

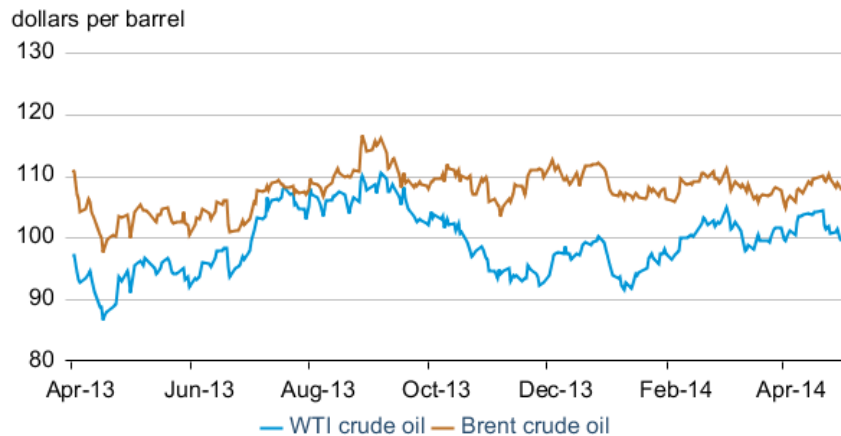


## Short-Term Energy Outlook Market Prices and Uncertainty Report

### Crude Oil

**Prices:** International crude oil futures prices rebounded in April and approached the top of their recent trading range. The North Sea Brent front month futures price settled at \$107.76 per barrel (bbl) on May 1, an increase of \$2.14/bbl from April 1 (**Figure 1**). West Texas Intermediate (WTI) prices at the start of May were near the same levels as the beginning of April. The front month WTI contract settled at \$99.42/bbl on May 1, a slight decrease of \$0.32/bbl since April 1.

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



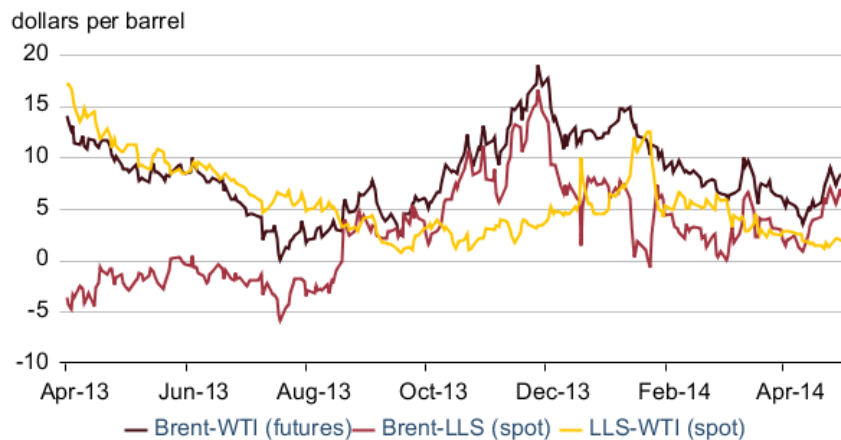
IntercontinentalExchange, CME Group

Continued supply disruptions and generally positive U.S. economic news were some of the drivers behind recent strength in Brent prices. Libyan production remains at low levels, with the prospects to return to higher production in the near future highly uncertain. Rising tensions around Russia and Ukraine have also increased the perceived risk of a potential future oil market disruption. Also providing support to oil prices, the U.S. economy added over 200,000 jobs in both March and April, which may contribute to further increases in U.S. gasoline consumption.

This is a regular monthly companion to the EIA Short-Term Energy Outlook (<http://www.eia.gov/forecasts/steo/>)  
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The Brent-WTI spread increased sharply in April as inventory builds in U.S. Gulf Coast (PADD 3) pushed down domestic crude oil prices relative to international crude oil benchmarks. Commercial crude oil inventories in PADD 3 reached 215 million barrels for the week ending April 25 and marked the fourth consecutive week of record high inventories. In response, Light Louisiana Sweet (LLS) prices dropped relative to Brent, with the spread between the two settling at \$6.19 on May 1. In the Mid-Continent, stocks in Cushing, Oklahoma, the delivery point for the WTI futures contract, were 24 million barrels for the week ending April 25, their lowest point in more than 4 years. These low inventories strengthened WTI relative to LLS, with the differential reaching a low of \$1.20/bbl on April 22. The result is that the Brent-WTI spread widened to settle at \$8.34/bbl on May 1, an increase of \$2.46/bbl since April 1 (**Figure 2**).

