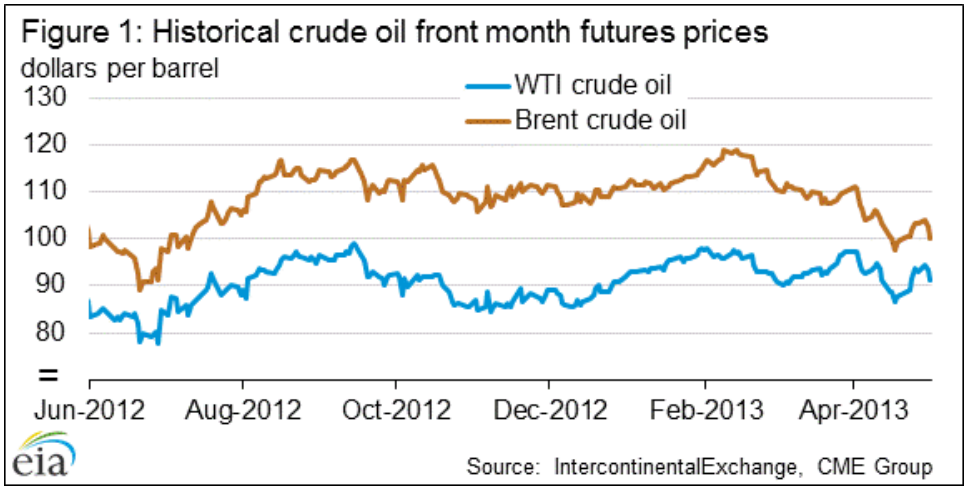
Independent Statistics & Analysis
U.S. Energy Information Administration

May 2013

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

## Crude Oil

***Prices:*** Crude oil prices declined during April with Brent prices reaching their lowest levels since the summer of 2012. The Brent front month futures contract settled at $102.85 per barrel on May 2, $8 per barrel lower than on April 1. Futures prices for West Texas Intermediate (WTI) also declined in April, with the front month contract settling at $93.99 per barrel on May 2 **(Figure 1)**.




Developments on both the supply and demand side have likely contributed to lower crude oil prices over the last month. Lower than expected first quarter GDP growth in China as well as a higher amount of OPEC spare production capacity applied downward pressure on crude prices. Additionally, outside the United States, global refinery maintenance was greater than expected in April and most likely resulted in a short-term reduction in crude oil runs. The restarting of refineries and planned maintenance on oil producing fields in the North Sea could alleviate some of the recent weakness in Brent prices.

This is a regular monthly companion to the EIA Short-Term Energy Outlook (http://www.eia.gov/forecasts/steo/)
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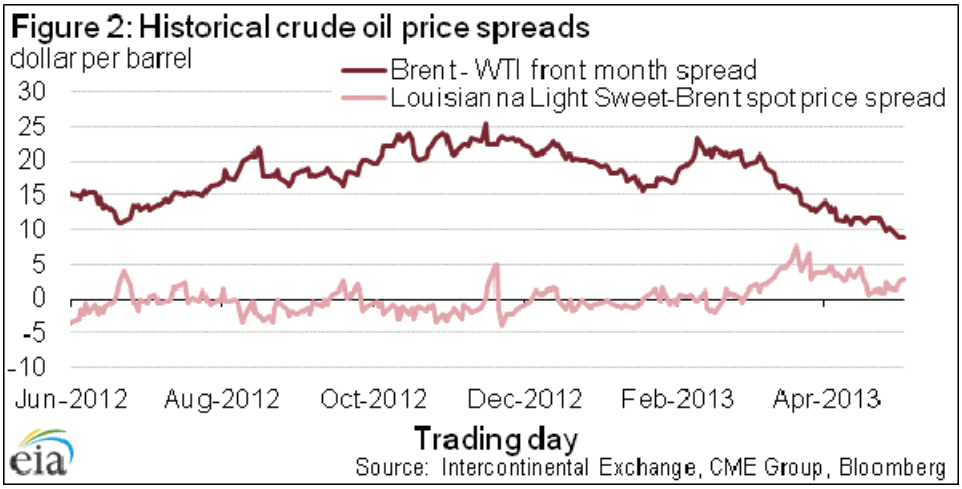
The Brent-WTI spread narrowed over the last month. The front month futures price spread settled at $8.86 per barrel on May 2, continuing the recent trend and declining by about $5 per barrel compared to April 1 **(Figure 2)**. Some of the decrease in the spread was due to the looser world waterborne crude market mentioned above but some of the decline is because of production and transportation developments in the United States. Poor weather conditions in the Midwest during the last few months has most likely contributed to lower U.S. production. In EIA's latest petroleum supply monthly, February crude oil production in PADDs 2 and 4 dropped from their levels in January. March and April were also unseasonably cold. Additonally, expanding rail and pipeline capacity eased some of the tightness in these transportation modes, further contributing to the decline in the Brent-WTI spread.

