

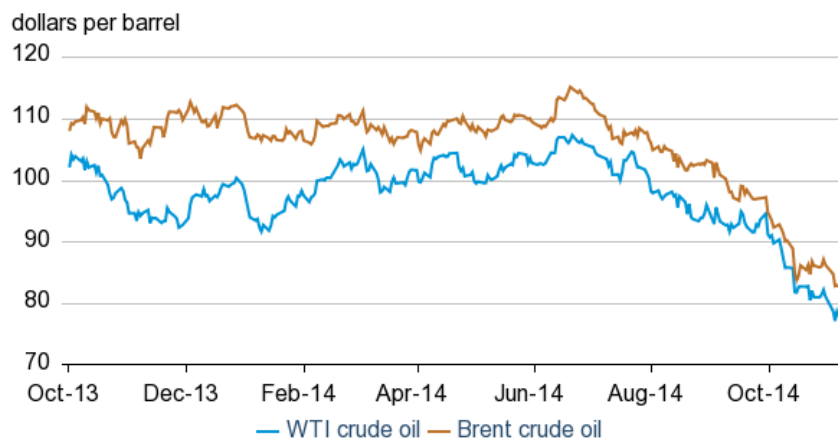


## Short-Term Energy Outlook Market Prices and Uncertainty Report

### Crude Oil

**Prices:** Both international and domestic crude oil prices moved sharply lower over the previous five weeks. The North Sea Brent front month futures price settled at \$82.86/bbl on November 6, a decline of \$11.30/bbl from October 1 (**Figure 1**). The front month West Texas Intermediate (WTI) contract price settled at \$77.91/bbl on November 6, decreasing by \$12.82/bbl since the start of October. November marked the lowest level of Brent prices since September 2010 and the lowest level for WTI prices since October 2011.

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



Concerns over a growing imbalance between global crude oil production and consumption continue to weigh on crude oil prices. The alleviation of global crude oil supply disruptions and continuing production increases from North America occur at a time when global demand for petroleum products is weakening, loosening the global crude oil market. Potential actions from members of the Organization of the Petroleum Exporting Countries (OPEC), geopolitical concerns in oil-producing countries, and uncertainty over future global economic growth elevate crude oil price risk going forward.

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

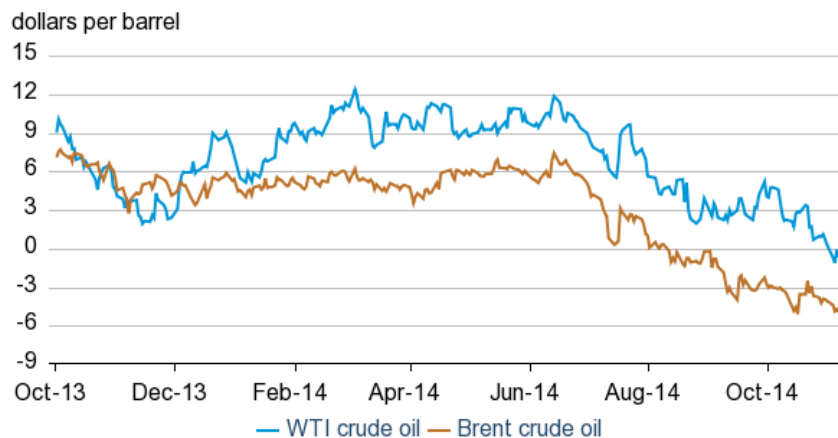
(<http://www.eia.gov/forecasts/steo/>)

Contact: James Preciado ([james.preciado@eia.gov](mailto:james.preciado@eia.gov))

The WTI futures curve switched into contango (when near-term prices are less than longer-dated ones) for the first time since February 2013. The 1<sup>st</sup>-13<sup>th</sup> spread settled at -\$0.70/bbl on November 6, a decline of \$4.67/bbl since October 1 (**Figure 2**). Crude oil imports into the United States were relatively constant from September to October, and with U.S. refineries currently undergoing planned maintenance, crude oil inventories rose, putting downward pressure on near-term prices. [U.S. commercial crude oil inventories](#) increased by 20.7 million barrels in October, about 16 million barrels higher than the average September to October inventory build over the previous five years.