**Figure 2. Historical crude oil differentials**

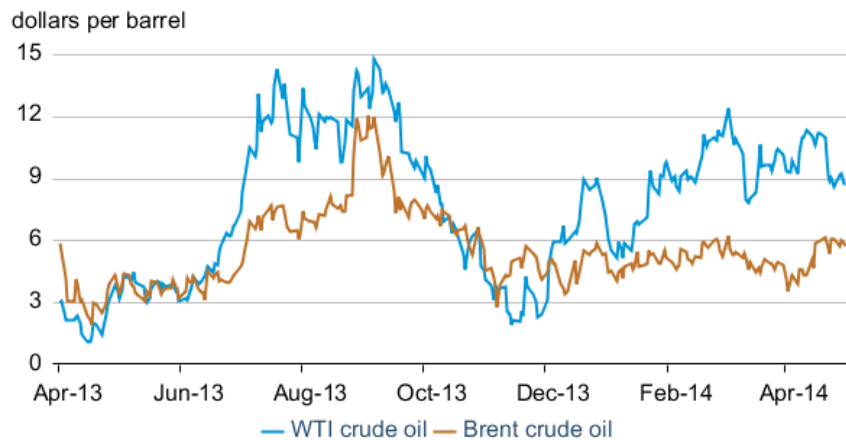


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Backwardation (when near-term prices are greater than longer-term ones) in the Brent futures curve increased in April and settled near its highest point so far this year. The Brent 1<sup>st</sup>-13<sup>th</sup> month spread settled at \$5.72/bbl on May 1, an increase of \$1.54/bbl since April 1 (**Figure 3**). In addition to current and potential future supply disruptions, the contract roll from May to June delivery contributed to the higher levels of backwardation as European refineries coming out of seasonal maintenance will likely tighten the near-term Brent market.

In the U.S. domestic market, backwardation in the WTI curve decreased in April as the pace of inventory withdrawals from Cushing, Oklahoma, lessened. The 1<sup>st</sup>-13<sup>th</sup> spread for WTI settled at \$8.70/bbl on May 1, a decline of \$0.68/bbl since April 1. For the four weeks ending March 28, commercial crude oil inventories in Cushing declined by an average of 1.2 million barrels per week. The most recent four-week period ending April 25 showed an average weekly decline of 0.5 million barrels per week.

**Figure 3. Crude oil front month - 13th month futures price spread**

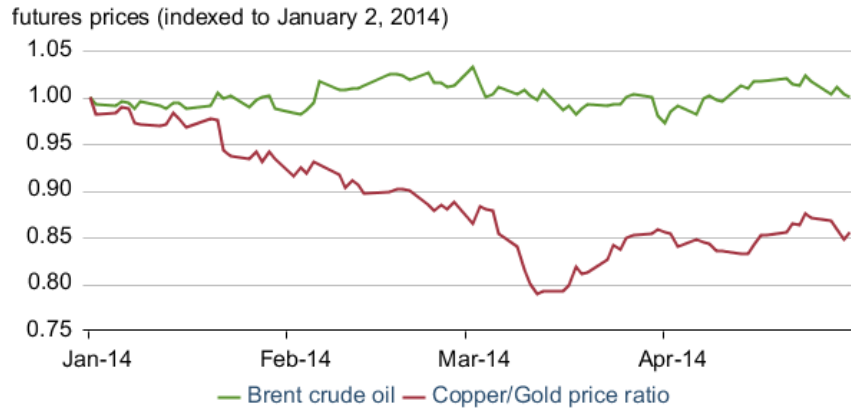


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**Brent and metals futures prices:** The copper-to-gold price ratio is helpful in determining market sentiment on economic growth, which is closely related to future crude oil demand. The price of an industrial metal like copper is typically associated with economic growth because the metal is used primarily in construction and infrastructure projects. On the other hand, the price of a precious metal like gold can indicate the market's appetite for safe investments during times of economic uncertainty. When the copper-to-gold ratio increases, a sign that expectations for future economic growth are increasing, Brent prices tend to rise as well. From 2010 to 2013, the 60-day rolling correlation between Brent prices and the copper-to-gold price ratio was mostly positive, at times reaching correlations between 0.4 and 0.6.

