

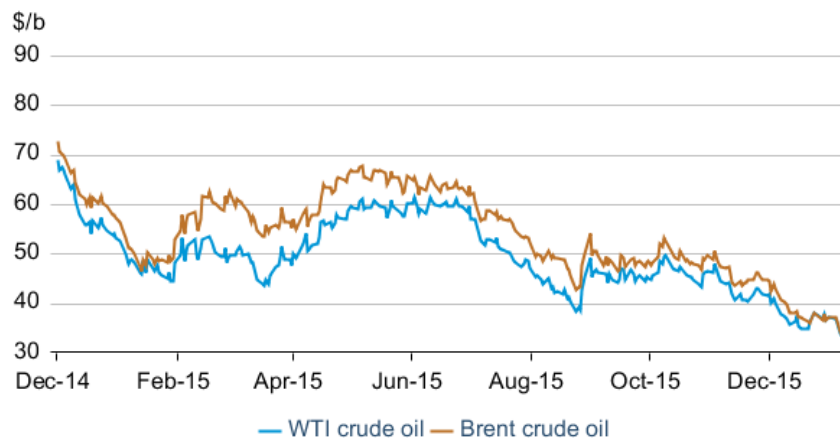


Short-Term Energy Outlook Market Prices and Uncertainty Report

Crude Oil

Prices: Crude oil futures prices reached the lowest level in 12 years in December and early January. The North Sea Brent front month futures price settled at \$33.75 per barrel (b) on January 7, \$10.69/b lower than the close on December 1 (**Figure 1**). The West Texas Intermediate (WTI) front month futures price settled at \$33.27, a decrease of \$8.58/b over the same period.

Figure 1. Historical crude oil front month futures prices



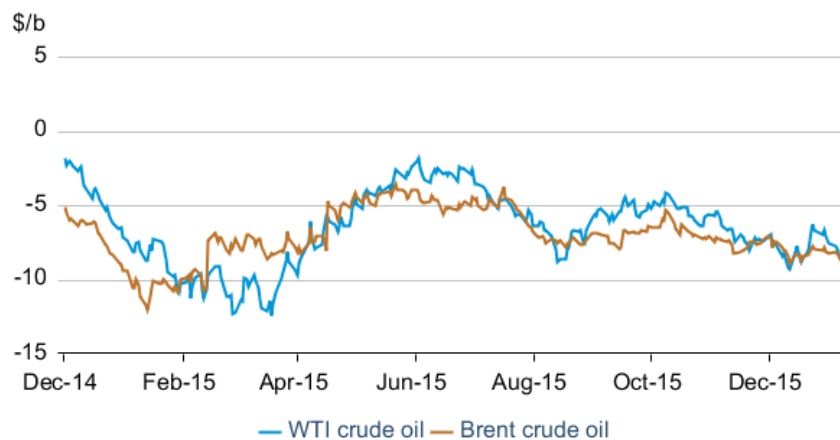
Global crude oil prices declined after the December 4 Organization of Petroleum Exporting Countries (OPEC) meeting, where the group maintained the previous production policy and failed to set a total production quota. While expectations for an oversupplied market persist, demand-side factors are also exerting selling pressure on crude prices. Manufacturing activity in China continued to contract and volatility in Chinese financial markets is increasingly pressuring prices for many global assets, including crude oil.

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

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The price discount of near-term contracts and further-dated ones (contango) decreased for both Brent and WTI in December. The 1st-13th spread decreased \$1.28/b and \$1.57/b for Brent and WTI, respectively, since the close on December 1, settling at -\$8.47/b and -\$8.53/b, respectively, on January 7 (**Figure 2**). Stocks in Cushing, Oklahoma, surpassed the all-time recorded high set in April 2015 at 64 million barrels as of January 1. However, the construction of additional storage capacity in Cushing may be limiting the effect of additional inventories on time spreads. Current [storage utilization](#) is comparable to last spring's, at 87.5% compared to 87.1%, even with 1.7 million barrels more in storage. Available storage combined with flooding in the Midwest—resulting in the closure of a 200,000 barrel per day (b/d) pipeline from Cushing to Wood River, Illinois—likely contributed to higher storage levels at Cushing.