The 1<sup>st</sup>-13<sup>th</sup> month spread for the Brent futures curve also moved lower in the past five weeks, settling at -\$4.97/bbl on November 6. Increased contango indicates a further loosening of global market balances and provides financial incentive for market participants to store oil. OECD commercial inventory levels are forecasted to be 2,649 million barrels at the end of fourth quarter 2014, 97 million barrels higher than the end of 2013 but within the five-year range.

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

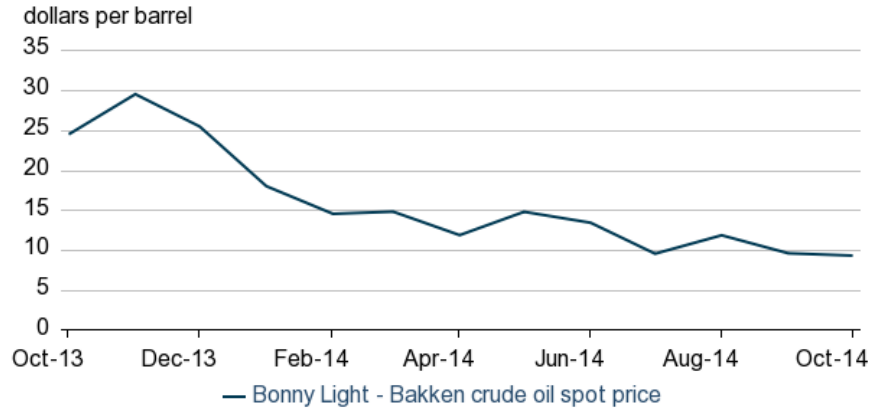


Over the past few years, refiners in PADD 1 (East Coast) have gradually reduced their imports of foreign crude oil by relying more on domestic sources of crude oil, as expanded rail capacity allowed more U.S. crude oil to move to U.S. East Coast refineries. The amount of imported crude oil [processed](#) in PADD 1 declined from an average of 1.1 million bbl/d in 2010 down to 0.6 million bbl/d from January to August in 2014 (the latest monthly data available). In particular, crude oil imports from West Africa were almost entirely pushed out, with Nigerian crude oil [imports](#) into PADD 1 decreasing from 0.4 million bbl/d in 2010 to 0.06 million bbl/d in 2014.

Recently, the average monthly spread between the Nigerian crude oil Bonny Light and Bakken crude oil fell to \$9.33/barrel (**Figure 3**), the lowest monthly average since July 2013, which resulted in an uptick in some West African crude oil imports into PADD 1

in recent weeks. This dynamic demonstrates that on the U.S. East Coast, a new arbitrage market may be forming between waterborne West African crude oil and domestic crude oil transported by rail. The differential between these two types of crudes will be driven by several factors, including differences in U.S. domestic and international market conditions, variations in transportation costs and delivery times between Bakken and Bonny Light, and by refinery economics.

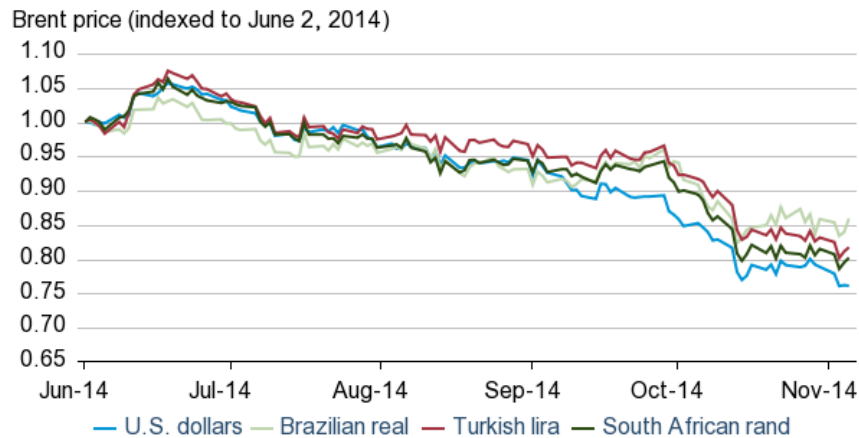
**Figure 3. Bonny Light - Bakken crude oil spot price monthly average spread**