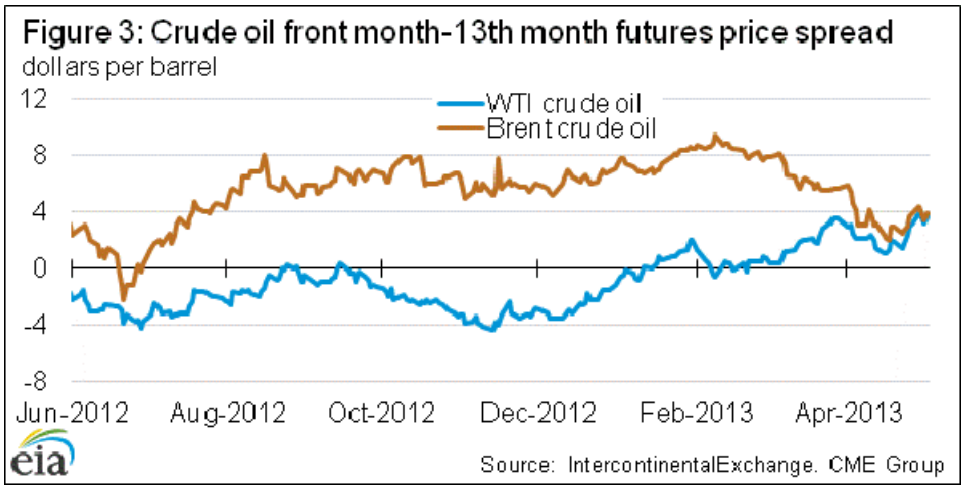
United States refinery runs picked up in April, with PADD 3 weekly refinery utilization averaging 87.3 percent through April 26, an increase of 2.6 percentage points from March. With the U.S. completing refinery maintenance earlier than other parts of the world, particularly on the U.S. Gulf Coast, demand for crude oil supported a temporary premium of U.S. light-sweet crude to international oil.



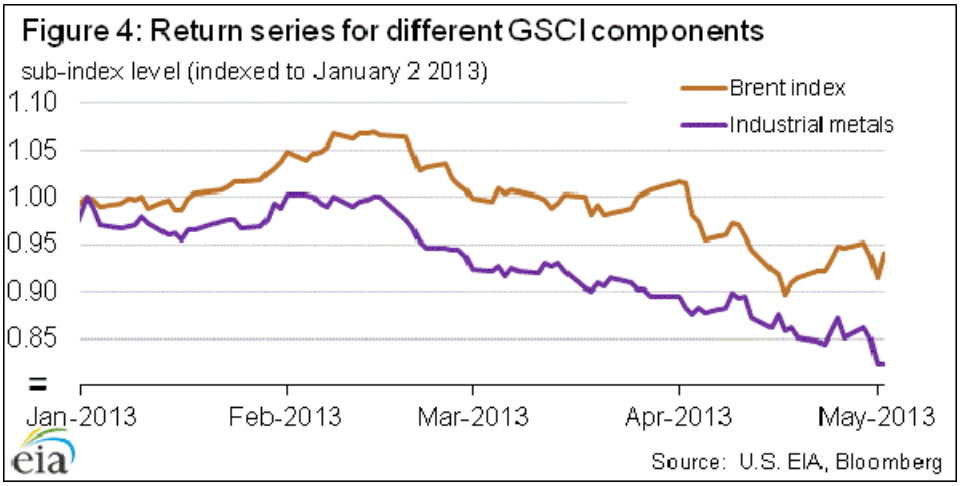

A looser world waterborne crude oil market can be observed in the slope of the Brent futures curve. The 1st-13th month spread for Brent is still in backwardation (when near term prices are greater than farther dated ones) but the amount of backwardation declined in April. The spread settled at $3.92 per barrel on May 2, nearly $2 per barrel lower than on April 1 and its lowest point since summer 2012 **(Figure 3)**. Some of the decrease in backwardation for Brent is due to temporary factors pushing down near-term demand.

The WTI futures curve has also been backwardated since February 21, marking the longest stretch of continuous WTI backwardation since January 2012. The 1st-13th spread for the U.S. benchmark settled at $3.64 per barrel on May 2, a $0.63 per barrel increase from its level on April 1. Day-to-day changes in the slopes of the Brent and WTI futures

