Independent Statistics & Analysis
U.S. Energy Information Administration

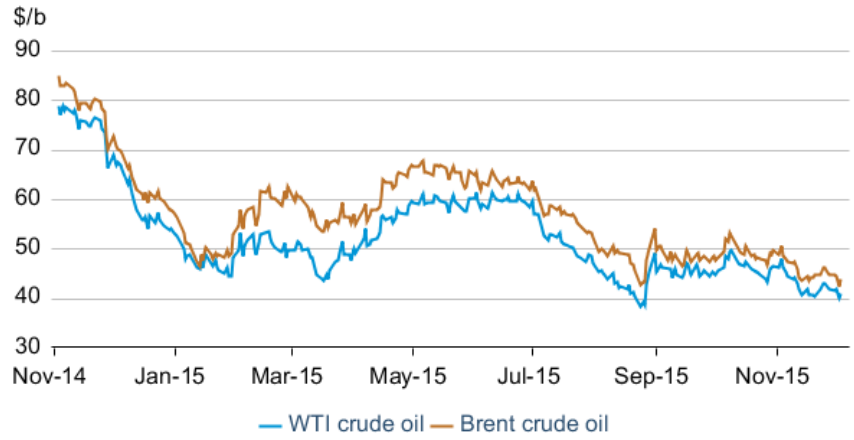
December 2015

Short-Term Energy Outlook
Market Prices and Uncertainty Report

Crude Oil

Prices: Crude oil prices in November declined to the lowest levels since August. The North Sea Brent front month futures price settled at $43.84 per barrel (b) on December 3, a decrease of $4.95/b since November 2 **(Figure 1)**. The West Texas Intermediate (WTI) front month futures price settled at $41.08/b on December 3, declining $5.06/b over the same period.

Figure 1. Historical crude oil front month futures prices

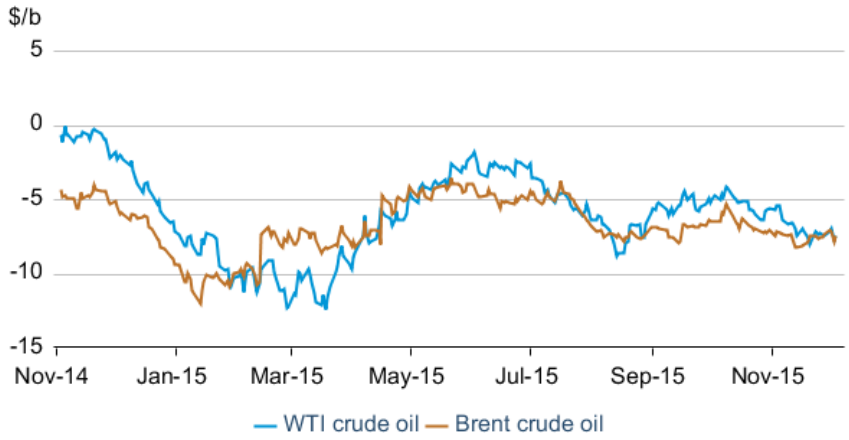


The prospect of an oversupplied crude oil market continuing in the near term weighed on prices. Russian crude oil production recently reached a post-Soviet record high while U.S. crude oil production estimates for 2015 have been revised up each of the past three months. Key members of The Organization of Petroleum Exporting Countries (OPEC) also appear poised to maintain their current high production strategy after the organization's December meeting. On the demand side, weak economic growth in emerging market economies persists particularly in China's manufacturing sector, and in Brazil, where GDP contraction in the third-quarter was larger than expected.

