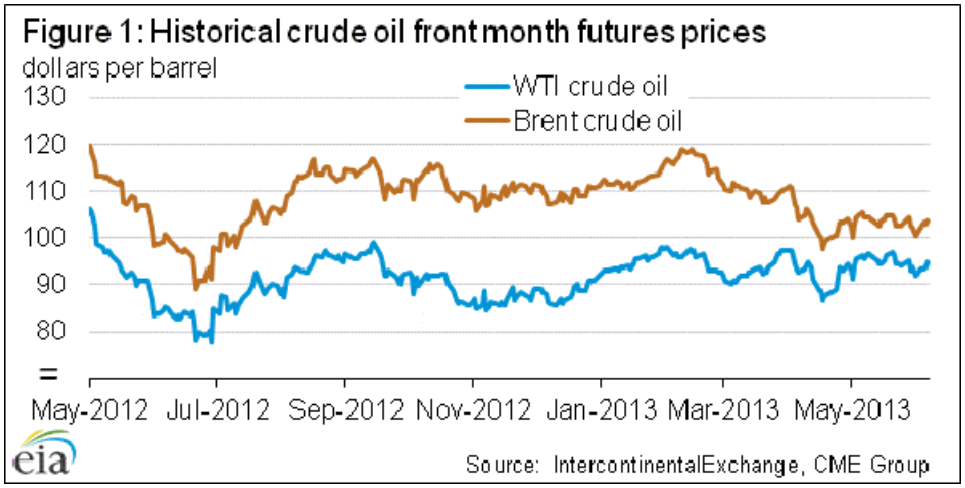
Independent Statistics & Analysis
U.S. Energy Information Administration

June 2013

Short-Term Energy Outlook
Market Prices and Uncertainty Report

Crude Oil

Prices: After declining in March and April, Brent and WTI prices traded in a relatively narrow range for most of May. Brent settled at $103.61 per barrel on June 6, an increase of $3.66 per barrel since May 1, and WTI settled at $94.76 per barrel on June 6, an increase of $3.73 per barrel since May 1 **(Figure 1)**.



Recent oil price reflect a more subdued outlook for world economic growth, the possibility of the U.S. Federal Reserve bank reducing or ending its asset purchases program, and continued improvements in forecasts for non-OPEC crude oil production, particularly in the U.S., which have all contributed to lower world oil prices compared to earlier this year. Meanwhile, the OPEC policy meeting held on May 30 and 31 produced no changes in production quotas and left the stated preference of $100 per barrel by the Saudi Arabian oil minister as a key support level for world waterborne crude prices.

This is a regular monthly companion to the EIA Short-Term Energy Outlook (http://www.eia.gov/forecasts/steo/)
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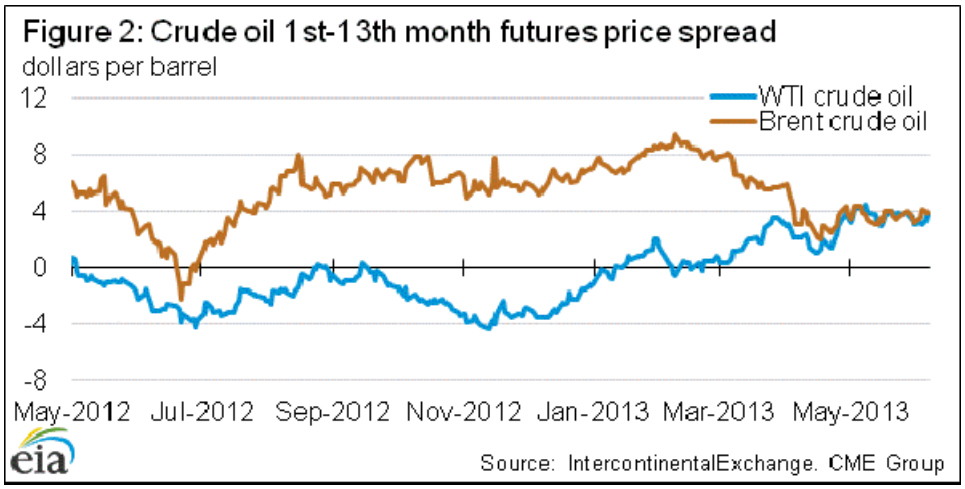
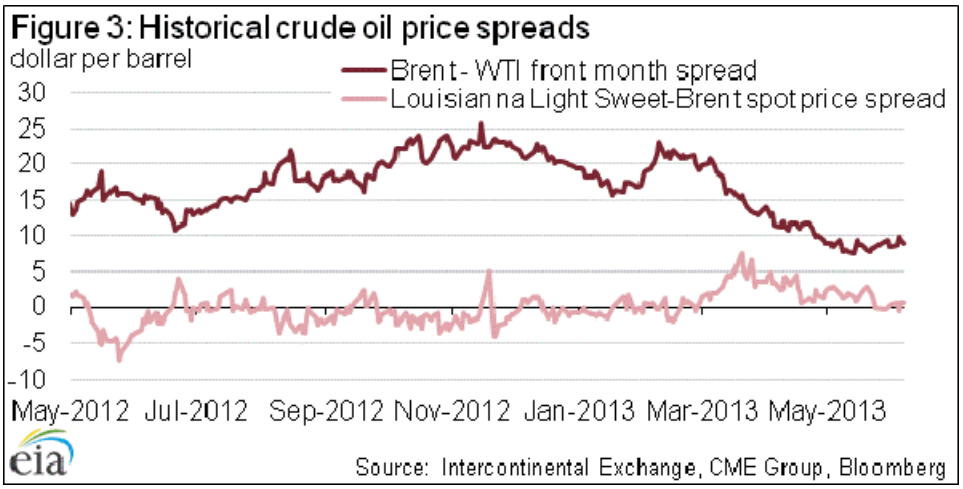
The 1st-13th month futures price spread for both Brent and WTI is relatively unchanged since May 1. Backwardation (when near-term prices are higher than farther dated ones) for the Brent and WTI futures curves was $3.95 and $3.78 per barrel, respectively, on June 6, approximately the same level as on May 1 **(Figure 2)**. This shows that tightness in the crude oil market has not changed much over the last month, with the market providing a small incentive to sell oil out of inventories now rather than storing barrels to sell later. Additionally, the backwardation in both the Brent and WTI futures curves has been nearly identical since the end of April, with both spreads being highly correlated with each other. This is the first time since the fourth quarter of 2010 that the shape of these two futures curves has been similar for an entire month, providing some indication of a lack of expected change in marginal costs of crude transport in the U.S. mid-continent over the coming year.