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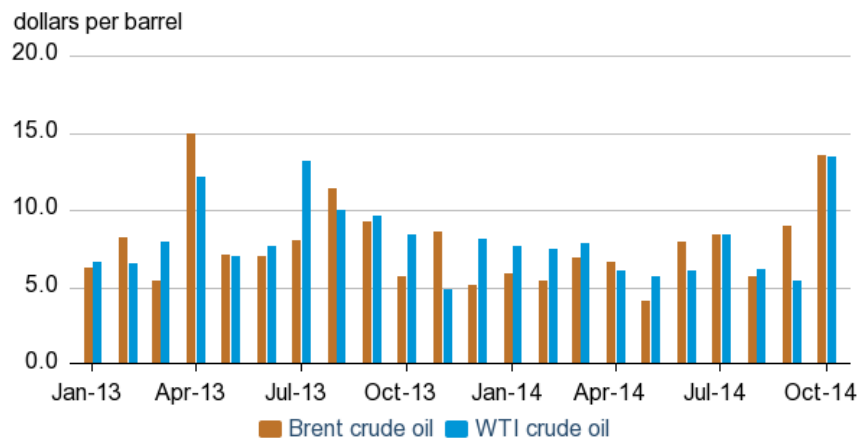
**Brent in emerging market currencies:** The price of crude oil also fell in emerging market currencies during October and the first week of November. The price of Brent in Brazilian real, Turkish lira, and South African rand declined by 9%, 13%, and 12%, respectively, from October 1 to November 6 (**Figure 4**). This is in contrast to September, when crude oil prices in these three currencies were relatively constant, while the price in dollars decreased by 8%. The recent downward move in crude oil priced in emerging market currencies, as well as the larger move from the price peak in June, could promote some additional consumption despite reduced economic growth forecasts.

**Figure 4. Brent crude oil price in emerging market currencies**



**Trading ranges:** From January 2013 to September 2014, monthly trading ranges for both Brent and WTI crude oil prices averaged just under \$8/barrel. However, in October, with the steep decline in crude oil prices, the trading range for Brent and WTI crude oil increased to \$13.63/bbl and \$13.52/bbl, respectively (**Figure 5**). April 2013 was the last time the monthly trading range for Brent was this large. Concerns about weak global economic growth, similar to the set of circumstances influencing the oil market in the last few months, were one of the main drivers pushing crude oil prices lower then. Prior to September this year, April 2013 was also the last time that the Brent front month futures contract declined to below \$100/barrel.

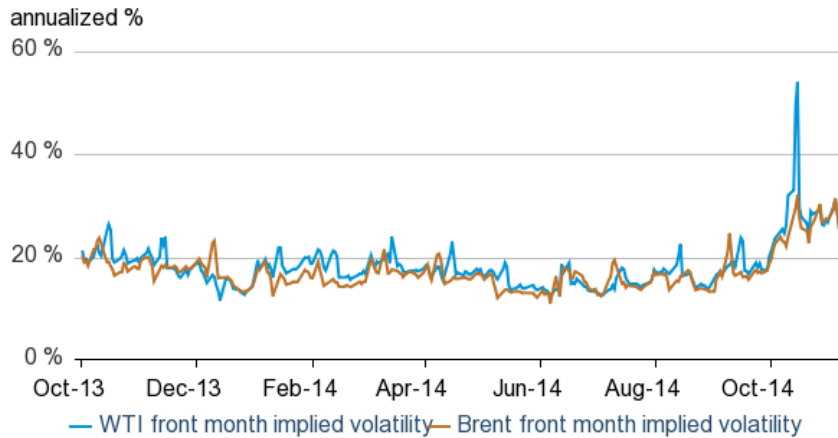
**Figure 5. Monthly trading ranges for Brent and WTI**



**Volatility:** Uncertainty over both future crude oil supply and demand pushed implied volatility for both Brent and WTI to their highest levels in over a year. Brent front

month implied volatility settled at 25.4% on November 6, 6.0 percentage points higher than on October 1 (**Figure 6**). WTI implied volatility increased by 5.1 percentage points over the same time, settling at 26.3% on November 6.