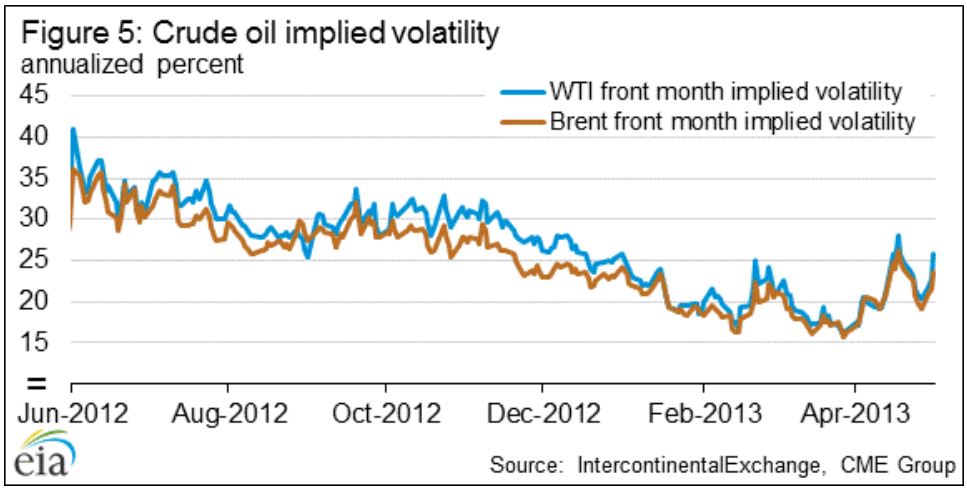
curves have been highly correlated over the last month, a change from over the last year when they showed little to no correlation. The elevated correlation between the two crude oil benchmark's futures curve shapes shows the increased stability of transporting crude oil out of the United States' Mid-continent.



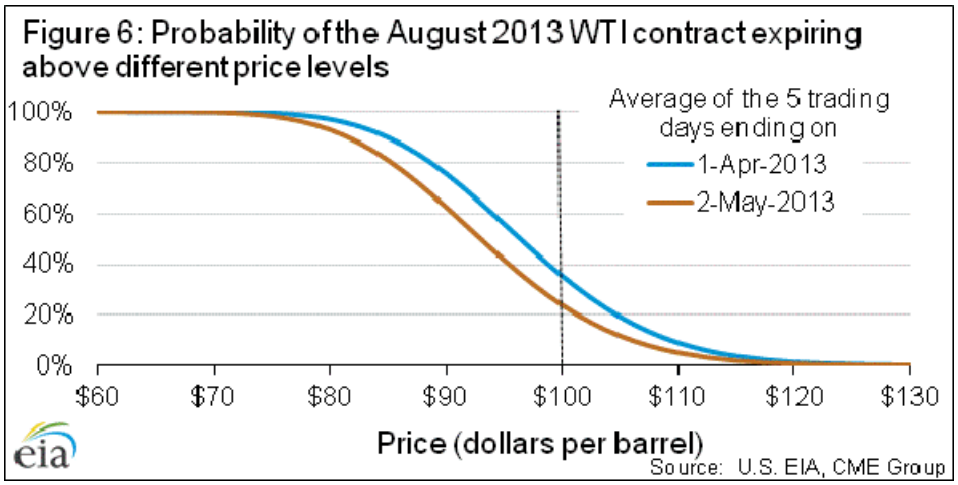

***Brent vs Industrial Metals:*** Aside from some of the temporary refining factors, global economic weakness has also affected crude oil prices. Industrial metals are strongly correlated with changes in expectations for economic growth in emerging market economies. The Goldman Sachs Commodity Index (GSCI) includes different commodity groups, with the industrial metal sub-index consisting of copper, aluminun, nickel, zinc and lead (in descending order from highest weight to lowest weight). The Brent sub-index declined by 7.5 percent since April 1 and the industrial metals component declined by 8.2 percent **(Figure 4)**. While the correlation of crude oil against other commodity groups like agricultural commodities and precious metals dropped during first quarter 2013, the positive correlation with industrial metals remained and suggests that weaker growth emerging market econmies has weighed on both crude oil and industrial metals demand, and consequently prices.



***Volatility:*** Implied volatility for front month Brent and WTI futures contracts was near its lowest point at the beginning of April but then spiked in the middle of the month amidst crude oil price declines **(Figure 5)**. Implied volatility hit its highest point since December 2012 on April 17, before declining to settle at 22.3 and 23.1 percent on May 2 for Brent and WTI, respectively.



