall electricity consumption higher as more is used for home cooling, and raising demand for natural gas to fuel power generation. On the supply side, the recent shutdown of Enterprise’s Pascagoula natural gas processing plant in Mississippi because of a fire could also be applying some upward price pressure on natural gas in the Gulf Coast region.

Figure 13. HDD minus normal and CDD minus normal



eia Bloomberg L.P., U.S. EIA

While prices for natural gas at Henry Hub rose, prices for natural gas at delivery points in the Marcellus production region did not increase by as much, widening natural gas basis spreads. Natural gas spot prices at the Tennessee Zone 4 and Transco Leidy hubs were \$1.39 and \$1.54/MMBtu, respectively, on July 7, remaining below \$2.00/MMBtu for all of June (Figure 14). The average spread between those prices and at Henry Hub in June was the largest for any month since this time last year. While price increases at Henry Hub could help reverse some of the declines in Gulf Coast production since mid-2015, relatively stable prices in the Marcellus area could mean slower production growth in states like Pennsylvania, Ohio, and West Virginia.

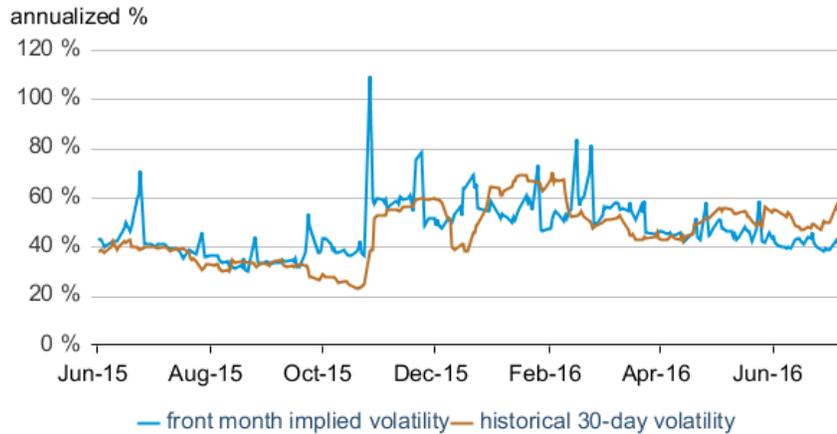
Figure 14. Marcellus area spot prices and Henry Hub



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Volatility: Implied volatility for the front month natural gas futures contract settled at 40.9% on July 7, a decrease of 3 percentage points since June 1 (Figure 15). Historical volatility remained unchanged over the past five weeks, settling at 55% on July 7. Rising overall demand for natural gas could reduce how much natural gas competes with coal in electricity generation this summer, potentially lowering uncertainty in the market.

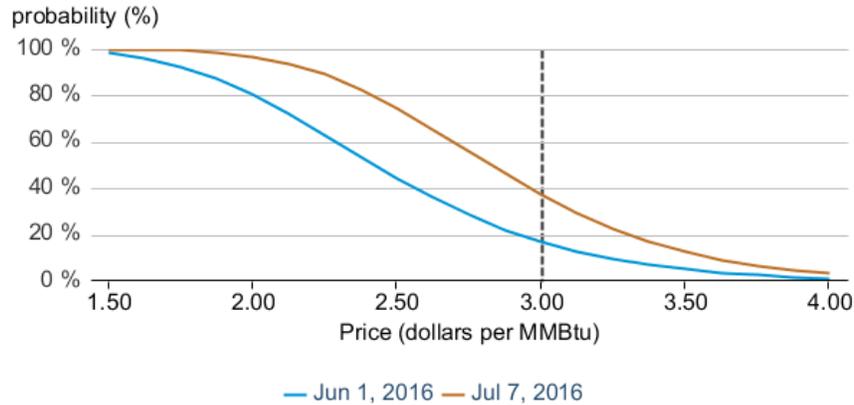
Figure 15. Natural gas historical and implied volatility



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Market-Derived Probabilities: The October 2016 Henry Hub futures contract averaged \$2.88/MMBtu for the five trading days ending July 7 and has a 38% probability of exceeding \$3.00/MMBtu at expiration. The same contract for the five trading days ending June 1 had a 17% probability of exceeding \$3.00/MMBtu (**Figure 16**).

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



eia U.S. Energy Information Administration, CME Group