This is a regular monthly companion to the EIA *Short-Term Energy Outlook* (http://www.eia.gov/forecasts/steo/)
Contact: James Preciado (james.preciado@eia.gov)

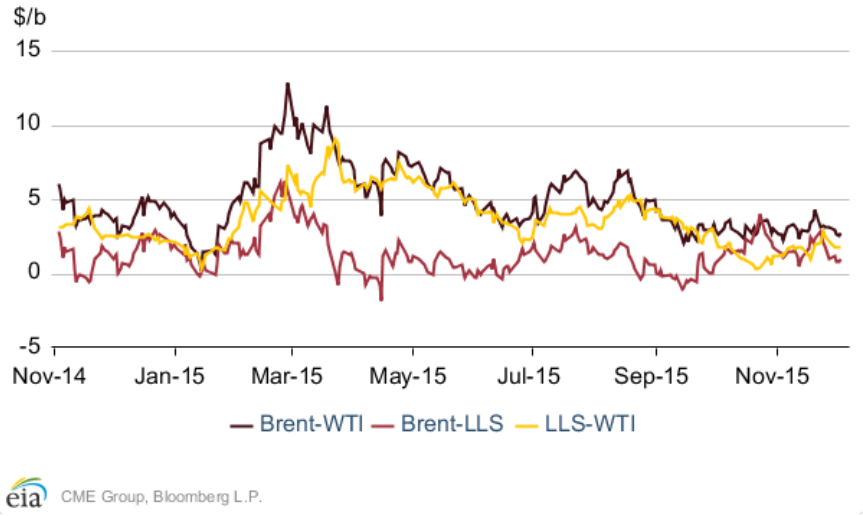
The price difference between the near-term futures contract and further-dated ones (contango) increased for WTI while decreasing slightly for Brent in November. The 1st-13th spread for WTI increased its contango by $1.71/b from November 2 to settle at -$7.46/b on December 3 **(Figure 2)**. Total U.S. crude oil stocks rose for ten straight weeks in the United States through November 27 and inventories in Cushing, Oklahoma (the delivery point for the WTI futures contract) also rose, resulting in weaker WTI front month futures prices. Despite the decline in Brent prices in November, the contango in the Brent futures curve increased over the same period by 3 cents/b to -$7.46/b on December 3. Factors that influence front month futures prices do not often affect the prices for futures contracts dated one year out. However, in November, the prices for further-dated Brent futures contracts also declined, suggesting that the market anticipates little alleviation from the effects of crude oversupply through 2016.

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



In the U.S. Gulf Coast (PADD 3), gross inputs to refineries rose 0.21 million barrels per day (b/d) from October to November as refineries finished seasonal maintenance. Crude oil stocks in PADD 3 declined slightly by 1.3 million barrels from the end of October to 250 million barrels as of November 27. Rising refinery runs and lower crude stocks in PADD 3 strengthened crude prices on the U.S. Gulf Coast relative to both Brent and WTI. The Light Louisiana Sweet (LLS) – WTI price differential rose 60 cents/b from November 2 to $1.75/b on December 3 **(Figure 3)**, and the Brent – LLS spread decreased by 49 cents/b to settle at $1.01/b over the same period. With the differential between LLS and WTI remaining below pipeline tariffs, PADD 3 imported 3 million b/d of crude oil in November, the highest since June.

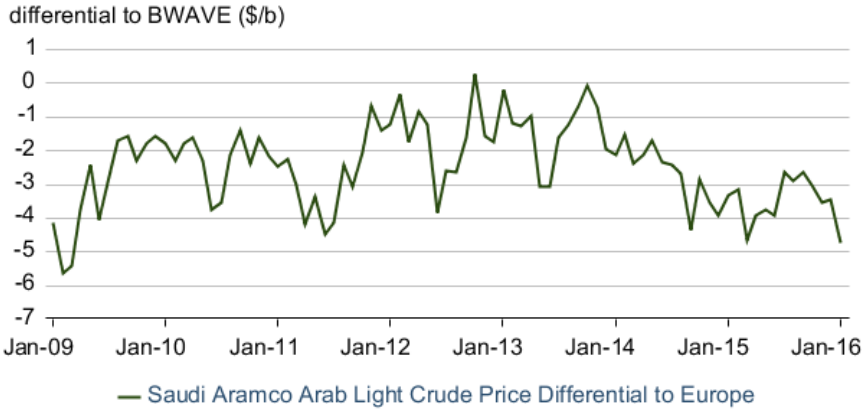
Figure 3. Historical crude oil differentials