The Brent-WTI spread also stabilized since May 1 after declining for much of this year. The spread averaged $8.61 per barrel from May 1 to June 6, with the high point of $9.93 occurring on June 4 and the low point of $7.65 occurring on May 13 **(Figure 3)**. This was the lowest variance for the Brent-WTI spread over any five-week period since December 2010 and shows that the marginal barrel of crude oil is able to consistently move between Cushing, Oklahoma and refining sectors on the U.S. Gulf Coast for about $7.50-$10 per barrel, compared to the $15-$25 per barrel range from fourth quarter 2012 through first quarter 2013. In the world waterborne crude oil market, the flows of oil from the U.S. mid-continent are displacing imports into the United States and a change in tariff policy in South Korea are pushing down Brent prices relative to WTI.

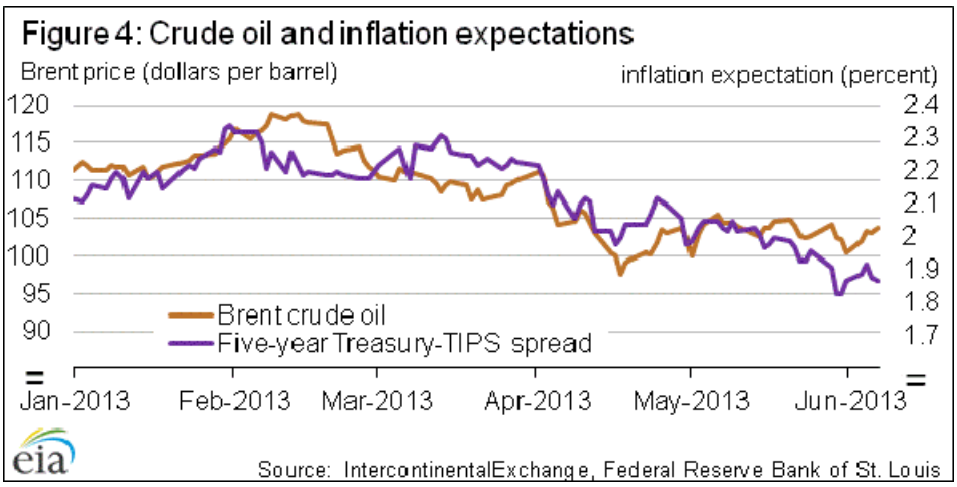
The spread between Louisiana Light Sweet (LLS) and Brent crude oil shrank over the last month and settled at $0.70 per barrel on June 6. The spread reached a high of $7.57 per barrel on March 20, the largest LLS premium since October 2008, and signaled profitable arbitrage to import light-sweet crude oil from the Atlantic Basin into the U.S. Gulf Coast. The main cause of the wide differential in March was the U.S. completing refinery maintenance sooner than other parts of the world and U.S. Gulf Coast refineries

running at a high utilization rate. Crude oil imports into PADD 3 averaged 646,000 barrels per day more in the four weeks ending May 31 compared to the four weeks ending March 15.