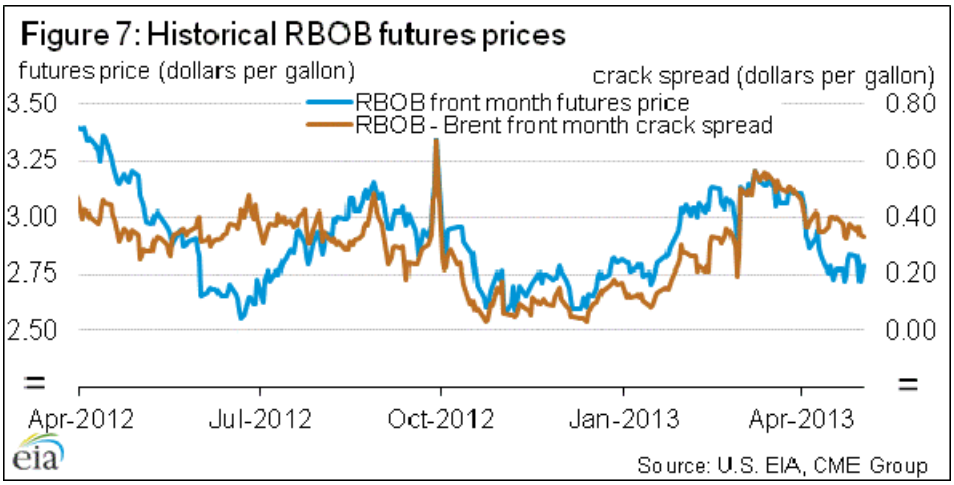

***Market-Derived Probabilities:*** The August 2013 WTI futures contract averaged $93.41 per barrel for the five trading days ending May 2 and has a probability of exceeding $100 per barrel at expiration of approximately 24 percent. The same contract for the five trading days ending April 1 had a probability of exceeding $100 of 35 percent (**Figure 6**). 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 r**eformulated blendstock for oxygenate blending (RBOB) front month futures continued its decline from the last few days of March throughout April settling at $2.78 per gallon on May 2, $0.32 per gallon lower than its settle price on April 1st **(Figure 7)**. The RBOB-Brent crack spread decreased $0.12 per gallon since the beginning of April, settling at $0.33 per gallon on May 2. Current RBOB front month futures prices are $0.30 lower than the front month prices this time last year, while the RBOB-Brent crack spread seen at the end of April 2013 is roughly equal to the crack spread seen last year at the end of April 2012.

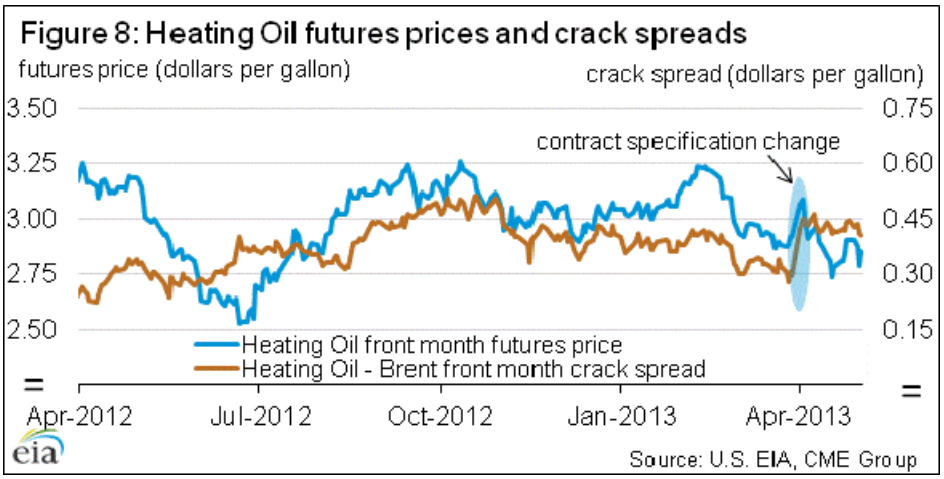
The latest U. S. GDP growth figures for the 1st quarter came in at 2.5 percent, below expectations of around 3 percent. A decline in the economic growth outlook in the United States can have a larger effect on gasoline prices compared to other petroleum products because the United States uses proportionally more gasoline than other parts of the world. In addition, refineries in Louisiana and California began operating after maintenance outages during April. As refineries return online, more crude oil can be processed, which raises gasoline production and contributes to lower gasoline prices and crack spreads. Average U. S. refinery utilization in April, through the week ending April 26, increased to 85.1 percent, up from 84.2 percent in March.




***Heating Oil prices***: The heating oil front month prices decreased by $0.21 since April 1st, settling at $2.86 per gallon on May 2. Heating oil prices settled at their lowest prices for 2013 on April 17 before recovering slightly. The Heating oil – Brent crack spread settled at $0.41 on May 2, relatively unchanged from beginning of April **(Figure 8)**.

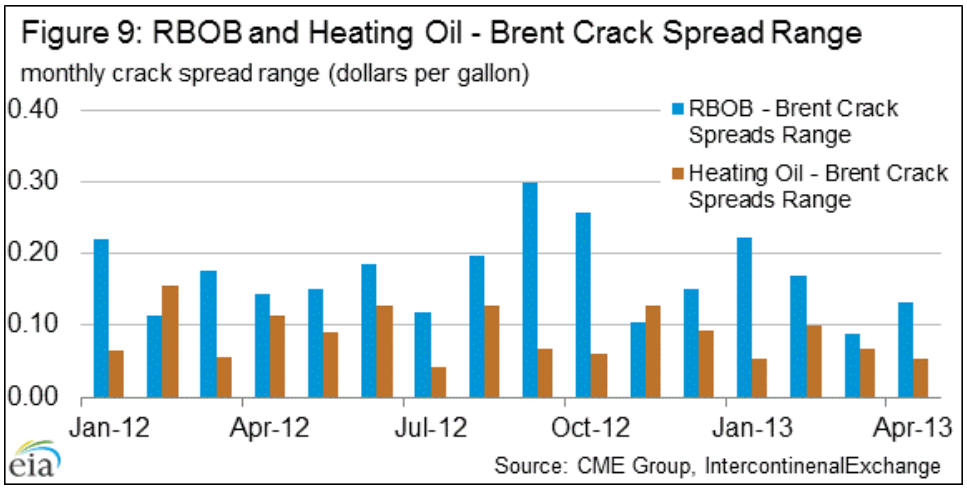
Heating oil crack spreads have remained rather stable through April, with distillate prices moving lower in near lockstep with crude oil prices. This is indicative of the greater influence of international markets on distillate compared to gasoline.