Saudi Arabia official selling price: The December 2015 Saudi Aramco official selling price (OSP) differential for light crude oil sold to Northwest Europe dropped to -$4.75/b, the largest discount since February 2009 **(Figure 4)**. For crude oil sold to Europe, Saudi Aramco uses the Brent Weighted Average (BWAVE) price, a volume-weighted average price of all trades made on Brent futures contracts, as the reference crude to which the differential is applied. The differential itself is generated from a pricing mechanism that attempts to adjust the crude price competitively by not only taking into account crude quality and the crude purchasers' transportation costs, but also the purchasers' regional market dynamics such as refinery margins and petroleum product prices.

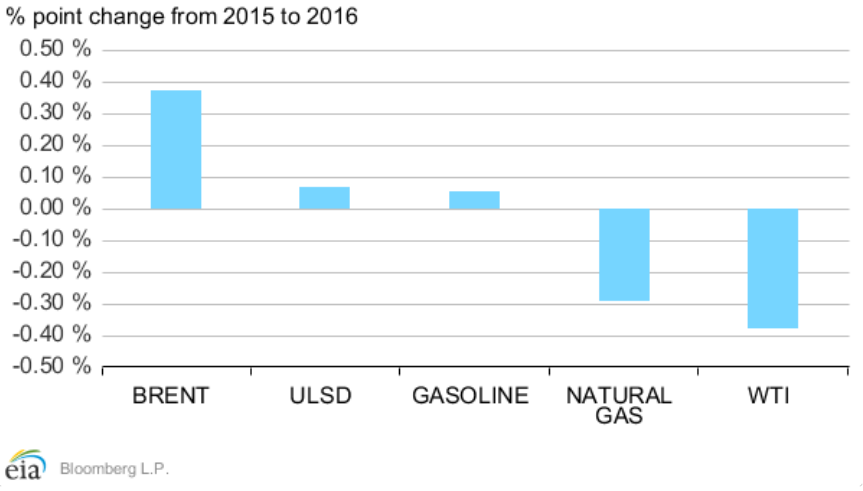
Since July 2014 when oil prices began to decline, Saudi Arabia focused on maintaining market share in Asia. Recent trade press reports indicate that Saudi Arabia is also looking to expand its consumer base in Europe as well. In the past couple of months, Poland and Sweden, both traditionally supplied by Russia, reported buying shipments of Saudi Arabian crude.

Figure 4. Saudi Aramco light crude oil price differential to Northwest Europe



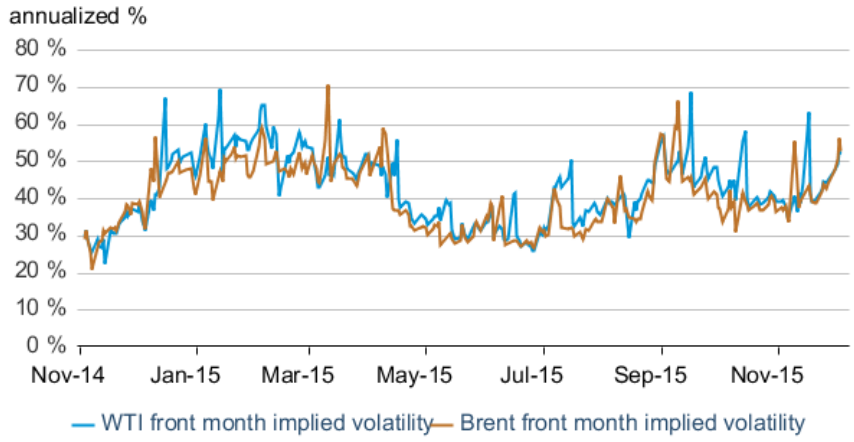
Bloomberg Commodity Index: In late October, Bloomberg released the 2016 target weights for 22 commodities included in the Bloomberg Commodity Index (BCOM). BCOM includes five energy commodities—Brent crude oil, WTI crude oil, heating oil, gasoline, and natural gas. Of the energy commodities, WTI had the largest percentage point decline in its target weight from 2015 of 0.37 percentage points **(Figure 5)**. In contrast, the target weight calculated for Brent in 2016 not only had the largest percentage point increase from 2015 of all the commodities in BCOM, but Brent now is also weighted higher than WTI for the first time since 2012, the first year Brent was included in the index. The increased trading activity in Brent futures contracts relative to WTI over the past couple of years was the primary driver for the higher weighting of Brent in BCOM.