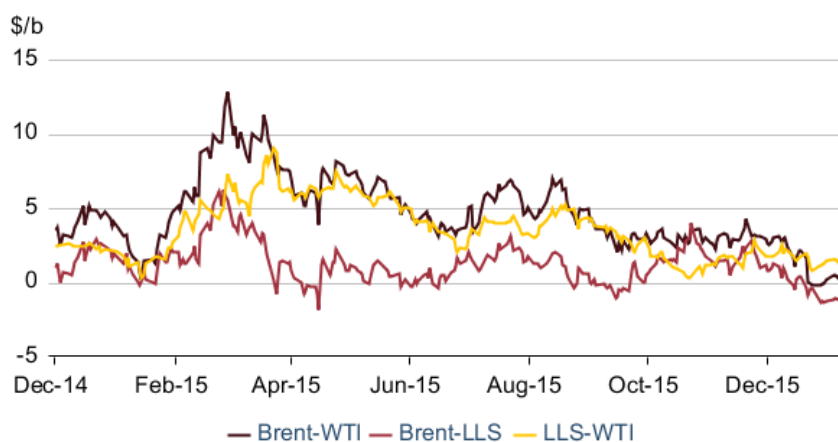
Figure 2. Crude oil front month - 13th month futures price spread



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In the Brent market, production from the United Kingdom and Norway was up 3% on average in 2015, which is a contributing factor for Brent's contango but also for the Brent crude oil price spread with U.S. crude oils. The Brent-WTI spread decreased \$2.11/b since December 1, settling at \$0.48/b on January 7, while the Brent-Louisiana Light Sweet (LLS) spread decreased \$1.86/b over the same period to settle at -\$1.07/b (**Figure 3**). WTI settled above Brent for several days in late December, the first time since August 2010. Narrow price spreads between U.S. and waterborne crudes contributed to an increase in PADD 3 imports, [averaging 3.3 million b/d in December](#) and a year-over-year increase of 346,000 b/d. The United States ended the ban on crude oil exports in late December, but given current price differentials, the amount of crude exports from PADD 3 is likely to be small.

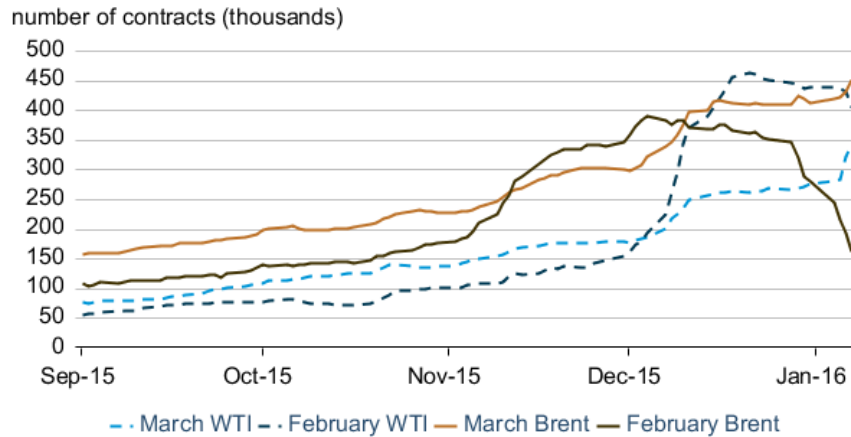
Figure 3. Historical crude oil differentials



 CME Group, Bloomberg L.P.

Brent and WTI open interest: Beginning with the [March contract](#), Brent crude oil futures will expire on the last business day of the second preceding month of the contract being traded (e.g., the March 2016 Brent contract expires on January 29, 2016). This is approximately 2-3 weeks earlier than current trading settlement on the IntercontinentalExchange. While the February Brent contract is the current front month, its open interest (number of contracts with an open position) is lower than the March contract (**Figure 4**). Open interest in February Brent futures was 163,000 contracts as of January 7, whereas open interest in the March contract was 450,000 contracts. Position closing in front month futures and position opening in the next month's contract typically occurs in the last week of trading, so the switch occurring several weeks before is unusual. The WTI contract, which is not undergoing a change in its expiration date, has its normal pattern of front month open interest remaining higher than the second month for now.