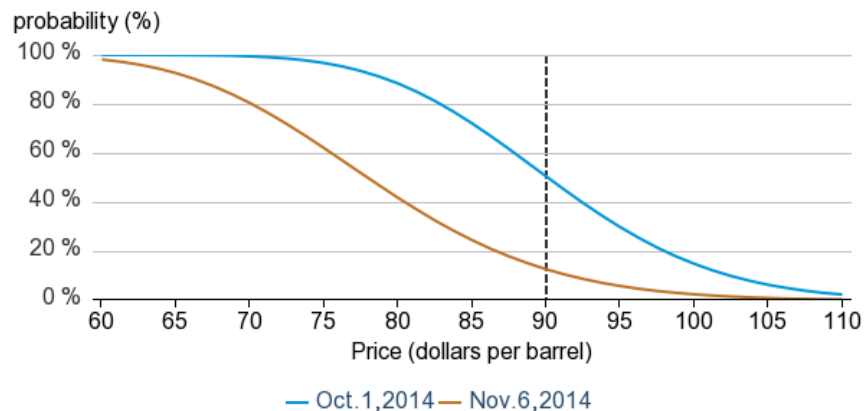
**Figure 6. Crude Oil Implied Volatility**



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**Market-Derived Probabilities:** The February 2015 WTI futures contract averaged \$78.55/bbl for the five trading days ending November 6 and has a market-derived probability of exceeding \$90/bbl at expiration of only 13%. The same contract for the five trading days ending October 1 had a probability of exceeding \$90 of 50% (**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 February 2015 WTI contract expiring above price levels**



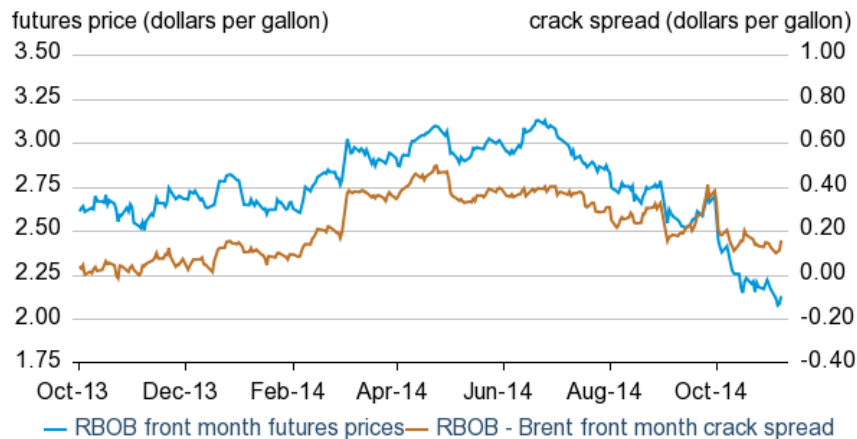
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## Petroleum Products

**Gasoline prices:** The reformulated blendstock for oxygenate blending (RBOB, the petroleum component of gasoline) front month futures price decreased 32 cents per gallon (gal) from October 1 to settle at \$2.13/gal on November 6 (**Figure 8**). On November 4, the price dropped to \$2.08, the lowest since October 2010. The RBOB-Brent crack spread dropped 5 cents/gal from October 1 to settle at 16 cents/gal November 6.

Although the gasoline crack spread declined through the month of October, it is still stronger than this time last year, averaging 13 cents/gal more than the average in October 2013 and the highest for the month of October since 2007. The four-week average gasoline [consumption plus exports](#) ending October 31 was 9.4 million bbl/d, the highest for the month of October since 2006. As a result, total gasoline [inventories](#) as of October 31 declined to 202 million barrels, falling below the five-year range.

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



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During the last week of September, the RBOB front month futures price reached a premium to the northwest Europe gasoline spot price of 18 cents/gal, the largest differential since June. Once again in the middle of October, the premium reached more than 10 cents/gal (**Figure 9**). This allowed for an opening in the trans-Atlantic arbitrage for gasoline imports into the U.S. East Coast, with total gasoline [imports](#) into PADD 1 increasing each week in October. The arbitrage opportunity likely closed at the start of November, as the differential between the RBOB front month and northwest Europe gasoline spot prices declined and settled at 1 cent/gal on November 6.