Figure 5. Bloomberg Commodity Index energy components' target weight changes



Volatility: In November, the implied volatilities for both Brent and WTI rose for the first time since August. The implied volatility for Brent rose 15.3 percentage points from November 2 to settle at 53% on December 3 **(Figure 6)**. The implied volatility for WTI rose 12.7 percentage points to settle at 52% over the same period. The persistent oversupply in the crude oil market has put greater uncertainty on future price movements. Additionally, though market expectations for a change to OPEC's production quota remained low before the December meeting, the possibility of an agreement to change production levels among oil producers may have contributed to higher implied volatility.

Figure 6. Crude oil implied volatility



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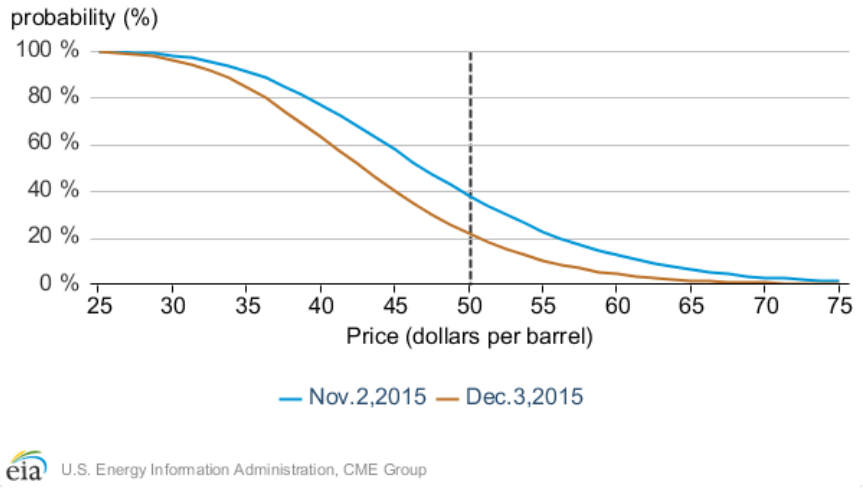
Market-Derived Probabilities: The March 2016 WTI futures contract averaged $43.64/b for the five trading days ending December 3 and has a 22% probability of exceeding $50/b at expiration. The same contract for the five trading days ending November 2 had a 38% probability of exceeding $50/b **(Figure 7)**. Because Brent prices are higher than WTI prices, the probability of Brent futures contracts expiring above the same dollar thresholds is higher.

