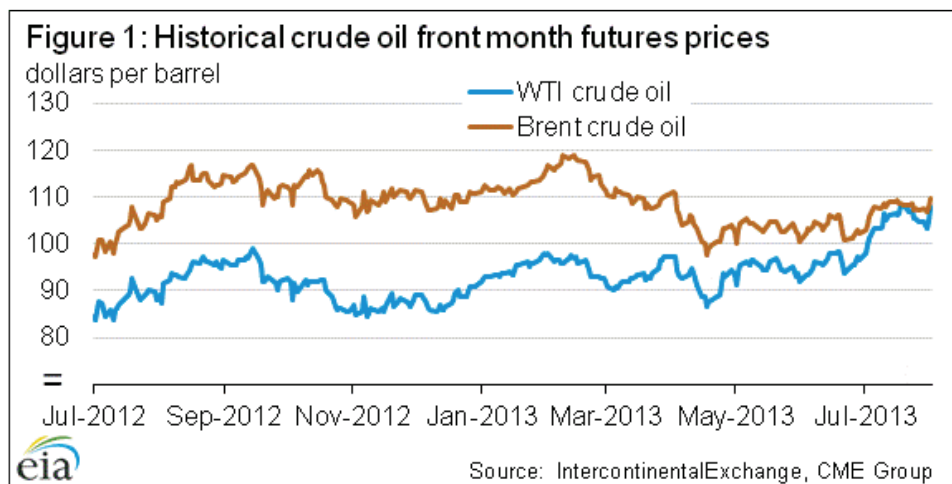# Short-Term Energy Outlook
Market Prices and Uncertainty Report

Crude Oil

Prices: Front month futures prices for both the Brent and WTI crude oil benchmarks rose over the last month, with WTI rising faster than Brent to sharply narrow the spread between the two benchmarks. Since July 1, Brent has increased by $6.54 per barrel to settle at $109.54 per barrel on August 1 **(Figure 1)**. Over the same time period, WTI increased by $9.90 per barrel to settle at $107.89. While the August 1 settle was the highest price for Brent since early April of this year, the July 19 settle price of $108.05 for WTI was the highest since March of 2012.

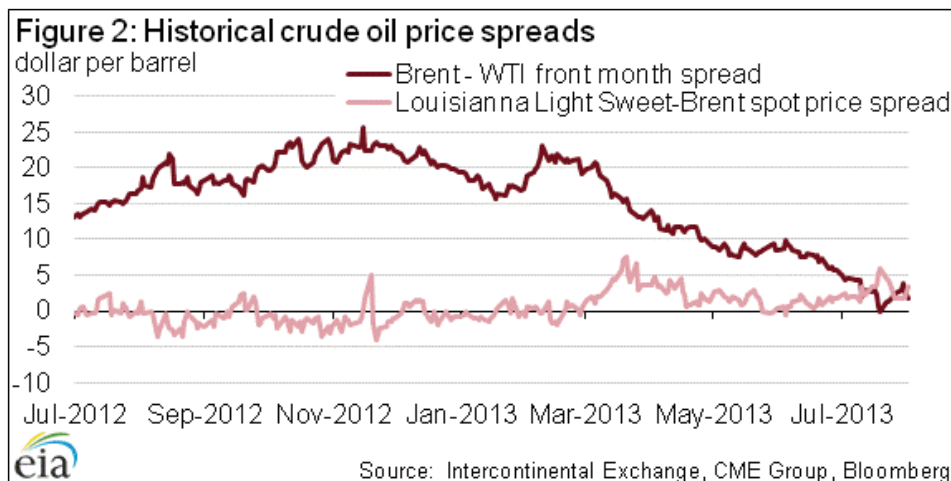Figure 1: Historical crude oil front month futures prices

Although there was no single major disruption in oil production over the last month, lower exports from South Sudan, Iraq, and Libya and a continuation of some production outages in Canada likely contributed to higher global crude oil prices in July. These outages occurred at the same time that refineries were running at high utilization rates in order to meet the seasonal peak in demand for petroleum products.