Since January of this year, however, Brent front month futures prices stayed in a relatively narrow range, while the copper-to-gold front month futures price ratio declined 15%, resulting in a correlation of -0.14 between daily movements, or essentially no relationship, by the end of April (**Figure 4**). This suggests that in the beginning of 2014, Brent prices were less affected by perceived long-term economic health of developing countries and more so by other factors, such as ongoing supply disruptions.

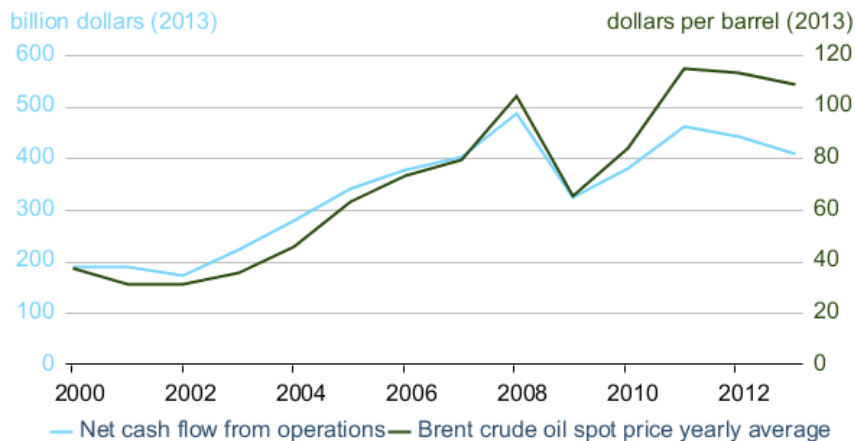
**Figure 4. Brent front month prices and Copper to Gold front month price ratio**



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**Oil company financial results:** Based on the recently released financial statements of 42 global oil and gas companies, representing 39% of non-OPEC liquids production in 2013, [cash flow declined](#) for the second year in a row (**Figure 5**). The aggregate cash from operating activities declined 4% and 7% in 2012 and 2013, respectively, with lower inflation-adjusted crude oil prices since 2011 negatively impacting cash flow. Company investment spending patterns also increased slightly since 2011, largely concentrating on [upstream exploration and development](#). The decline in cash flow has made it more difficult for companies to maintain capital expenditures, dividends, and share repurchases. Further reductions in oil company cash flow could challenge capital expenditures on finding and developing new fields, which could impact future production; however, some of the decline could be offset by [increased drilling productivity](#).

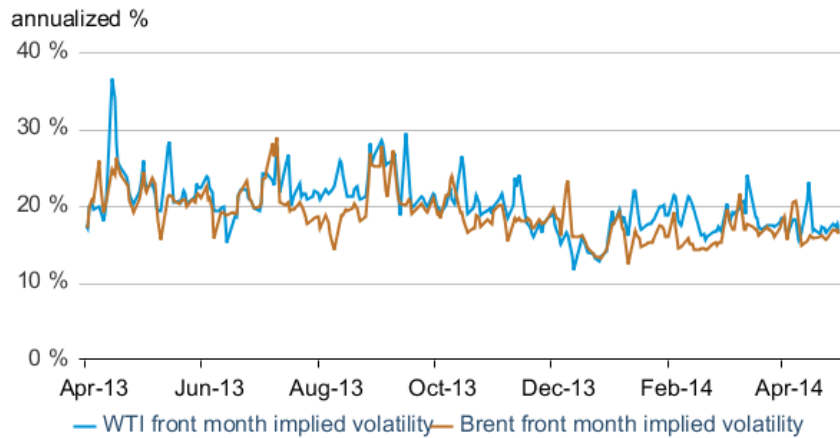
**Figure 5. Cash flow for major oil companies**



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**Volatility:** Implied volatility for front month oil futures contracts declined slightly in April and remain close to prior month levels. Brent implied volatility settled at 16.3% on May 1, a decline of 1.5 percentage points compared to April 1 (**Figure 6**). WTI implied volatility settled at 16.6% on May 1, a decrease of 1.8 percentage points since April 1.