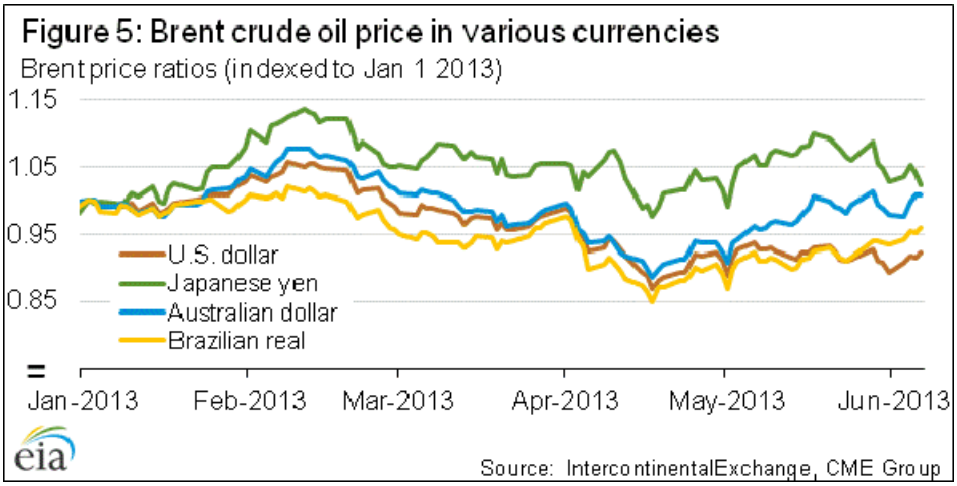


Brent vs Inflation Expectations: Minutes from the last Federal Open Markets Committee (FOMC) meeting as well as statements from Fed officials show they are considering how and when to either reduce or stop their asset purchase program (also known as quantitative easing). These actions were discussed at previous FOMC meetings but expectations that a reduction in quantitative easing may take place in the near future are being reflected in financial markets for the first time. The five-year Treasury-TIPS spread provides a daily market expectation for inflation over the next five years. From its March peak, the spread has fallen by 0.44 percentage points (44 basis points) to settle at 1.87 percent on June 6 **(Figure 4)**.

Falling expectations for inflation generally provide downward pressure on crude oil prices. Historically, crude oil prices and the Treasury-TIPS spread are positively correlated. The relationship is bi-causal as investments in crude oil and other commodities are often viewed as hedges against inflation and oil prices factor into the costs for many different goods and services. (For a further discussion of the effect of oil prices on inflation, see Increases in oil prices affect broader measures of inflation).



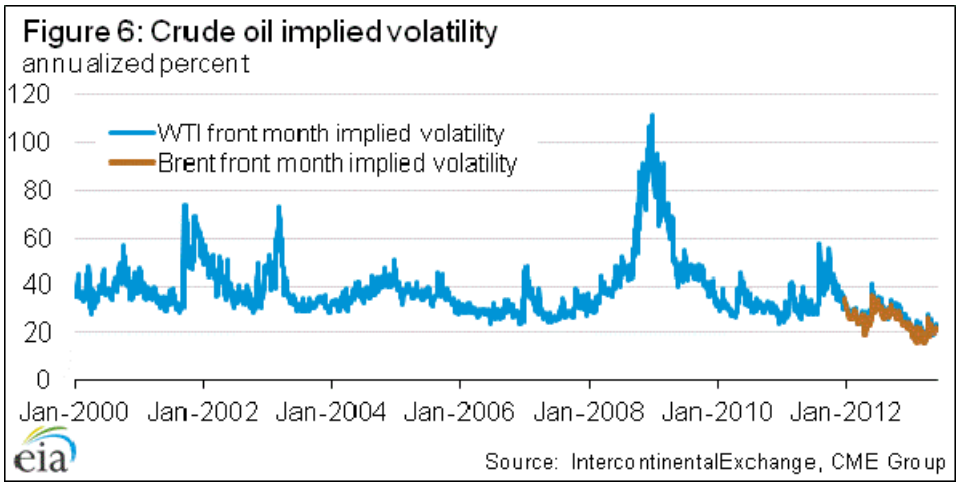
Brent crude oil in other currencies: From January 1 to June 6, the price of Brent in U.S. dollars has fallen by 7.9 percent; however, when examining the price of Brent in other currencies, the price has not fallen by nearly as much and has even risen in some cases **(Figure 5)**. For example, Brent crude oil has risen by 2.3 percent since January 1 when measured in Japanese yen and is nearly unchanged when measured in Australian dollars. Stronger prices outside the U.S. may dampen international consumption and lead to further crude oil prices weakness.



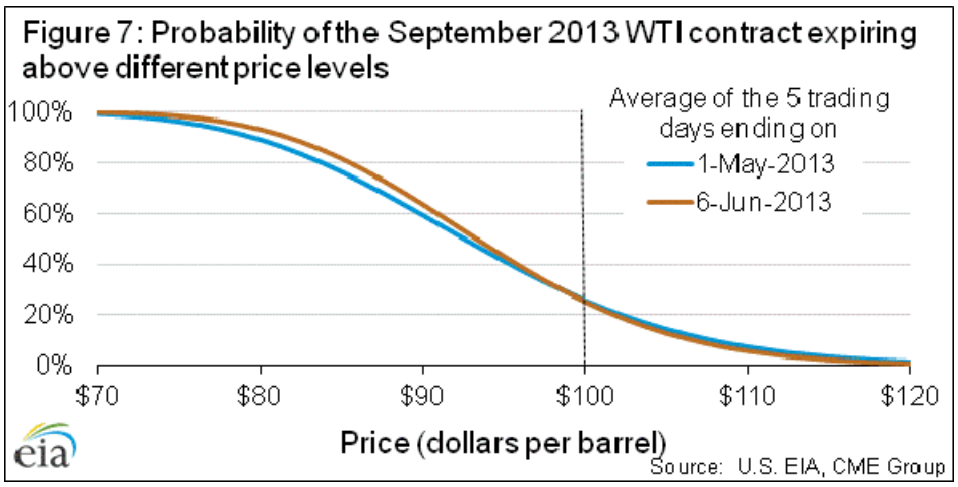
Volatility: Implied volatility for front month Brent and WTI futures contracts settled at 20.9 and 22.2 percent, respectively, on June 6 **(Figure 6)**. This was a decrease of 2.8 and 3.6 percentage points from May 1 for both benchmarks and occurred amidst some of the lowest levels of implied volatility in over 13 years[1]. Prior to this year, implied volatility for the front month WTI futures contract had not dropped below 20 percent since at least January 2000. Implied volatility remains low compared to historical data and supports recent price stability. Rising OPEC spare production capacity may be contributing to