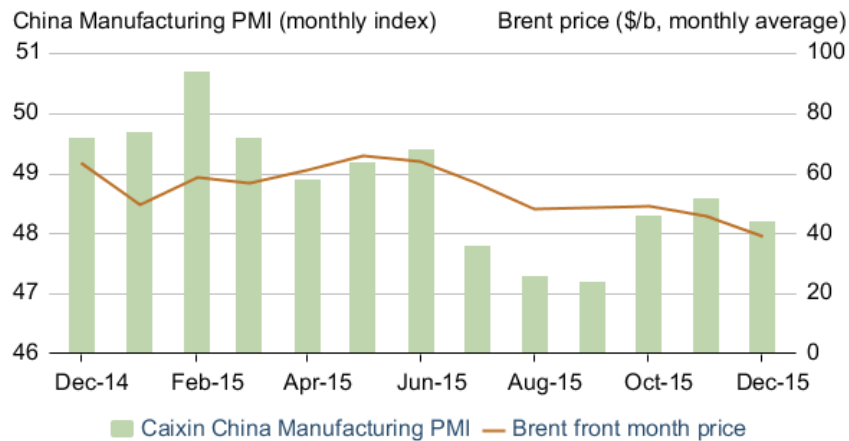
Figure 4. Brent and WTI futures contracts' open interest



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China's purchasing managers' index: The Caixin China General Manufacturing Purchasing Managers' Index (PMI) is a survey of small and medium-sized manufacturers that includes information about changes in output, new orders, new export orders, and employment. The [December PMI](#) declined to 48.2 from 48.6 in November (where any reading lower than 50 indicates contraction in manufacturing activity) and marks the 10th consecutive month below 50 (**Figure 5**). The new export orders sub-index contracted for the first time since September, indicating weaker global demand. Similar to August 2015, PMI readings below expectations as well as Chinese equity and currency market volatility could be contributing downward pressure on commodity prices. Crude oil prices declined as China's stock market in Shanghai reached daily down limits and closed early twice in one week, on January 4 and January 7.

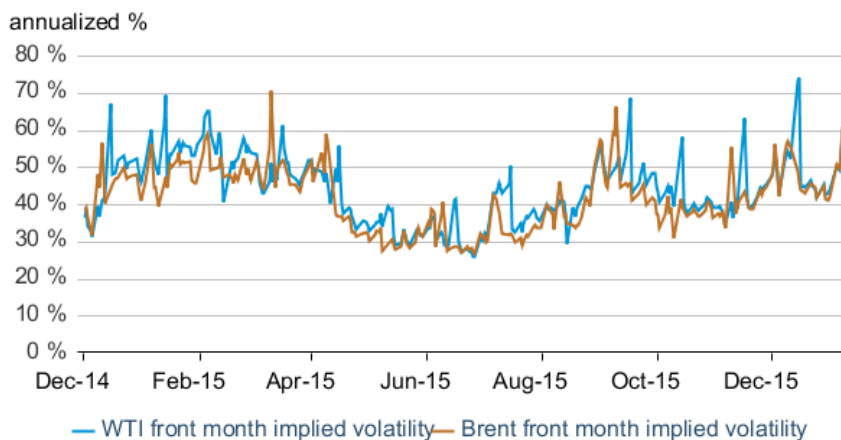
Figure 5. China monthly PMI and Brent price



eia Bloomberg L.P., Caixin Insight Group, Markit

Volatility: Brent and WTI implied volatility closed at 60.6% for Brent and 59.6% for WTI on January 7, an increase of 10.2 and 10.5 percentage points, respectively, since December 1 (**Figure 6**). Most of the increase in implied volatility occurred over the course of the first few trading days of the year, likely related to news surrounding tensions between Saudi Arabia and Iran as well as volatility in China’s financial markets.

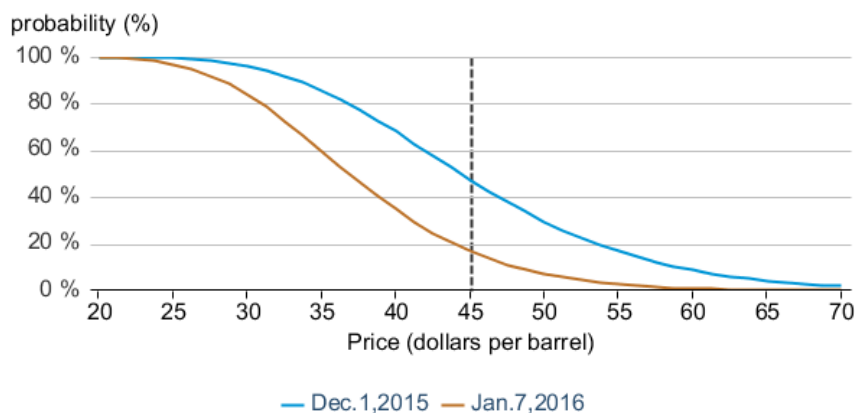
Figure 6. Crude oil implied volatility



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Market-Derived Probabilities: The April 2016 WTI futures contract averaged \$37.65/b for the five trading days ending January 7 and has a 17% probability of exceeding \$45/b at expiration. The same contract for the five trading days ending December 1 had a 47% probability of exceeding \$45/b (**Figure 7**).