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

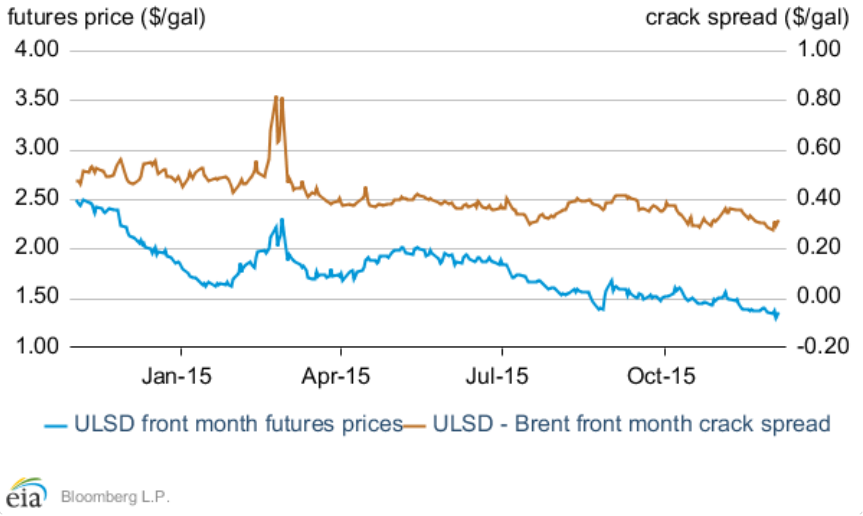


Petroleum Products

Ultra-low Sulfur Diesel Prices: The front month futures price for the New York Harbor Ultra-low Sulfur Diesel (ULSD) contract declined 15 cents/gal from November 2 to settle at $1.36/gal on December 3 **(Figure 8)**. The ULSD-Brent crack spread decreased 3 cents/gal over the same period to settle at 31 cents/gal. The average ULSD-Brent crack spread in November was 7 cents/gal lower than the five-year average and 19 cents/gal below November 2014.

Unseasonably warm weather in the Northeast United States in November likely contributed to decreased heating oil consumption and a build in inventories. Total distillate stocks in PADDs 1 A and B increased 3 million barrels in November, the first November increase since 2010. Consumption could also be lower from the manufacturing sector, as the U.S. manufacturing Purchasing Managers' Index reading for November read 48.6 (where any reading below 50 indicates contraction in activity), the first month of contraction since 2012 and the lowest reading since 2009. Exports from other countries are also increasing, with reports of an extension to a September program that pays Chinese refineries to export diesel, which is likely increasing global distillate waterborne supply.

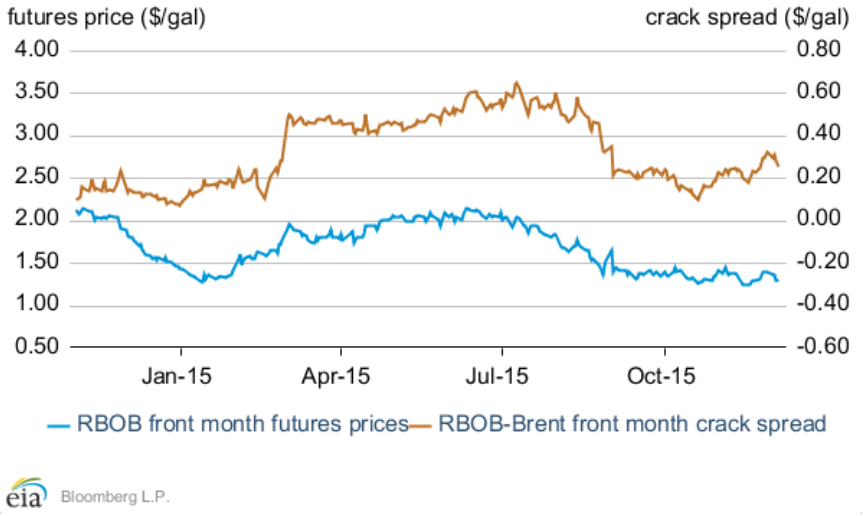
Figure 8. Historical ULSD futures price and crack spread



Gasoline prices: The reformulated blendstock for oxygenate blending (RBOB, the petroleum component of gasoline) front month futures price declined 8 cents per gallon (gal) from November 2 to December 3, settling at $1.30/gal **(Figure 9)**. The RBOB-Brent crack spread increased by 4 cents/gal over the same period and settled at 25 cents/gal.