The increase in the Heating oil-Brent crack spread in the beginning of April is primarily the result of the New York Mercantile Exchange (Nymex) switching its specification for the heating oil futures contract to an ultra-low sulfur diesel specification (ULSD). Beginning with the May 2013 contract, all heating oil contracts traded will contain less than 15 parts per million of sulfur. Since this requires additional refining steps that raise processing costs, the increase in the futures prices and crack spreads was not unexpected.

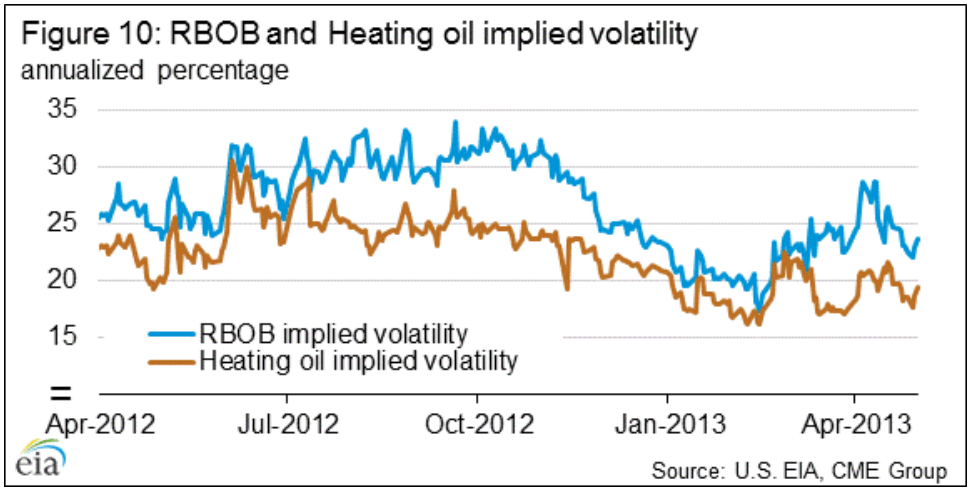



***Crack spreads:*** Comparing the RBOB-Brent and Heating oil-Brent crack spreads since January 2012, the RBOB-Brent crack spread exhibited a greater range than the heating oil-Brent crack spread in 14 of the 16 months **(Figure 9)**. Since the start of 2012, the average monthly crack spread range for front month RBOB futures prices was $0.18 per gallon compared to an average range of $0.09 per gallon for the front month heating oil-Brent crack spread.

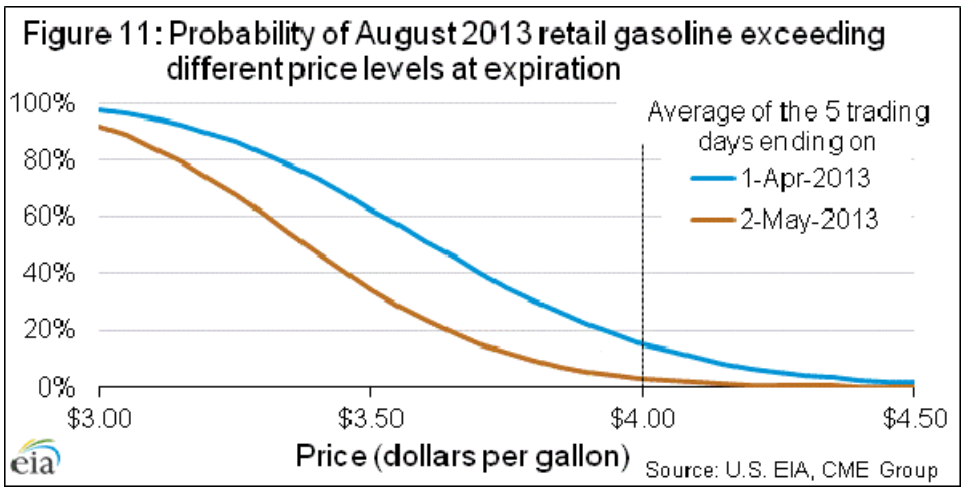
For the majority of the 16 preceding months, distillate has shown a higher, more stable profit margin than gasoline. With both products being relatively inelastic in the short-term on the demand side due to the lack of available substitutes, it suggests that refineries are adjusting production levels in response to realized or anticipated changes in global distillate consumption. The higher variance for gasoline crack spreads may indicate that gasoline markets are achieving equilibrium through relatively large price changes rather than production adjustments.