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



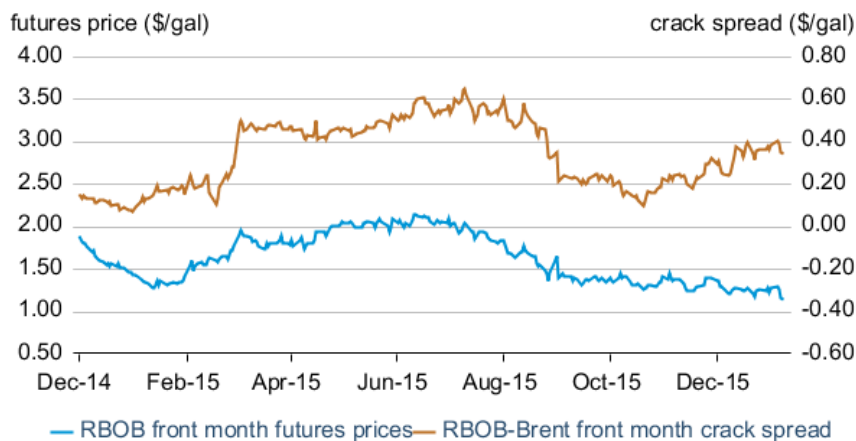
eia U.S. Energy Information Administration, CME Group

Petroleum Products

Gasoline prices: The reformulated blendstock for oxygenate blending (RBOB, the petroleum component of gasoline) front month futures price declined 22 cents per gallon (gal) from December 1 to January 7, settling at \$1.15/gal (**Figure 8**). The RBOB-Brent crack spread increased by 4 cents/gal over the same period and settled at 34 cents/gal. The crack spread averaged 33 cents/gal in December, the highest on record for that month.

For most of 2015, gasoline consumption plus exports consistently set new five-year highs, helping to make the decline in gasoline prices last year the [smallest of all energy commodities](#). As a result, the average gasoline crack spread in 2015 was the highest of any year in RBOB's trading history. However, during the last week of December, [gasoline consumption plus exports](#) declined significantly from the previous weeks, pulling the average for December down to 9.5 million b/d, slightly below the five-year high. Gasoline prices reacted negatively to this news, declining by 7.6% on January 6. This decline was the largest single-day decline since August 3 (not including declines that occur during the seasonal switch to winter-grade gasoline).

Figure 8. Historical RBOB futures prices and crack spread



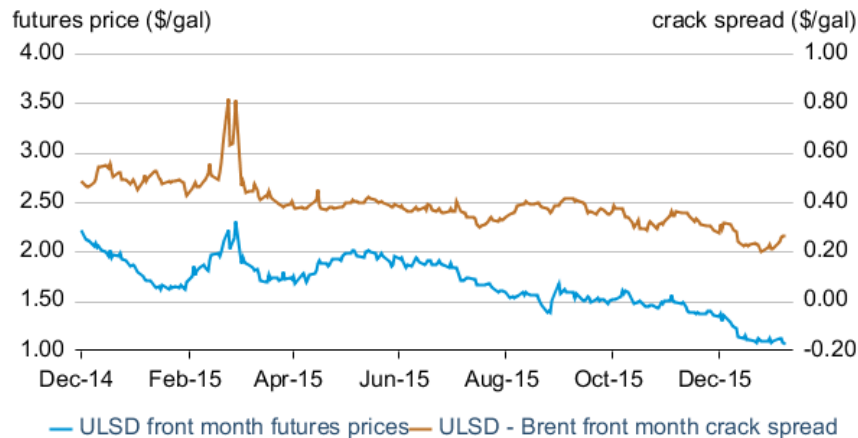
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Ultra-low Sulfur Diesel Prices: The front month futures price for the New York Harbor Ultra-low Sulfur Diesel (ULSD) contract declined 30 cents/gal from December 1 to settle at \$1.07/gal on January 7 (**Figure 9**). ULSD prices fell below the lows set during March 2009 and settled at the lowest since 2004. The ULSD-Brent crack spread decreased 5 cents/gal over the same period to settle at 26 cents/gal.