Total motor gasoline inventories built seasonally in November but declined in PADDs 1 A and B by 3.2 million barrels, the largest decline in November since 1996. The Irving Saint John refinery in New Brunswick, Canada, that supplies gasoline to PADDs 1 A and B had a unit restart failure after the refinery's planned two-month maintenance ended in late November, which contributed to some supply tightness in the New York Harbor market. On the demand side, United States gasoline consumption remains higher than year-ago levels—the latest *Petroleum Supply Monthly* showed September year-over-year consumption increased 5% and weekly consumption plus exports estimates show a 2% year-over-year increase in November.

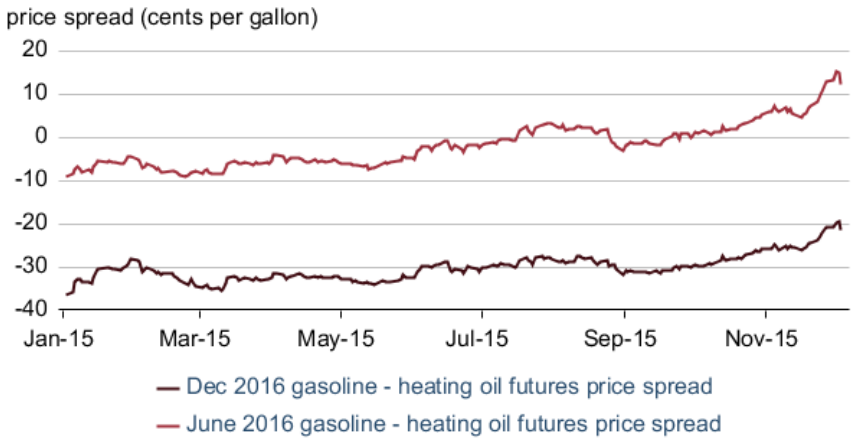
Figure 9. Historical RBOB futures prices and crack spread



Gasoline and distillate futures price spreads: The relative increases of front month gasoline prices compared to front month heating oil prices this year also occurred in contracts for delivery in 2016 **(Figure 10)**. The RBOB-heating oil spread for June 2016 delivery increased from -9 cents/gal at the beginning of the year to 12 cents/gal as of December 3, while the December 2016 spread increased 15 cents/gal over the same period to -21 cents/gal. Similarly, the distillate crack spreads with Brent crude oil for delivery in June and December 2016 are near the lowest levels for the year while the RBOB-Brent crack spreads are near the highest levels.

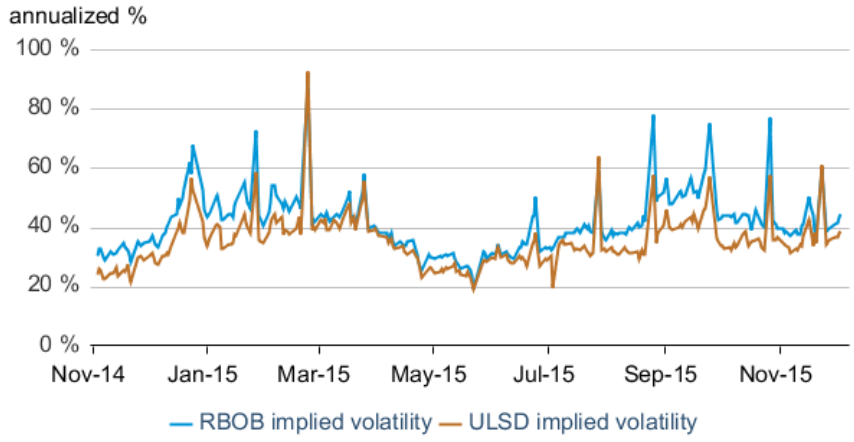
High global distillate inventories, expectations for a warm winter, and lower economic growth expectations from emerging markets are all contributing factors that could weigh on distillate prices going forward. Expectations for gasoline, on the other hand, suggest increased price support for the fuel. Markets that import gasoline, such as Latin America and West Africa, are expected to increase consumption in the future. In China, a manufacturing and industrial slowdown may affect distillate consumption, but rising automobile sales and household income could support future gasoline consumption.