***Volatility:*** Implied volatilities for the front month RBOB and Heating Oil contracts ended April roughly where they started at the beginning of the month. The RBOB implied volatility settled at 22.8 percent on May 2 while the heating oil implied volatility settled at 18.9 percent **(Figure 10)**. The implied volatilities for RBOB and Heating oil contracts peaked in the middle of the month, tracking closely with the implied volatility of Brent and WTI crude oil over the same period.

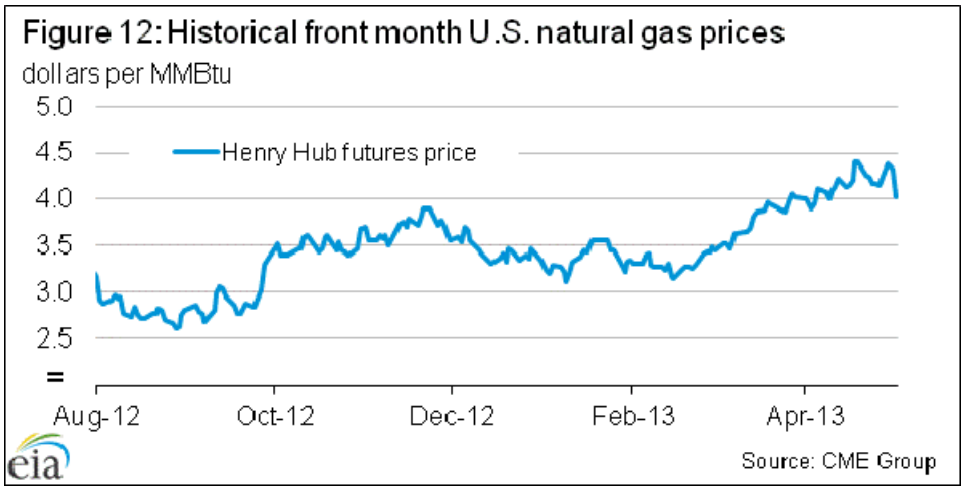



***Market-Derived Probabilities:*** The August 2013 RBOB futures contract averaged $2.75 per gallon for the five trading days ending May 2 and has a probability of exceeding $3.35 per gallon (typically leading to a retail price of $4.00 per gallon) at expiration of approximately 3 percent. The same contract for the five trading days ending April 1 had a probability of exceeding $3.35 of 15 percent **(Figure 11)**.