Warmer-than-normal temperatures in December in the United States along with [two straight months of contraction](#) in the U.S. manufacturing sector in November and

December contributed to the largest year-over-year decline in distillate demand since January 2010. [Distillate consumption plus exports](#) in December were 4.8 million b/d, 0.54 million b/d lower than December 2014.

Figure 9. Historical ULSD futures price and crack spread

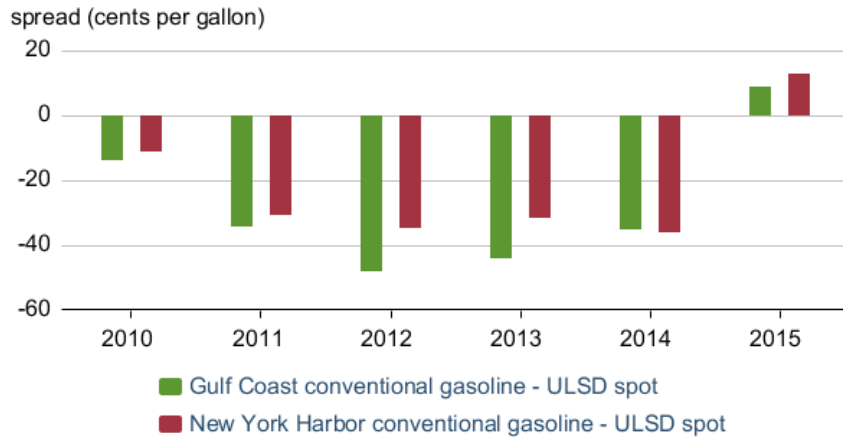


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Gasoline and ULSD price spreads: Traditionally, ULSD prices increase to a premium over RBOB prices during the winter months because of increased domestic consumption of home heating oil and less personal vehicle travel compared to the summer driving season. However, sustained weakness in the distillate market and comparatively stronger gasoline market fundamentals have led to a gasoline price premium over ULSD in December, the first time on record for that month. The New York Harbor conventional gasoline-New York Harbor ULSD spot price spread averaged 13 cents/gal, compared to a five-year average of -29 cents/gal (**Figure 10**). The Gulf Coast conventional gasoline-Gulf Coast ULSD spot price spread averaged 9 cents/gal, compared to a five-year average of -35 cents/gal.

The reversal in price spreads is partly due to diverging inventory behavior of the U.S. gasoline and distillate markets. In PADD 1B, which includes New York Harbor, total motor gasoline stocks were 1.7 million barrels lower than in December 2014, while PADD 1B distillate stocks set a new five-year high in December of 38.9 million barrels. In PADD 3, total motor gasoline stocks were lower in December than the year prior by 1.1 million barrels, while PADD 3 distillate stocks were 1.5 million barrels higher.

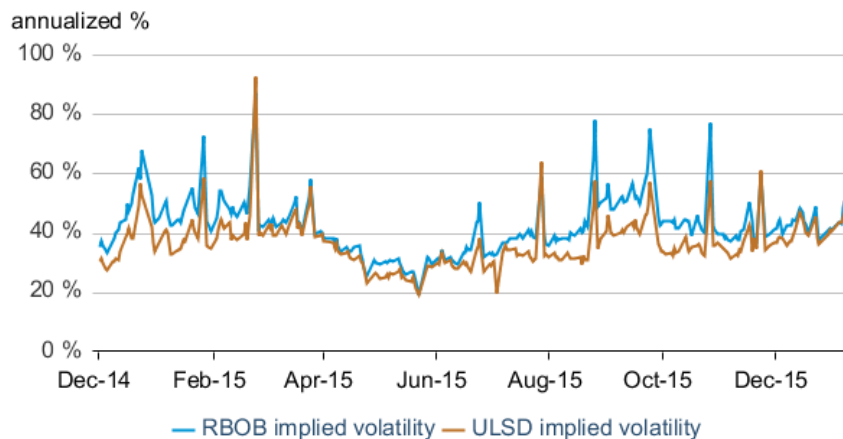
Figure 10. Gasoline minus ULSD price spread in December



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Volatility: Implied volatility for the RBOB front month futures contract increased 9 percentage points since December 1 to settle at 50.6% on January 7 (**Figure 11**). The implied volatility for the ULSD front month futures contract settled at 46.8% on January 7, an increase of 10 percentage points since December 1. The increase in implied volatility for RBOB was primarily due to the significant drop in RBOB prices on January 6. In contrast, the increase in implied volatility for ULSD can be attributed to the declines in ULSD prices over the course of December and uncertainty about whether growth in distillate inventories can be moderated by heating oil consumption in the coming weeks.