[1] Implied volatility for the Brent front month contract is only graphed starting in January 2012, when volume in Brent options rose and the market became more liquid.

lower volatility in oil prices. Since June 2012, EIA estimates that spare production capacity has risen from 1.95 million barrels per day to 2.80 million barrels per day, the highest amount of spare production capacity since May 2011 and the largest year-over-year increase since first quarter 2010.



Market-Derived Probabilities: The September 2013 WTI futures contract averaged $93.75 per barrel for the five trading days ending June 6 and has a probability of exceeding $100 per barrel at expiration of approximately 25 percent. The same contract for the five trading days ending May 1 had a probability of exceeding $100 of 26 percent (**Figure 7**). Given the elevated price of Brent relative to WTI, the probability of Brent futures contracts expiring above the same dollar thresholds is higher.

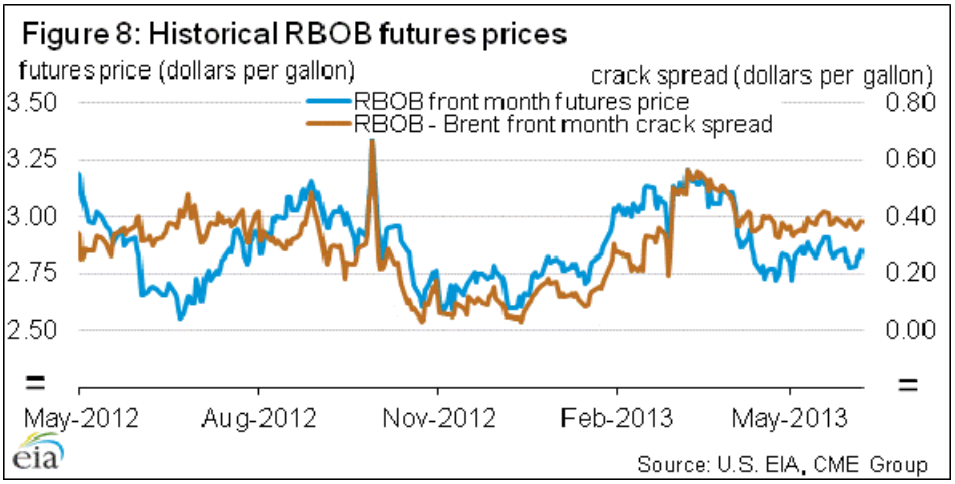


Petroleum Products

Gasoline prices: The price of reformulated blendstock for oxygenate blending (RBOB) front month futures stayed relatively stable during May. Prices increased $0.13 from

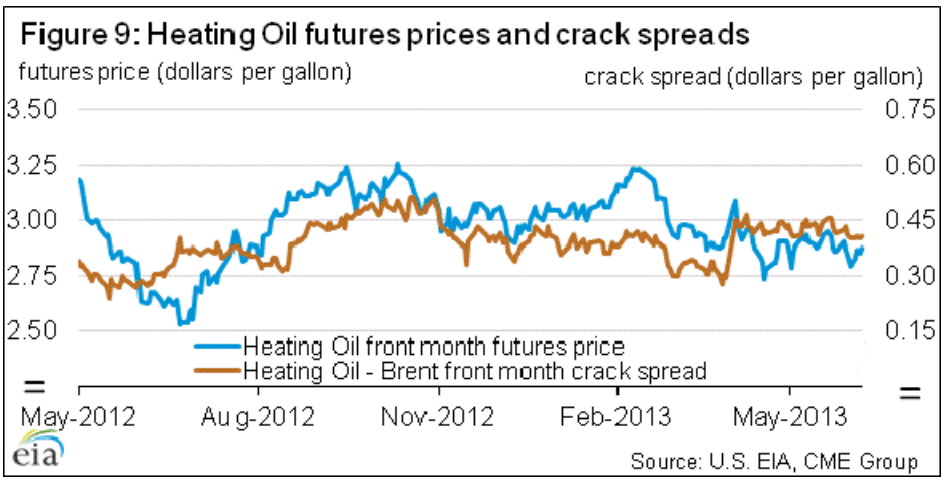
May 1, settling at $2.85 on June 6 **(Figure 8)**. The RBOB-Brent crack spread increased slightly by $0.04 per gallon since the beginning of May, settling at $0.38 per gallon on June 6. Current RBOB front month futures prices are roughly equal to the front month prices this time last year. Similarly, the RBOB-Brent crack spread seen at the end of May 2013 was relatively unchanged from the crack spread seen last year at the end of May 2012.