Figure 10. Gasoline minus heating oil futures price spreads



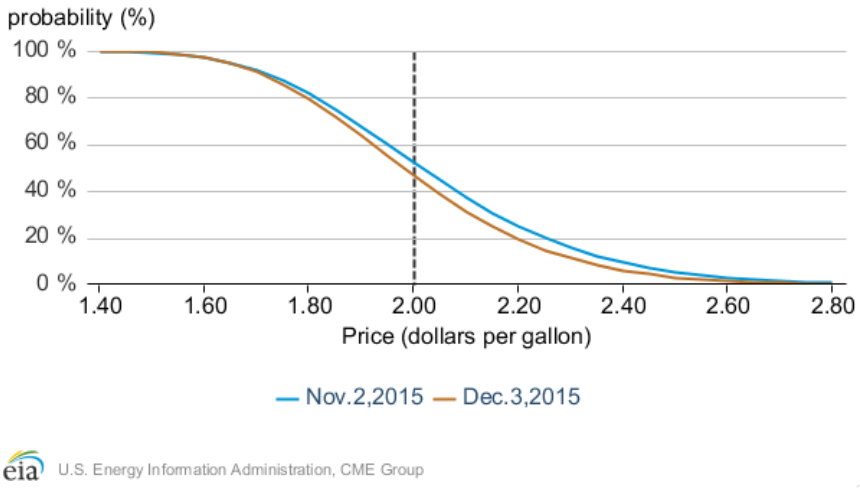
Volatility: Implied volatility for the RBOB front month futures contract increased 4.5 percentage points since November 2 to settle at 44% on December 3 **(Figure 11)**. The implied volatility for the ULSD front month futures contract settled at 39% on December 3, an increase of 3.9 percentage points since November 2. Both petroleum products had relatively small changes in implied volatility compared to crude oil.

Figure 11. RBOB and ULSD implied volatility



Market-Derived Probabilities: The March 2016 RBOB futures contract averaged $1.35/gal for the five trading days ending December 3 and has a 47% 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 November 2 had a 52% probability of exceeding $1.35/gal **(Figure 12)**.

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



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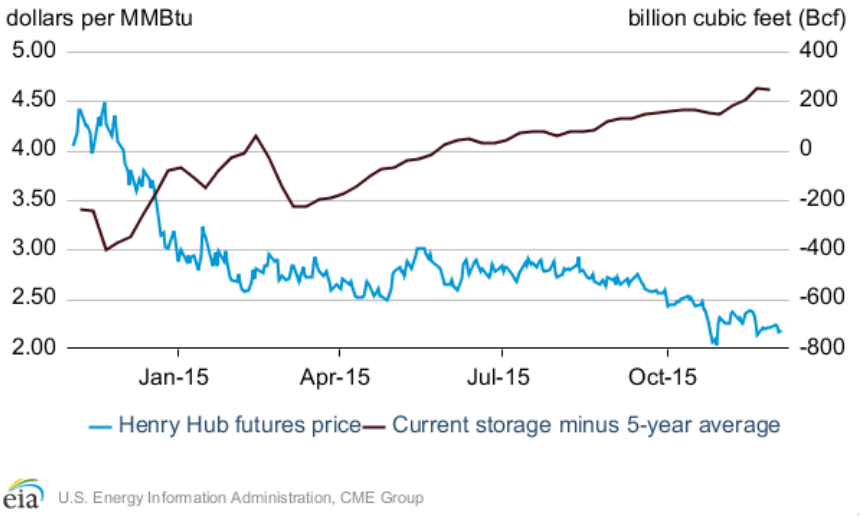
Natural Gas