Figure 11. RBOB and ULSD implied volatility

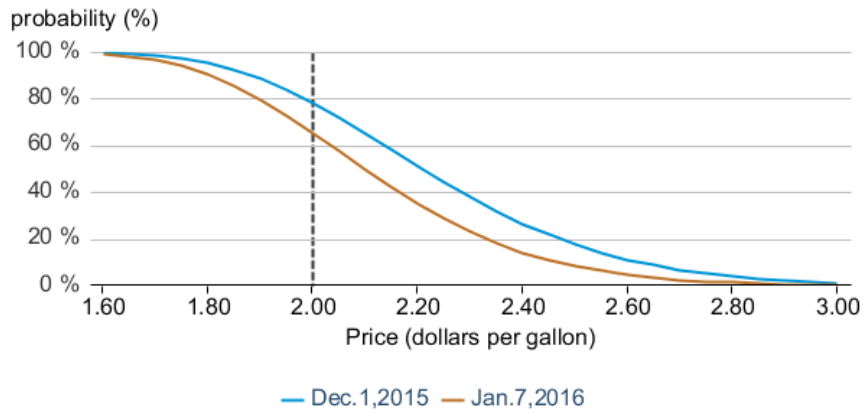


eia CME Group, Bloomberg L.P.

Market-Derived Probabilities: The April 2016 RBOB futures contract averaged \$1.47/gal for the five trading days ending January 7 and has a 65% 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 December 1 had a 78% probability of exceeding \$1.35/gal (**Figure 12**).

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

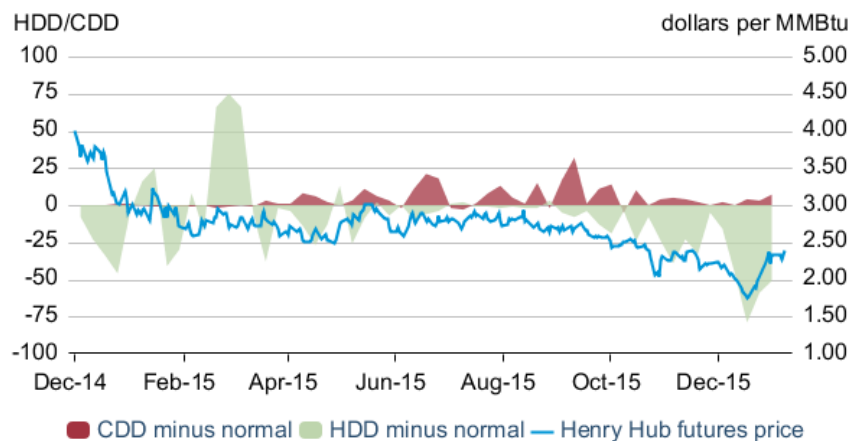


eia U.S. Energy Information Administration, CME Group

Natural Gas

Prices: The front month natural gas futures contract for delivery at Henry Hub settled at \$2.38/MMBtu on January 7, an increase of 15 cents/MMBtu from December 1 (**Figure 13**). Heating degree days (HDD) in mid-December were well below the previous five-year average and contributed to natural gas prices falling below \$2/MMBtu for the first time since 2012. Although temperatures subsequently dropped in parts of the United States and natural gas prices responded by moving higher, HDD still remain below historical levels for this time of year.

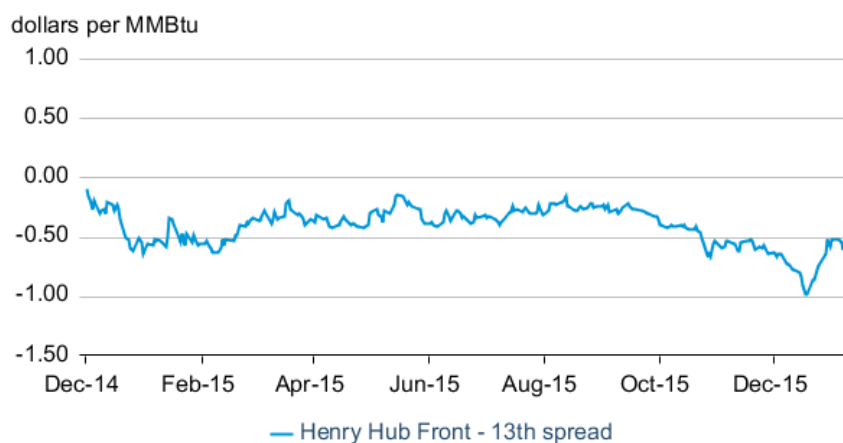
Figure 13. HDD minus normal and CDD minus normal