**Figure 9. RBOB front month - Northwest Europe gasoline spot price differential**

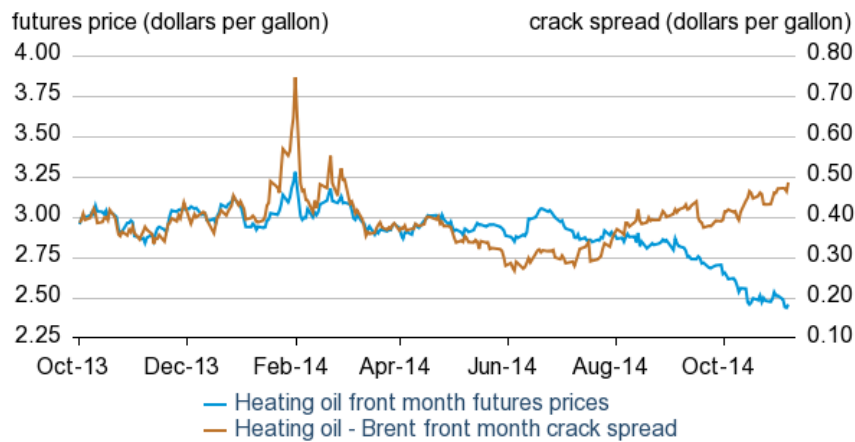


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**Heating oil prices:** The front month futures price for heating oil decreased 20 cents/gal from October 1, settling at \$2.46/gal on November 6 (**Figure 10**). On November 5, the heating oil future price fell to \$2.44/gal, the lowest price since December 2010. The heating oil-Brent crack spread increased 7 cents/gal from October 1 to settle at 49 cents/gal on November 6.

As with gasoline, the declines in heating oil prices reflect the decline in crude oil prices. While part the strength in the heating oil-Brent crack spread can also be attributed to declining crude oil prices, seasonal refinery maintenance in the United States may also be a contributing factor. U.S. distillate [production](#) from September to October declined 0.4 million bbl/d, compared to an average of a 0.1 million bbl/d decline over the same period from 2009 to 2013. As a result, 6 million barrels of distillate [stocks](#) were drawn, keeping the level of remaining stocks at the bottom of the five-year range.

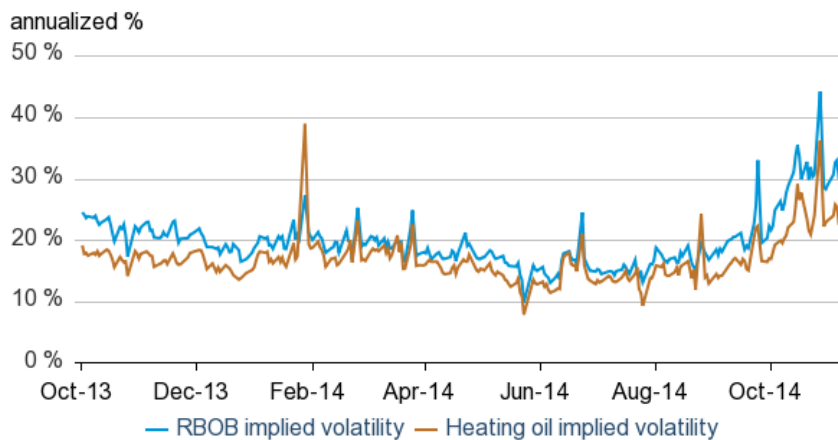
**Figure 10. Historical heating oil futures price and crack spread**



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**Volatility:** Implied volatility for the front month RBOB contract and front month heating oil contract increased 8.2 percentage points and 5.5 percentage points, respectively, from October 1 to settle at 29.8% and 22.5%, respectively, on November 6 (**Figure 11**). The implied volatilities of both products have been on an upward trend for the past two months, similar to the increases in implied volatility for crude oil prices.