Prices: High U.S. natural gas inventory levels, a result of rising U.S. natural gas production at time when heating-related demand is low due to warmer-than-normal temperatures, are putting downward pressure on prices. The front month contract for delivery of natural gas at Henry Hub declined by 8 cents per million British thermal unit (MMBtu) from November 2 to December 3, settling at $2.18/MMBtu **(Figure 13)**. Natural gas inventories continued to build in November, topping 4 trillion cubic feet (Tcf) and are 247 billion cubic feet (Bcf) above the five-year average for this time of year.

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



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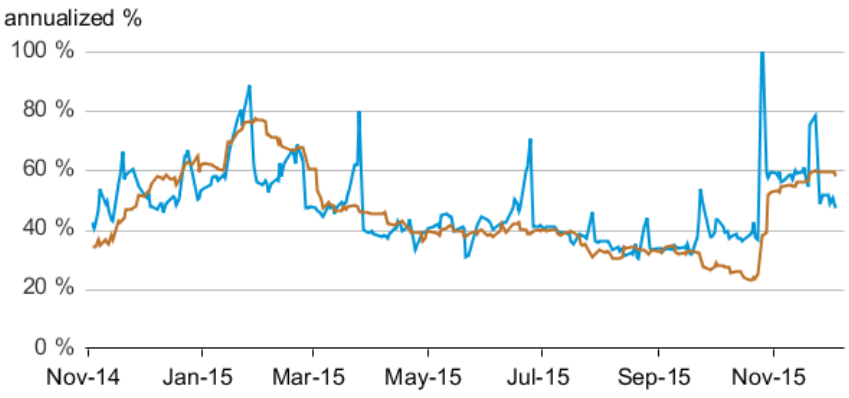
Volatility: Implied volatility for natural gas dropped by 10 percentage points to settle at 49% on December 3 **(Figure 14)**. While implied volatility was lower month-over-month, it remains elevated compared to the last 6 months and higher than at this time last year.

The large amounts of natural gas inventories and the beginning of the winter heating season are contributing to both low prices and heightened uncertainty.

Figure 14. Natural gas historical and implied volatility



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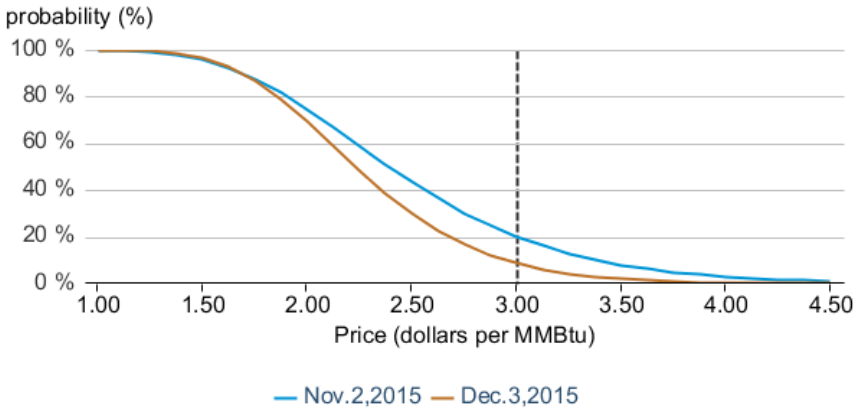
Market-Derived Probabilities: The March 2016 Henry Hub futures contract averaged $2.31/MMBtu for the five trading days ending December 3 and has a 9% probability of exceeding $3.00/MMBtu at expiration. The same contract for the five trading days ending November 2 had a 20% probability of exceeding $3.00/MMBtu **(Figure 15)**.

Figure 15. Probability of the March 2016 Henry Hub contract expiring above price levels



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