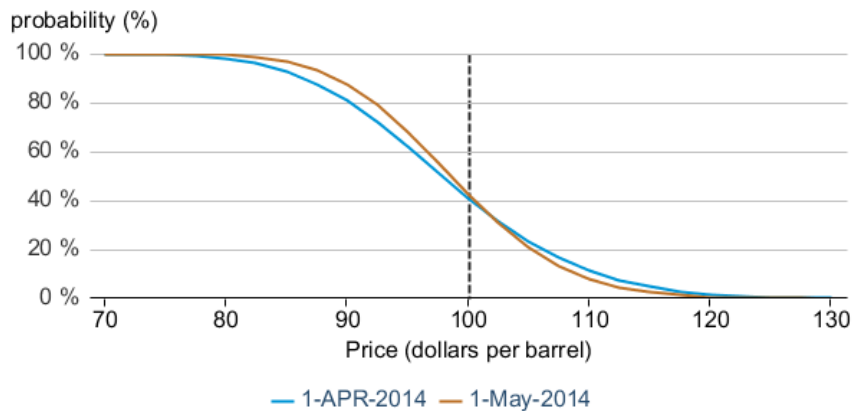
**Figure 6. Crude Oil Implied Volatility**



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**Market-Derived Probabilities:** The August 2014 WTI futures contract averaged \$98.88/bbl for the five trading days ending May 1 and has a probability of exceeding \$100/bbl at expiration of 43%. The same contract for the five trading days ending April 1 had a probability of exceeding \$100 of 41% (**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 August 2014 WTI contract expiring above price levels**

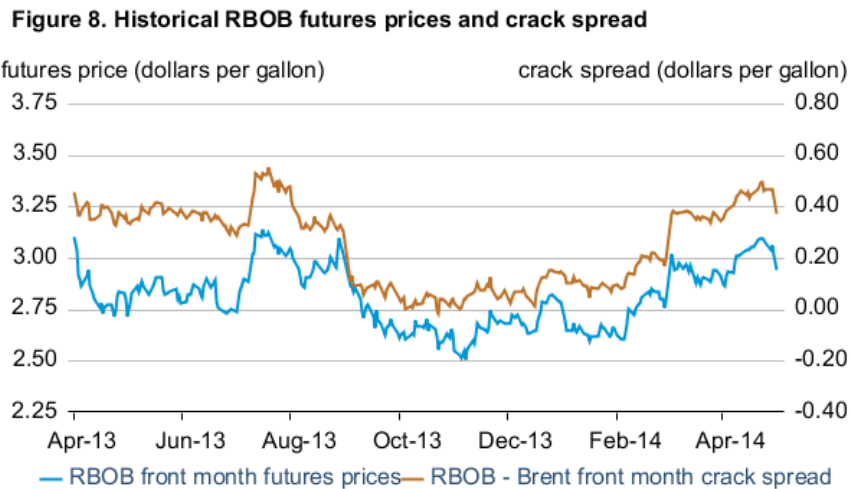


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## Petroleum Products

**Gasoline prices:** The reformulated blendstock for oxygenate blending (RBOB, the petroleum component of gasoline) front month futures price rose \$0.07 per gallon (gal) since April 1, settling at \$2.94/gal on May 1 (**Figure 8**). April was the first month this year in which the average monthly gasoline price showed a year-over-year increase. The RBOB-Brent crack spread settled at \$0.37/gal on May 1, an increase of \$0.02/gal since April 1. The average crack spread in April was the highest for that month since 2007.

After a delayed start to the driving season in the United States, gasoline prices in April began to display their seasonal spring rally as gasoline consumption and exports rose. The four-week average of gasoline consumption and exports ending April 25 was 9.2 million barrels per day (MMbbl/d), an increase of 0.1 MMbbl/d from last April and the highest for that month since 2011. Total U.S. gasoline inventories declined 9.5 million barrels from April 2013 to 212 million barrels, just below the five-year average for the month.