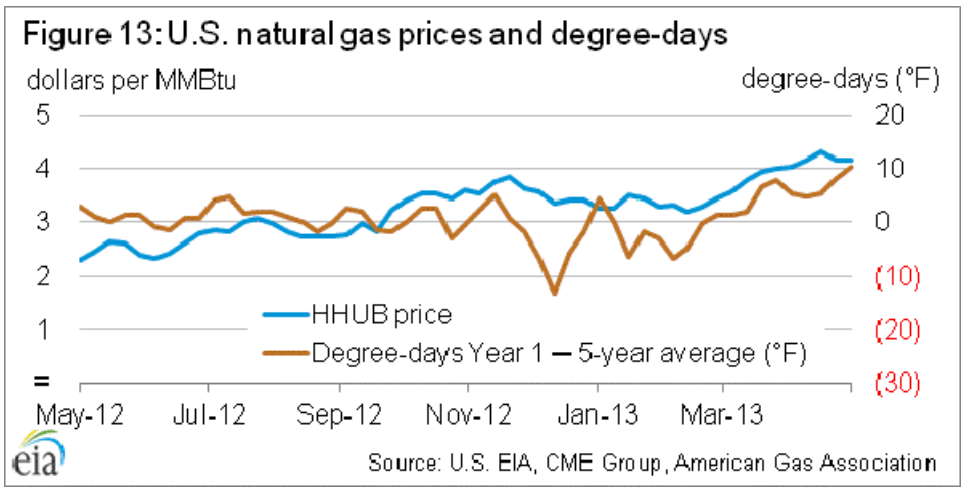



## Natural Gas

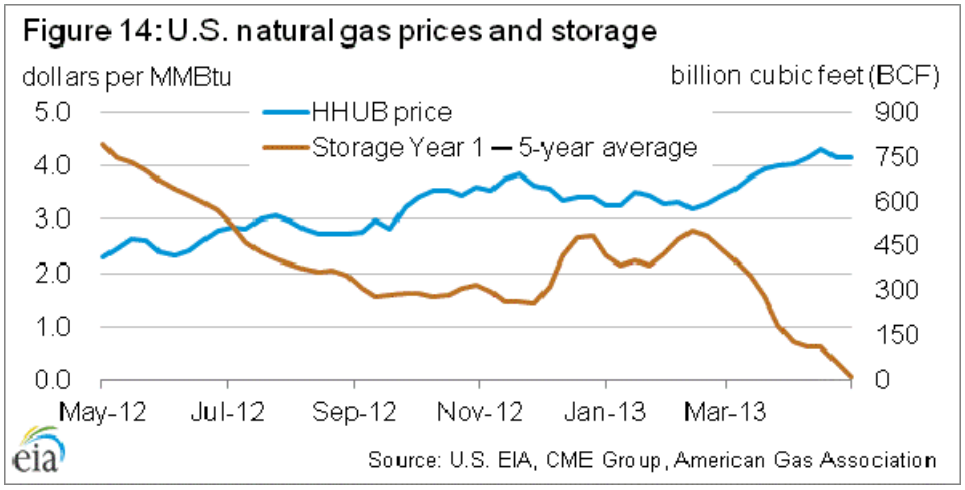
***Prices:*** The front month futures price settled at $4.03 per MMBtu on May 2, increasing $0.01 per MMBtu from the price on April 1 **(Figure 12)**. Prices fell sharply on May 2, wiping out nearly all of the increase since the beginning of April after a higher-than-expected increase in inventories reversed the positive market sentiment of the previous several weeks.



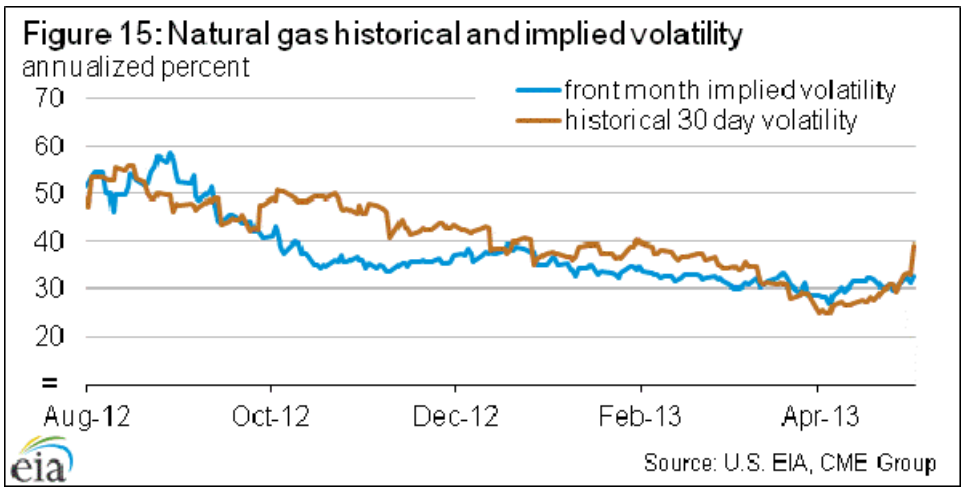

Since late February 2013, the weather turned colder than normal, as measured by the gas-weighted heating degree-days compared to the 5-year average. Natural gas consumption was thus higher and prices rose more than $1per MMBtu through the end of April **(Figure 13)**.



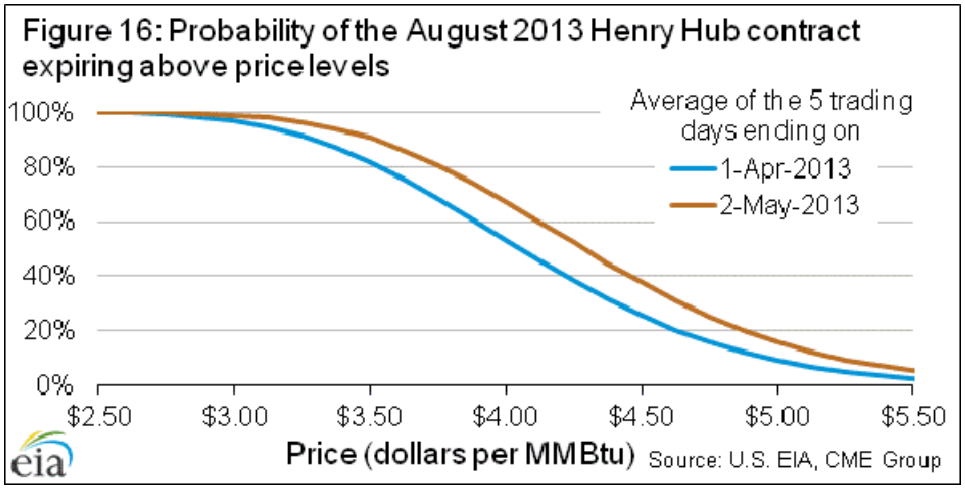

Colder weather extended through the end of winter and into early spring, prolonging the storage withdrawal season, and depressing initial injection rates. By the end of April, storage levels had moved back in line with the 5-year average for the first time since September 2011. The rise in natural gas prices in March and April reflects the movements in natural gas inventories relative to average storage levels **(Figure 14)**.