**Figure 11. RBOB and Heating oil Implied Volatility**

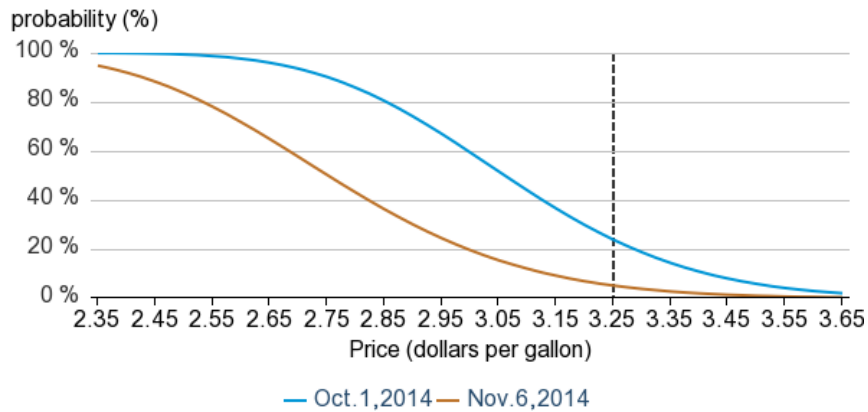


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**Market-Derived Probabilities:** The February 2015 RBOB futures contract averaged \$2.12/gal for the five trading days ending November 6 and has a 5% probability of exceeding \$2.60/gal (typically leading to a retail price of \$3.25/gal) at expiration. The same contract for the five trading days ending October 1 had a 24% probability of exceeding \$2.60/gal (**Figure 12**).



**Figure 12. Probability of February 2015 retail gasoline exceeding different price levels at expiration**

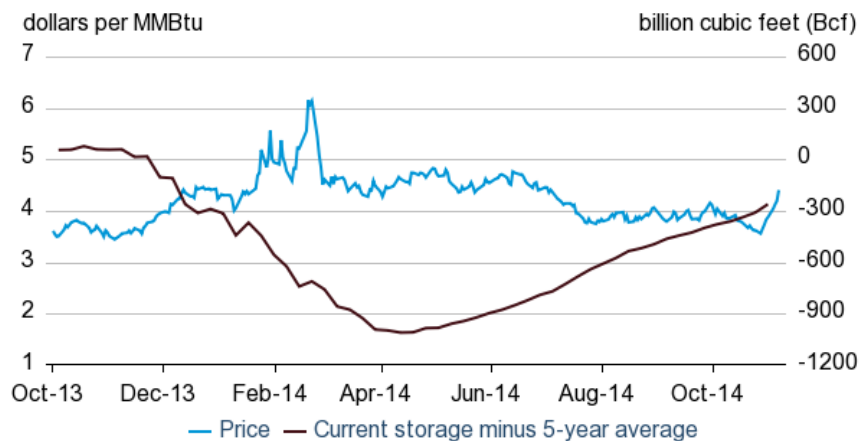


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## Natural Gas

**Prices:** Natural gas prices declined for much of October before moving higher in the first week of November as much of the United States experienced colder temperatures. The front month futures price for delivery of natural gas at Henry Hub settled at \$4.40/MMBtu on November 6, \$0.38/MMBtu higher than on October 1 (**Figure 13**). [Total U.S. working natural gas inventories](#) continued to build over the past month and are now 261 Bcf below their five-year average for this time of year. Natural gas inventories will likely begin their seasonal decline in the coming weeks, with reduced inventory levels at the start of winter heating season offset by higher forecasted domestic natural gas production. U.S. natural gas production is expected to average 75.5 Bcf/d in first quarter 2015, 3.4 Bcf/d higher than in first quarter 2014.

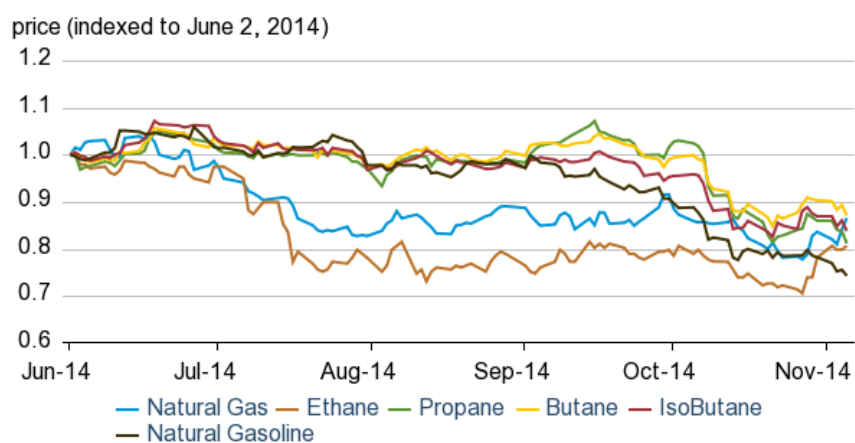
**Figure 13. U. S. natural gas prices and storage**