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

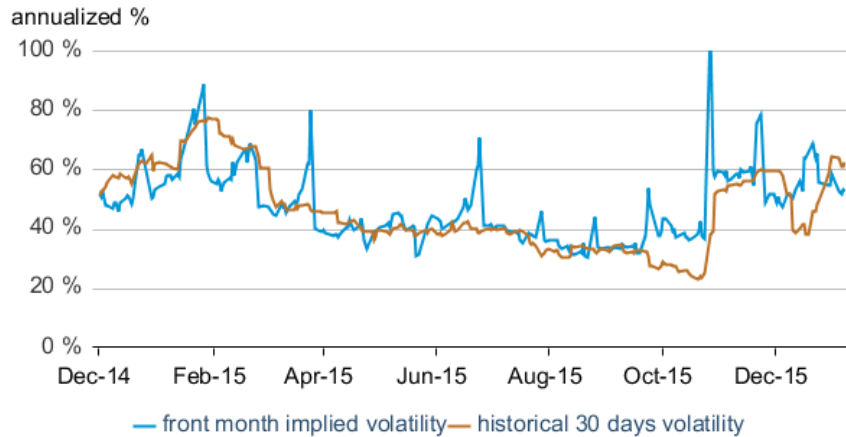
The 1st – 13th spread, the discount of front month natural gas prices to prices for delivery further in the future, reached 99 cents/MMBtu in mid-December before recovering to settle at 55 cents/MMBtu on January 7 (**Figure 14**). Three straight weeks of below average draws in U.S. working natural gas inventories likely pressured near-term prices lower. For the weeks ending December 4 through December 18, U.S. working natural gas inventories declined by just 142 billion cubic feet (Bcf). Over the previous five years, the average drop over the first three weeks of December was 303 Bcf. Inventory withdrawals in the second half of December were greater and helped support near-month natural gas prices.

Figure 14. Natural gas 1st-13th futures price spread



Volatility: Implied and historical volatility for the front month natural gas futures contract increased by 3.9 and 3.3 percentage points, respectively, from December 1 to January 7 (**Figure 15**). Similar to first quarter 2012, the unpredictability of upcoming winter weather at a time of elevated inventory levels is contributing to higher price volatility.

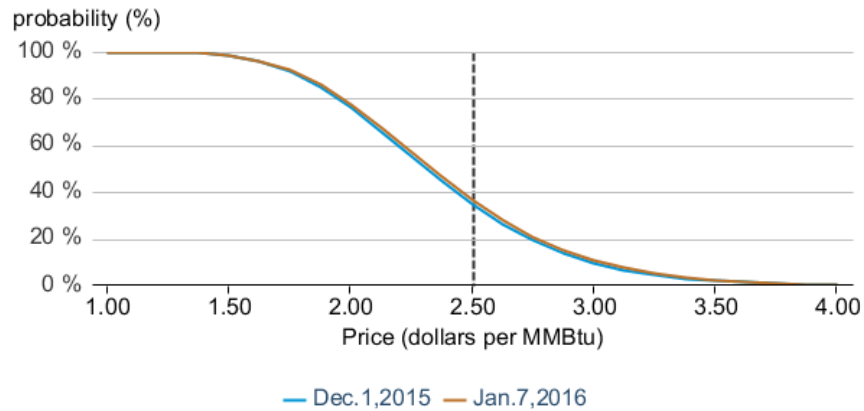
Figure 15. Natural gas historical and implied volatility



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Market-Derived Probabilities: The April 2016 Henry Hub futures contract averaged \$2.38/MMBtu for the five trading days ending January 7 and has a 37% probability of exceeding \$2.50/MMBtu at expiration. The same contract for the five trading days ending December 1 had a 35% probability of exceeding \$3.00/MMBtu (**Figure 16**).

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



eia U.S. Energy Information Administration, CME Group