RBOB futures prices mirrored the stable crude oil prices in May. This stability reflects the little movement in the supply and demand of gasoline in the United States when compared to historical May data. Gasoline production was relatively unchanged from its three-year average for May, increasing by 0.1 percent. Total gasoline demand and exports were also stable when compared to its three-year average, decreasing by just 1.0 percent.



Heating Oil prices: Heating oil front month prices were increased slightly by $0.08 per gallon since May 1 and settling at $2.87 per gallon on June 6. The heating oil-Brent crack spread settled at $0.40 on June 6, virtually unchanged since the beginning of May **(Figure 9)**.

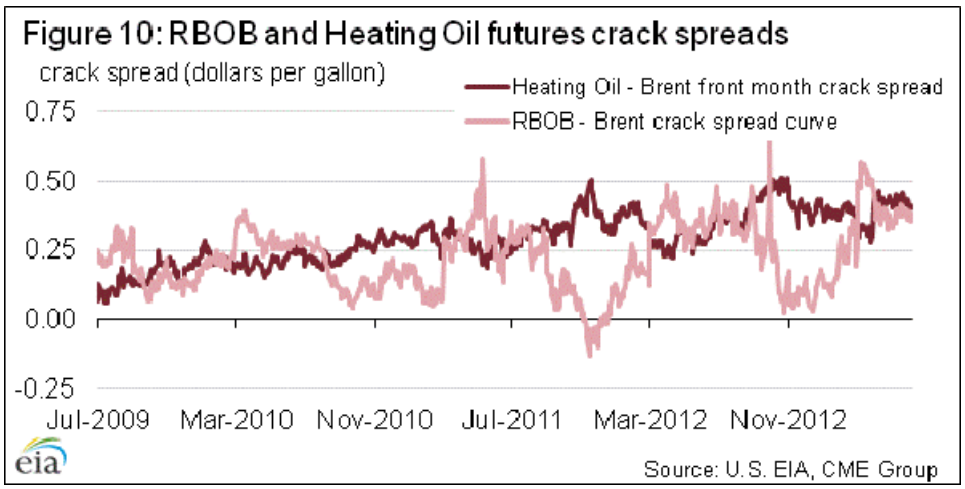
Distillate supply and demand in the United States were not as stable as gasoline supply and demand when compared to historical data. Distillate production increased 7.5 percent over the three-year average for May. Demand and exports for distillate increased by 2.5 percent, while inventories decreased by 11.0 percent. These opposing factors stabilize heating oil futures prices in May.



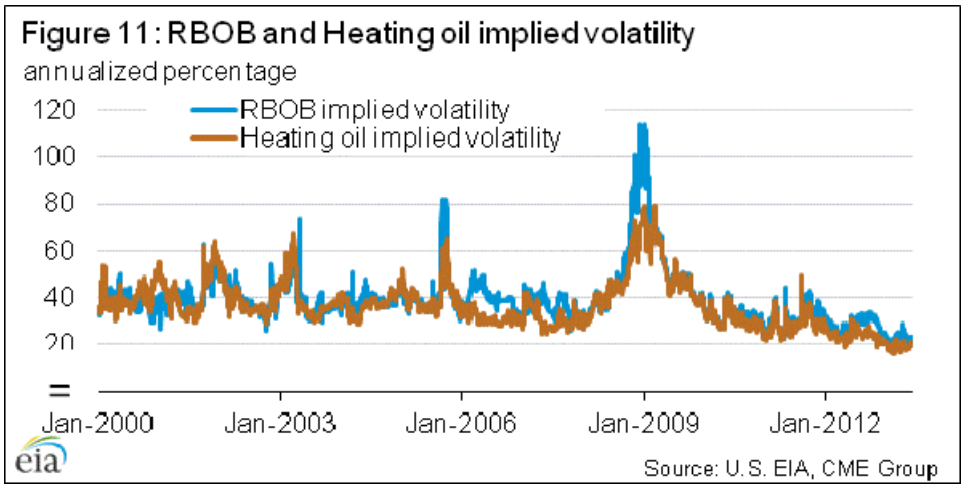
Crack spreads: Comparing the RBOB-Brent and heating oil-Brent crack spreads back to July 2009, several patterns begin to emerge **(Figure 10)**. The heating oil-Brent crack spread has steadily increased for the past four years, resulting in a gradually more profitable product. The crack spread averaged $0.10 in July 2009 and increased to an average of $0.43 in May 2013.

Unlike the crack spread for heating oil, the RBOB-Brent crack spread exhibits a noticeable increases in the variance within seasonality starting in January 2011, with peaks regularly occurring in the spring and summer months. However, from July 2009 to December 2010, the seasonality was relatively muted, with a crack spread variance of 3.1 percent compared to an increased in crack spread variance to 8.2 percent from 2011 until now.