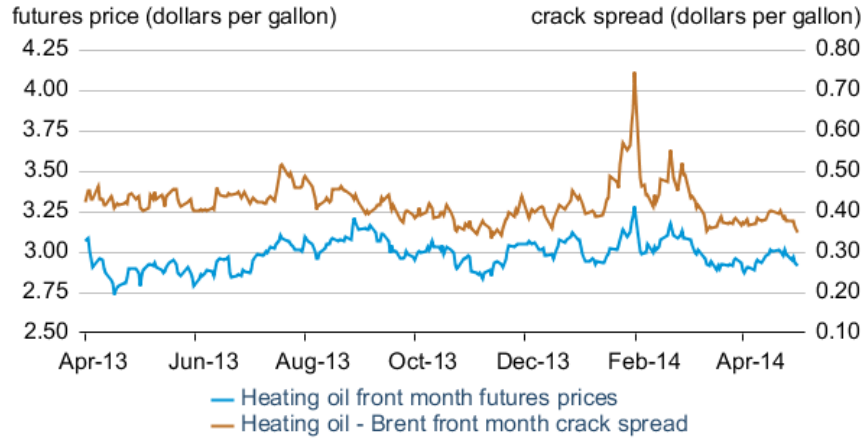
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**Heating Oil prices:** The front month futures price for heating oil increased slightly by \$0.03/gal since April 1, settling at \$2.91 on May 1 (**Figure 9**). The heating oil-Brent crack spread declined \$0.02/gal to \$0.35/gal on May 1.

Throughout the winter, distillate inventories remained below the previous five-year range, but in April, the distillate market was able to respond to an increase in U.S. heating oil consumption and exports from March without requiring additional inventory withdrawals. Total U.S. consumption and exports for the four weeks ending April 25 were 5.1 MMbbl/d, a slight increase from the four-week average ending March 28. Concurrently, total distillate production and imports increased 0.1 MMbbl/d from

March to 5.1 MMbbl/d in April. In PADD 1, distillate stocks have gradually recovered from their low levels in January.

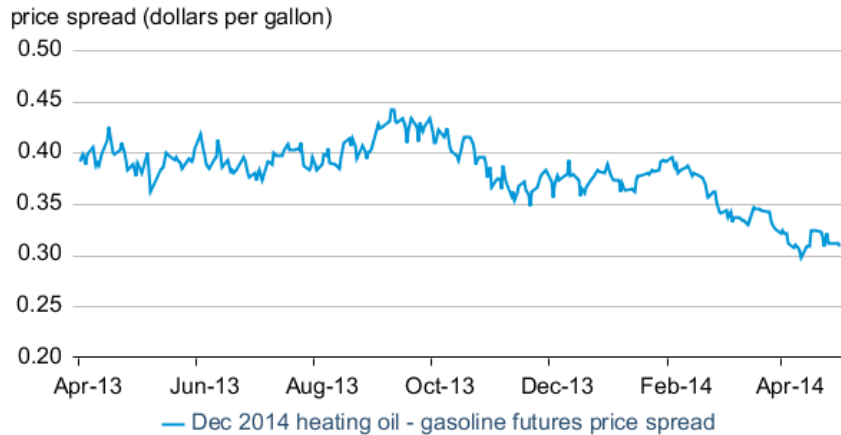
**Figure 9. Historical heating oil futures price and crack spread**



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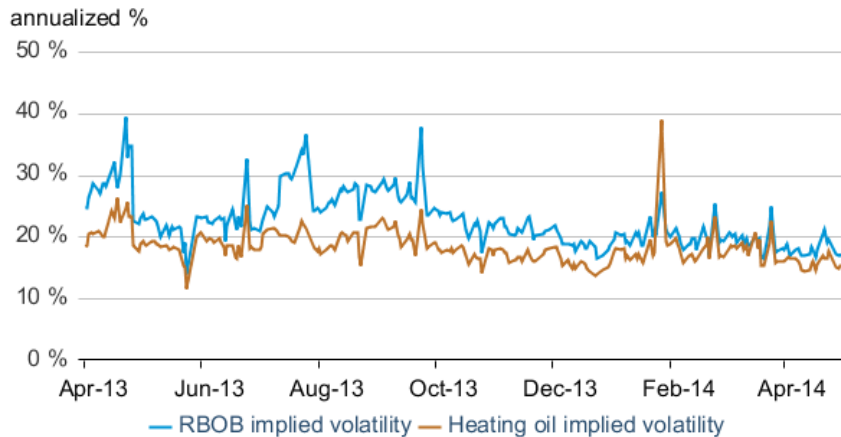
**Heating oil-gasoline price spread:** In April, increases in front month gasoline futures prices outpaced heating oil futures prices. In addition, longer-dated gasoline futures prices have also strengthened recently relative to heating oil prices. The spread between heating oil and gasoline contract prices for delivery in December 2014 settled at \$0.31/gal on May 1, a decline of \$0.09/gal since the beginning of February (**Figure 10**). Two factors may be contributing to the rise in gasoline futures contract prices at the end of the year compared to distillate. First, a potential slowdown in economic growth in emerging market economies will likely have a larger immediate impact on distillate demand compared to gasoline. Additionally, several advanced refineries are expected to come online this year that are configured to produce a high proportion of distillate, providing more distillate supply than gasoline. The refineries that have announced closures or are likely to close this year make a higher proportion of gasoline to distillate compared to the new ones now coming online.