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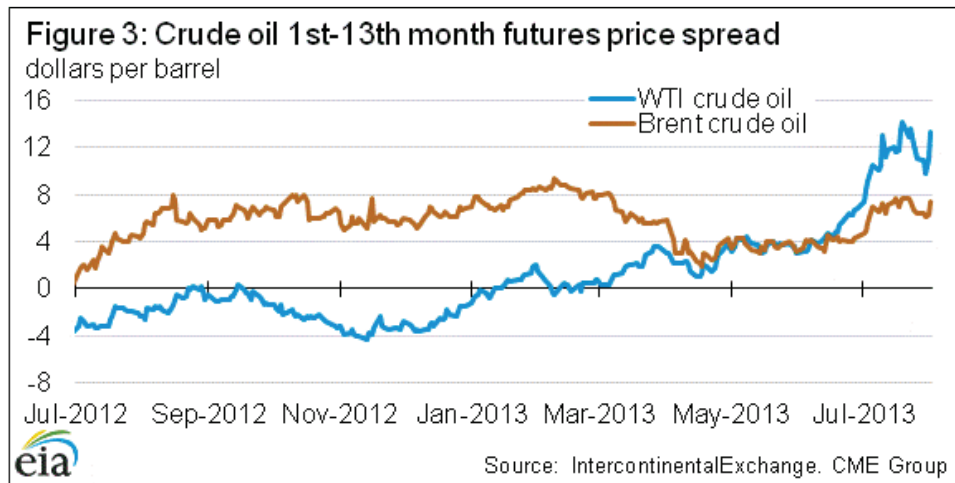Contact: James Preciado (james.preciado@eia.gov)

For the first time since August 2010, WTI prices reached near parity with Brent prices on July 19 when the Brent-WTI spread settled at $0.02 per barrel **(Figure 2)**. A strong seasonal increase in refinery runs in the U.S. Midcontinent contributed to the strength in WTI prices. From the recent low point for the week ending May 10 to the week ending July 26, PADD 2 refineries raised gross inputs by 532 thousand barrels per day, compared to an increase of only 195 thousand barrels per day over the same time period last year. Since the middle of July, the Brent-WTI spread has widened slightly to settle at $1.65 per barrel on August 1 as supply from Canada rebounded from earlier problems.
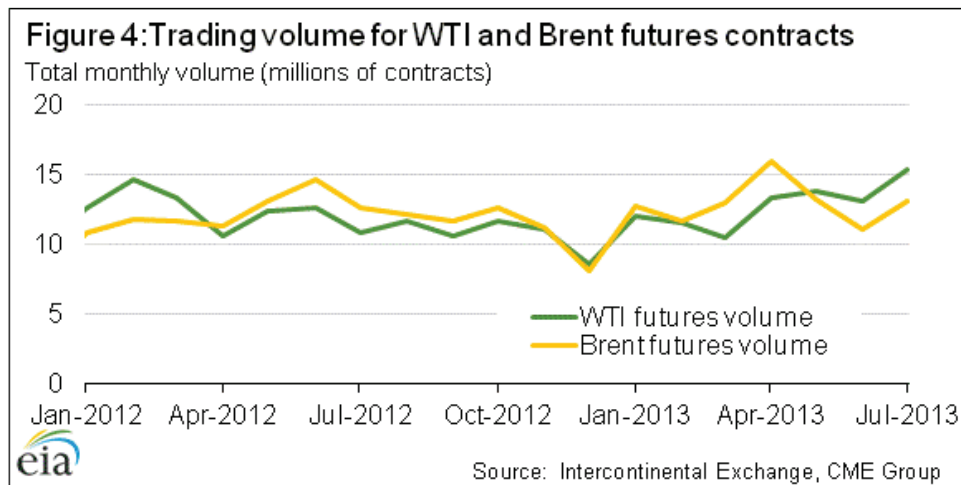
The strong demand for light sweet crude oil in PADD 2 is potentially affecting the availability of light sweet crude oil on the U.S. Gulf Coast and is supported by the recent negative correlation between the Brent-WTI spread and LLS-Brent spread. On July 19, the LLS-Brent spot spread reached nearly $6 per barrel, its highest level since the beginning of March and occurred on the same day that WTI reached near parity with Brent. A tighter market for crude oil in the U.S. Midcontinent, which likely reduced the flow of light sweet crude oil to the Gulf Coast, combined with high refinery runs in PADD 3 and other Gulf Coast infrastructure changes, have increased the LLS-Brent spread and with it the opportunity for imports of light sweet crude oil into the U.S. Gulf Coast.