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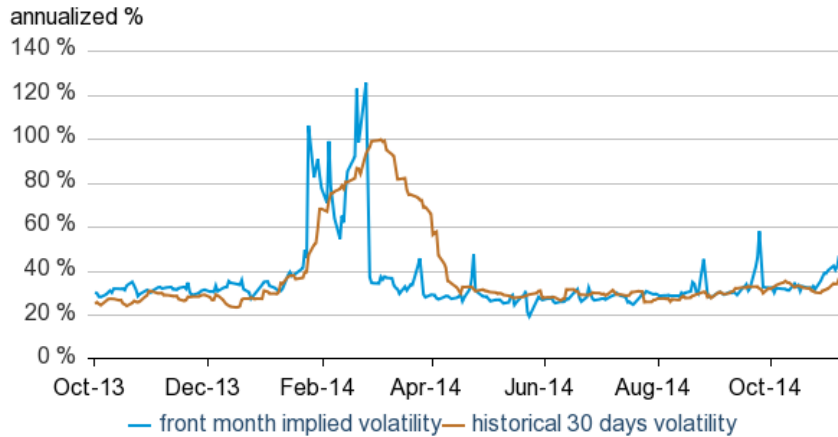
The recent decline in crude oil prices also affected the price for several hydrocarbon gas liquids (HGL). Spot prices for propane, butane, isobutane, and natural gasoline at Mont Belvieu declined by 20.1%, 12.0%, 12.0%, and 18.1%, respectively, from October 1 to November 6 (**Figure 14**). Ethane increased by 1.1%, the only one in the group to show price gains over the past five weeks, as it is more closely related to natural gas prices. Butane and propane were more resilient to oil-price reductions in August and September due to strong demand for these products. Butane was used to blend into RBOB to make winter-grade gasoline, while propane flowed into secondary storage in preparation for crop drying and winter heating seasons.

**Figure 14. Natural Gas and HGL prices**



**Volatility:** Implied volatility for the front month natural gas futures contract moved higher in the first week of November, settling at 47% on November 6, while historical volatility settled at 36.9% (**Figure 15**). Natural gas volatility is currently higher than last year and may reflect market concerns that this winter will be colder-than-average.

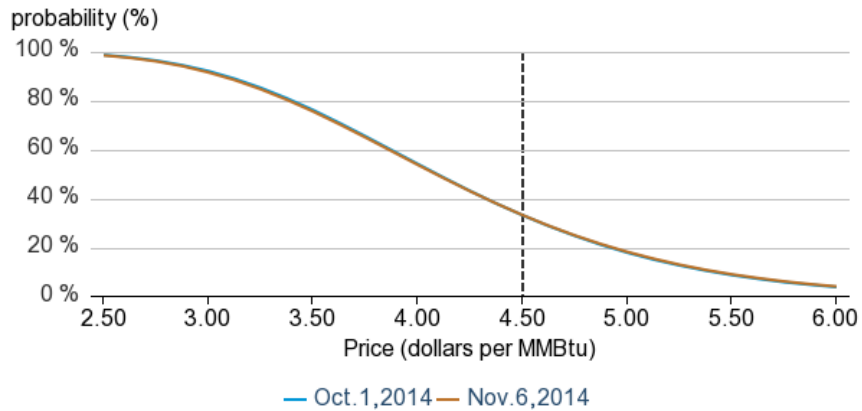
**Figure 15. Natural gas historical and implied volatility**



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**Market-Derived Probabilities:** The February 2015 Henry Hub futures contract averaged \$4.19/MMBtu for the five trading days ending November 6 and has a 33% probability of exceeding \$4.50/MMBtu at expiration. The same contract for the five trading days ending October 1 also had a 33% probability of exceeding \$4.50/MMBtu (**Figure 16**).

**Figure 16. Probability of the February 2015 Henry Hub contract expiring above price levels**



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