**Figure 10. Heating Oil minus Gasoline Futures Price Spread**



**Volatility:** The implied volatility for the front month RBOB contract and front month heating oil contract declined slightly by 0.7 percentage points- and 0.8 percentage points, respectively, from April 1 to settle at 17.2% and 15.3%, respectively, on May 1 (**Figure 11**).

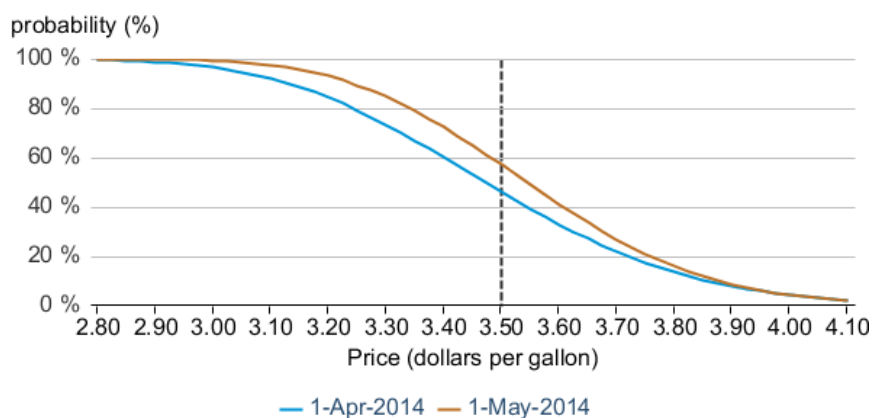
**Figure 11. RBOB and Heating oil Implied Volatility**



**Market-Derived Probabilities:** The August 2014 RBOB futures contract averaged \$2.90/gal for the five trading days ending May 1 and has a probability of exceeding \$2.85/gal (typically leading to a retail price of \$3.50/gal) at expiration of approximately 58%. The same contract for the five trading days ending April 1 had a probability of 46% of exceeding \$2.85/gal (**Figure 12**).



**Figure 12. Probability of August 2014 retail gasoline exceeding different price levels at expiration**

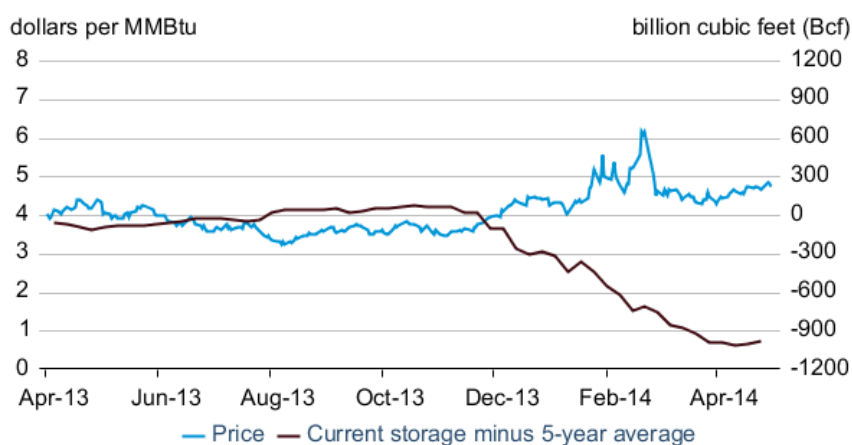


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## Natural Gas

**Prices:** Natural gas prices experienced a broad increase throughout April as storage injection season began. Futures prices settled at \$4.72/MMBtu on May 1, \$0.44/MMBtu higher than on April 1. Recent working storage reports showed builds that were below market expectations, which contributed to higher prices over the previous month (**Figure 13**).