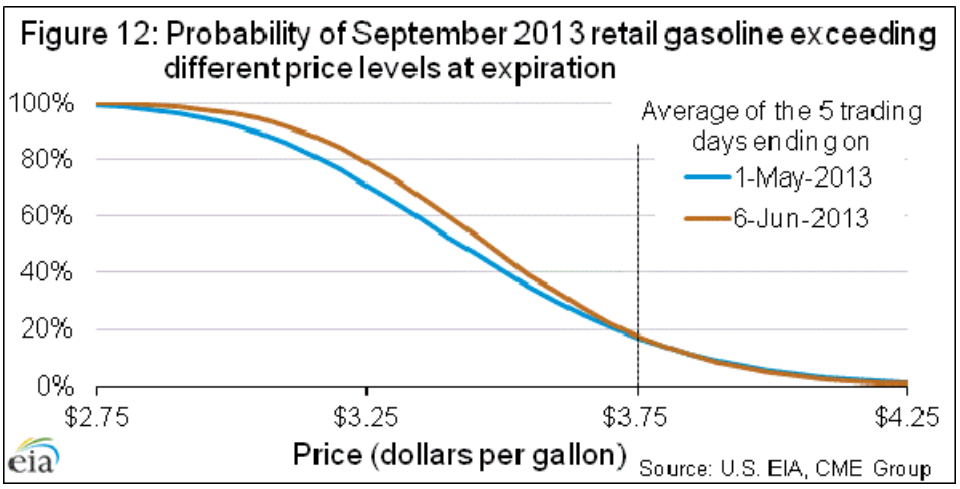
A possible explanation for the trends seen in these two crack spreads is a change in the primary output of refineries. The world distillate market has expanded, resulting in a year round demand for the product that is not dependent upon country-specific seasonal demand. U.S. exports of distillate rose from 6 percent of its total production in July 2009 to 19 percent in March 2013. A larger market combined with the steadily increasing margins for heating oil have provided refineries with an incentive to view distillate as their primary product, leaving gasoline as the residual product whose price would be more prone to change with seasonal shifts in demand.



Volatility: Implied volatilities for both the front month RBOB and heating oil contracts stayed relatively constant in May. The RBOB implied volatility settled at 22.2 percent on June 6 while the heating oil implied volatility settled at 19.6 percent **(Figure 11)**. Examining implied volatilities since January 2000, current implied volatilities for RBOB and heating oil front month contracts are near historical lows, the same as was seen in the implied volatility of crude oil futures.

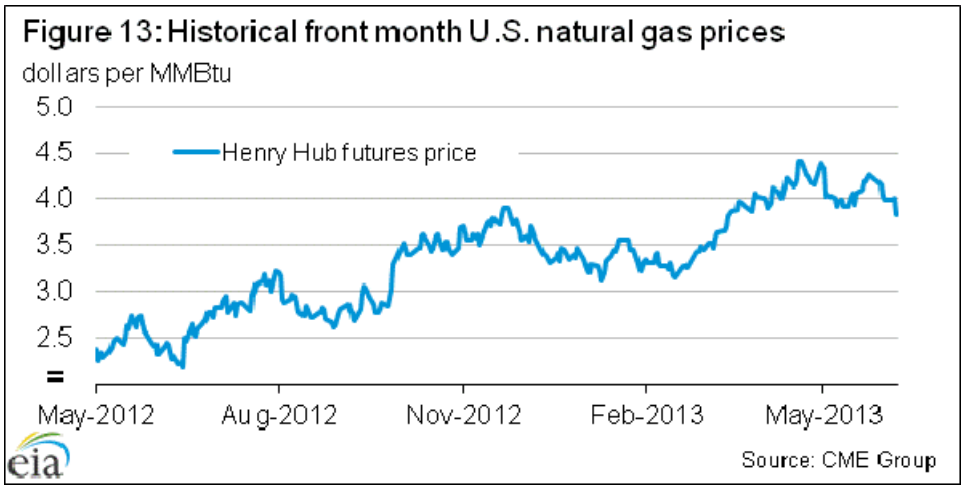


Market-Derived Probabilities: The September 2013 RBOB futures contract averaged $2.76 per gallon for the five trading days ending June 6 and has a probability of exceeding $3.05 per gallon (typically leading to a retail price of $3.75 per gallon) at expiration of approximately 16 percent. The same contract for the five trading days ending May 1 had a probability of exceeding $3.05 of 15 percent **(Figure 12)**.