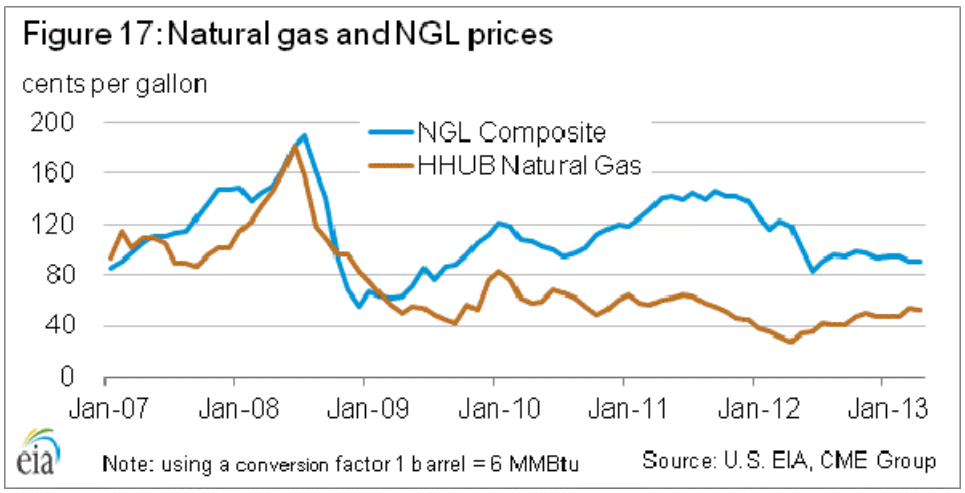

***Volatility:*** Implied volatility for the front month futures contract increased slightly in April, settling at 32.8 percent on May 2, 3.9 percentage points higher than at the beginning of April. During March and April, implied volatility moved in a narrow range of about 6 percentage points while prices gained about 26 percent. Historical volatility increased during April and jumped to 39.4 percent with the price decline on May 2, 14.4 percentage points higher than at the beginning of April **(Figure 15)**.



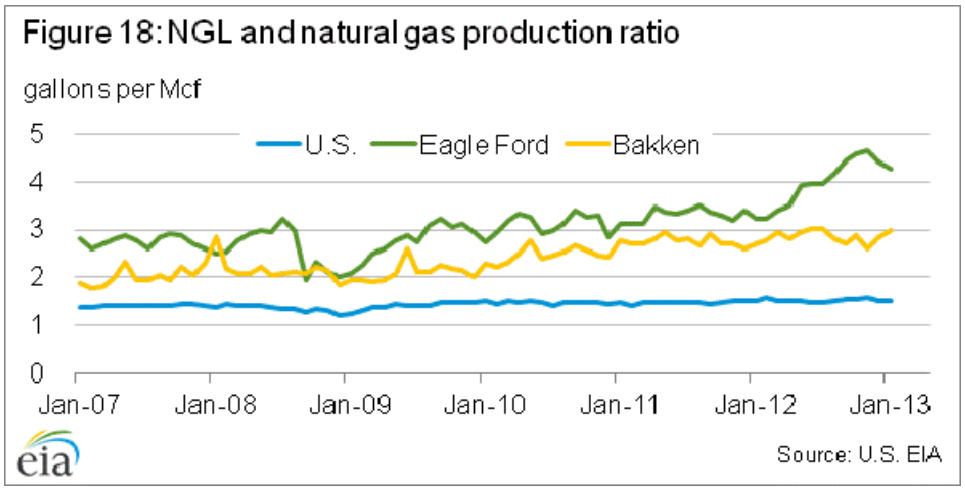

***Market Derived Probabilities:*** The probability that the August 2013 contract will settle higher than $4.00 per MMBtu increased 14 percentage points, from 53 percent to 67 percent, when compared to market conditions on the five trading days ending April 1, mostly a result of the increase in price **(Figure 16)**.




***Natural Gas versus Natural Gas Plant Liquids (NGPL):*** Last month's MPUR pointed out that the larger shares and lower prices of ethane and propane relative to other NGL had reduced the spread between the composite NGL price and natural gas price. The current natural gas price is 89 percent higher than the low in April 2012, while the current NGL composite price is about 10 percent higher than the low point in June 2012 **(Figure 17)**. The prices of natural gas and NGL were almost the same before 2009. Because NGL prices are linked to both oil and natural gas prices, the spread between the composite NGL price and natural gas prices widened through 2011 before narrowing somewhat in 2012.




The higher relative value of NGL is reflected by the increase in the NGL to natural gas production ratio (in gallons of NGL per Mcf of natural gas) in several natural gas production plays **(Figure 18)**. In Eagle Ford, the ratio increased through most of 2012. The ratio at Bakken remains lower at about 3 gallons per Mcf, but has risen from 2009 levels.




Bakken is not as NGL-rich Eagle Ford, but it has had substantial increases in more valuable crude oil production. Production from legacy dry gas wells held the U.S. average NGL to natural gas ratio to 1.6 gallons per Mcf, a modest increase from 1.2 gallons per Mcf in 2007.