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

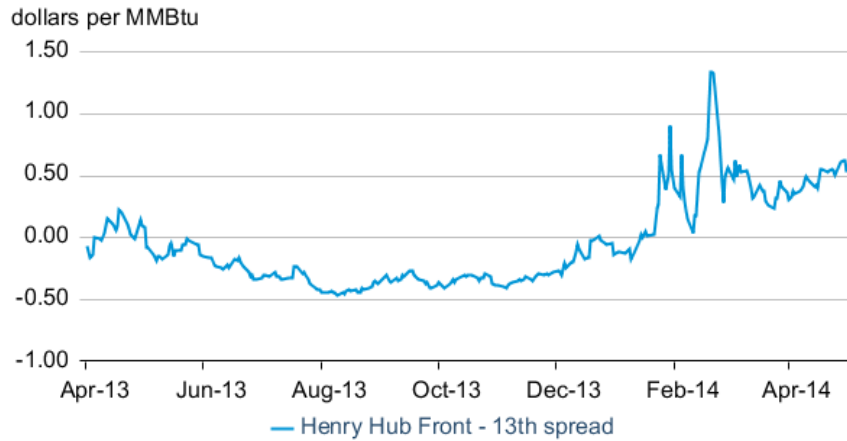


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Near-term natural gas prices continue to be elevated compared to prices for delivery of natural gas at the same time next year. The 1<sup>st</sup>-13<sup>th</sup> month spread for the Henry Hub natural gas futures contract settled at \$0.62/MMBtu on April 30, an increase of \$0.32/MMBtu since April 1 (**Figure 14**) and marks the highest level since February 21

when much of the United States was experiencing colder-than-normal temperatures. Backwardation in the first year of the natural gas futures curve is a change from last year's contango and incorporates the market's expectation that higher prices because of low inventory levels at the start of the seasonal injection period will be alleviated by next year.

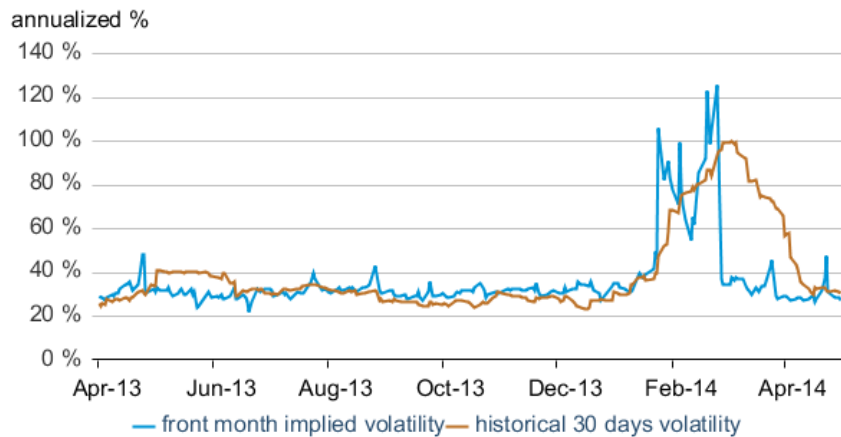
**Figure 14. Natural gas 1st-13th futures price spread**



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**Volatility:** Implied volatility decreased 1.8 percentage points since April 1, settling at 27.4% on May 1 (**Figure 15**). Historical 30-day volatility continued its downward trend, settling at 30.6% on May 1. Both implied volatility and historical volatility are near pre-winter levels.

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



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**Market-Derived Probabilities:** The probability of the August 2014 Henry Hub contract expiring above \$4.50 per MMBtu increased to 64% on May 1, 18 percentage points higher than the probability on April 1 (**Figure 16**).

**Figure 16. Probability of the August 2014 Henry Hub contract expiring above price levels**