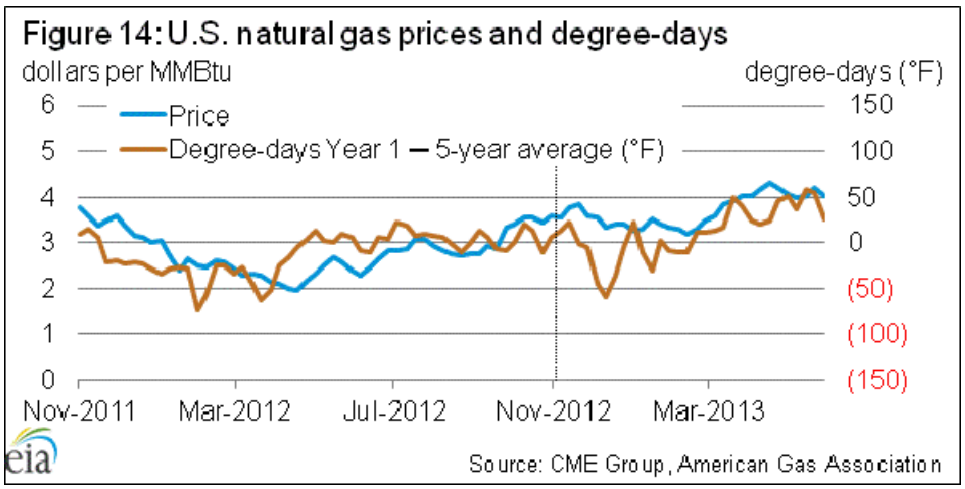


Natural Gas

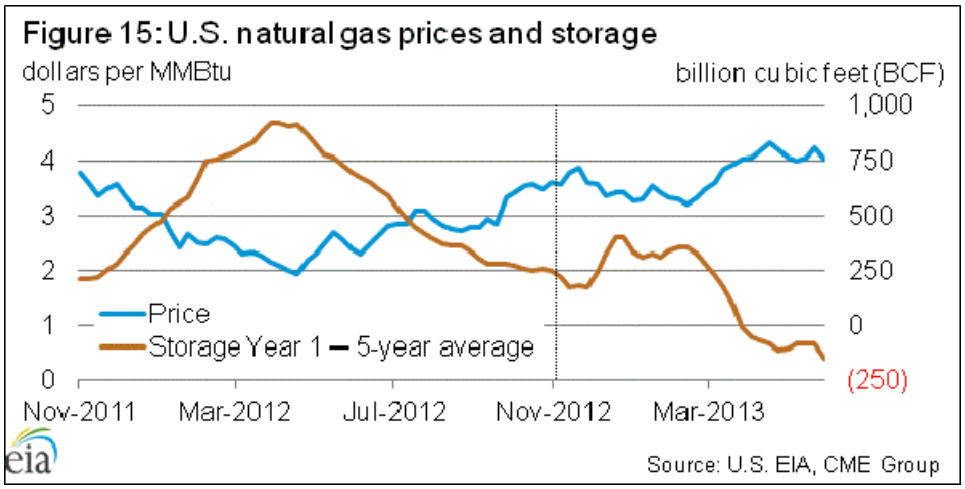
Prices: The front month futures price settled at $3.83 per MMBtu on June 6, decreasing $0.50 per MMBtu from the price on May 1 **(Figure 13)**, perhaps reflecting moderate temperatures during the May "shoulder" month.



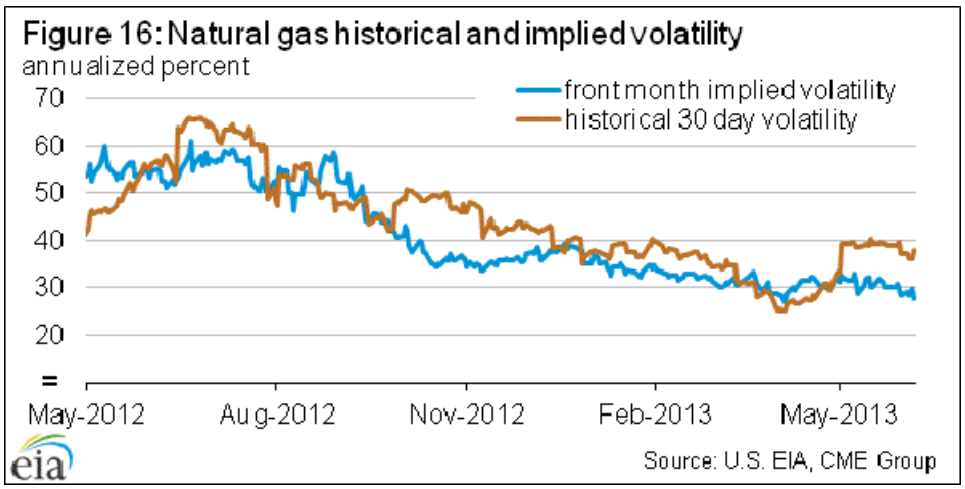
Weather is an important contributing factor to natural gas prices. The front month futures prices have tended to move with temperature fluctuations, shown here as the current year degree-days less the average degree-days in the prior five years **(Figure 14)**.



In addition, natural gas futures remained inversely related to the storage indicator **(Figure 15)**, which is defined as the current year storage level less the average storage levels in five prior years. In general, the storage indicator provides an assessment of market tightness. Nonetheless, winter 2011-12 was unusually warm, thus a negative storage indicator in May 2013 may not precisely imply a material inventory shortfall.



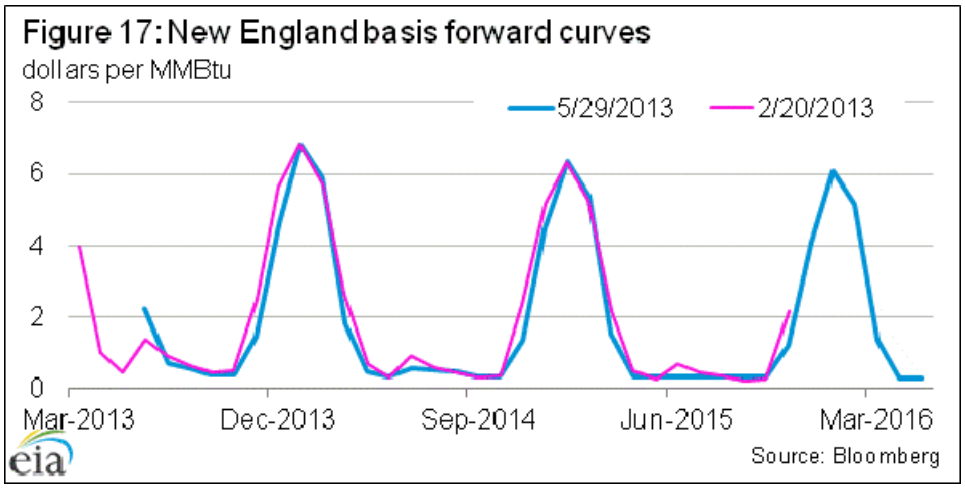
Volatility: Implied volatility for the front month futures contract decreased slightly in May, settling at 27.7 percent on June 6, 3.4 percentage points lower than at the beginning of May **(Figure 16)**. Implied volatility remained relatively steady, moving in a narrow range of about 6 percentage points while prices continue to swing noticeably. Such a pattern in implied volatility may suggest lower demand in natural gas options. Historical volatility, on the other hand, moved in much larger scale, settling at 38.0 percent on June 6, 5.1 percentage points higher than at the beginning of May. In particular, the 30-day historical volatility moved up more than 6 percentage points on May 2, as a result of a 30-cent drop in price.



Summer market in New England: In the winter 2012-13, the New England market experienced high prices and volatility because of the changing demand-supply constraints and market activities. Some volatility is also appearing for the upcoming summer season, especially in June.

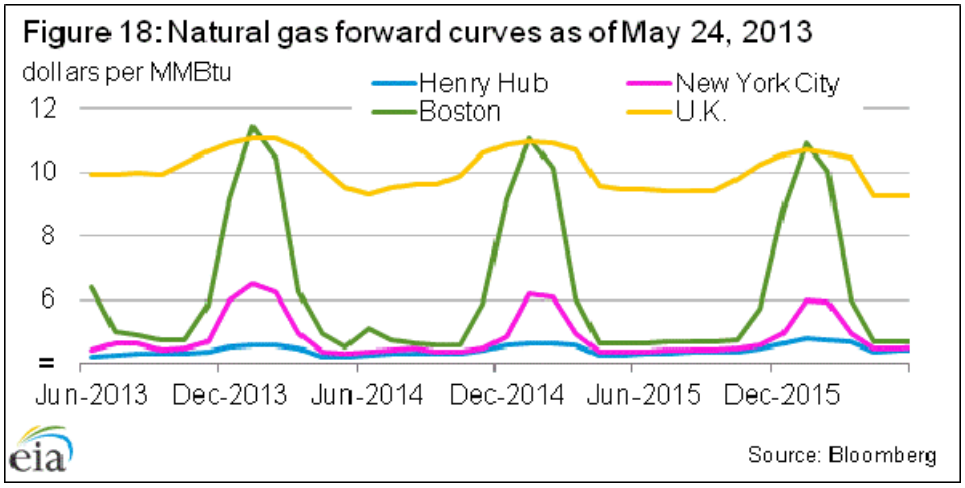
Due to a regularly scheduled maintenance of a major compressor station of the Algonquin pipeline at Cromwell, Connecticut, the June basis contract traded slightly higher than other summer months. Although the outage could reduce the capacity from 950,000 to 450,000 MMBtu per day, the effect is expected to be mild in general, since June is on average a moderate summer month and New England is also supplied by the Tennessee and Iroquois pipelines.

A forecast of warm weather pushed the June basis to $2.22 per MMBtu on May 28, the expiration day, up $0.86 per MMBtu from $1.36 per MMBtu on February 20 **(Figure 17)**. During May 30-June 2, temperatures exceeding 90°F along the East Coast provided a jump in cooling demand and the spot price in New England rose above $6 per MMBtu. But the heat was short-lived and the spot price moved back to the normal $4 per MMBtu level.



In May, the basis for the upcoming winter remained high, with the January and February basis above $6 per MMBtu. The corresponding forward prices in New England are above $10 per MMBtu, slightly exceeding the corresponding U.K. prices **(Figure 18)**. Such a price level provides opportunities for New England LNG facilities to lock in the financial spread and secure the forward LNG supply in peak winter months.

The landscape of the U.S. natural gas market continues to change. The New York City basis, one of the two remaining high-basis pockets, has fallen well below the New England basis because of production increases and pipeline expansions. New York winter forward prices are barely $6 per MMBtu, $5 per MMBtu lower than the New England winter forward prices.



Market Derived Probabilities: The probability that the September 2013 contract will settle higher than $4.00 per MMBtu decreased 21 percentage points, from 66 percent to 45 percent, when compared to market conditions on the five trading days ending May 1 **(Figure 19)**, as a result of the decline in price and implied volatility.