Figure 2: Historical crude oil price spreads

More backwardation (when near-term prices are higher than farther dated ones) in crude oil futures curves further suggests that the recent tightness in the crude oil markets reflects high refinery runs in the United States and the rest of the world as well as supply issues. The 1st-13th month spread for Brent settled at $7.41 per barrel on August 1, an increase of $2.65 per barrel since July 1 **(Figure 3)**. Over the same time period, backwardation in the WTI futures curve has increased by $5.93 per barrel, settling at $13.35 per barrel and reaching its highest level in over 10 years, implying that market participants believe the narrowing of the spread may be temporary.
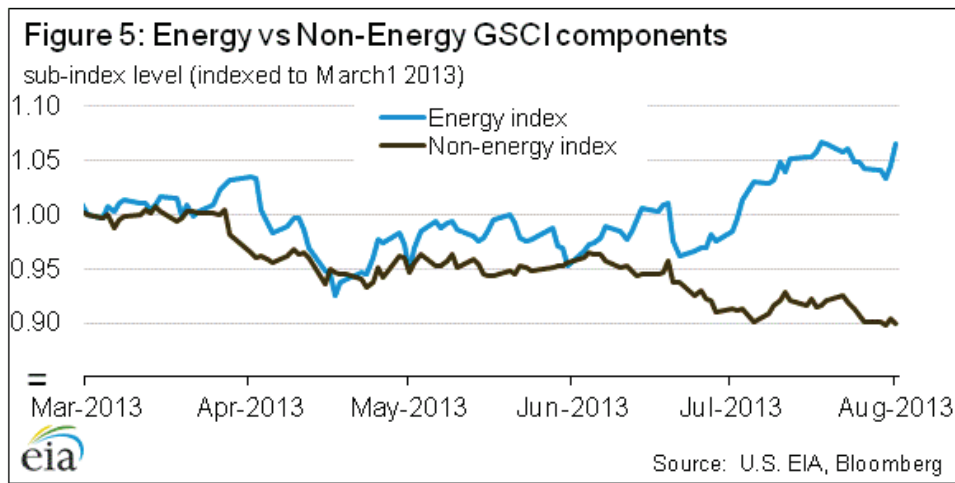
Figure 3: Crude oil 1st-13th month futures price spread
dollars per barrel

WTI crude oil
Brent crude oil

Source: IntercontinentalExchange. CME Group

Volume: Recent developments in the U.S. Midcontinent crude oil market induced more trading in the WTI benchmark compared to Brent. For the first time since April 2012 (except for December 2012, the seasonal low for trading across most asset classes), the total monthly trading volume for WTI surpassed Brent trading volumes during May, June and July. Over the last three months, on average about 1.5 million more WTI contracts traded per month than Brent contracts **(Figure 4)**.

Figure 4: Trading volume for WTI and Brent futures contracts
Total monthly volume (millions of contracts)

WTI futures volume
Brent futures volume

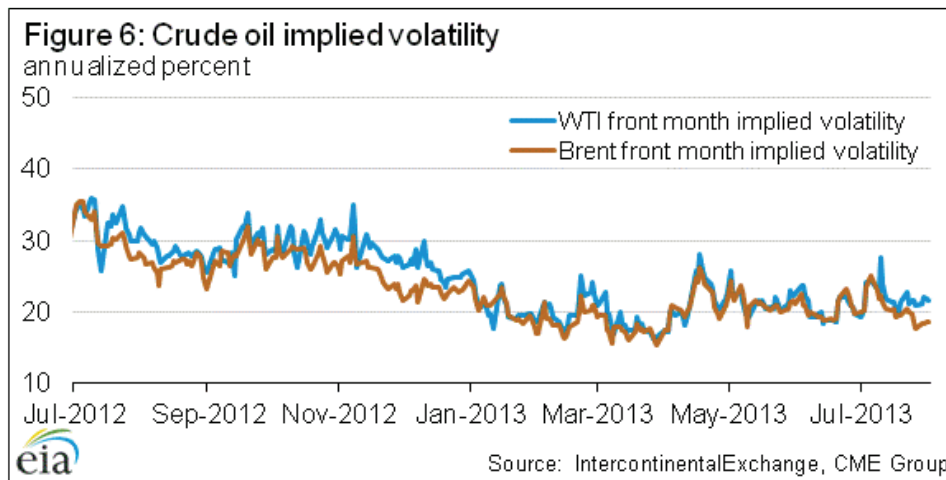Source: Intercontinental Exchange, CME Group

Energy vs Non-Energy: The recent increases in crude oil and petroleum product prices have not been shared by other commodities. Since July 1, the energy component of the Goldman Sachs Commodity Index (GSCI) has risen by 8.1 percent as the non-energy component of the GSCI has decreased slightly (1.5 percent) **(Figure 5)**. This divergence suggests that the recent increases in crude oil and petroleum product prices are most likely not due to changes in expectations for future global economic growth, which would tend to increase all commodity prices, but rather to factors specific to petroleum markets. WTI also has a large weighting in the energy GSCI sub-index and the rise of
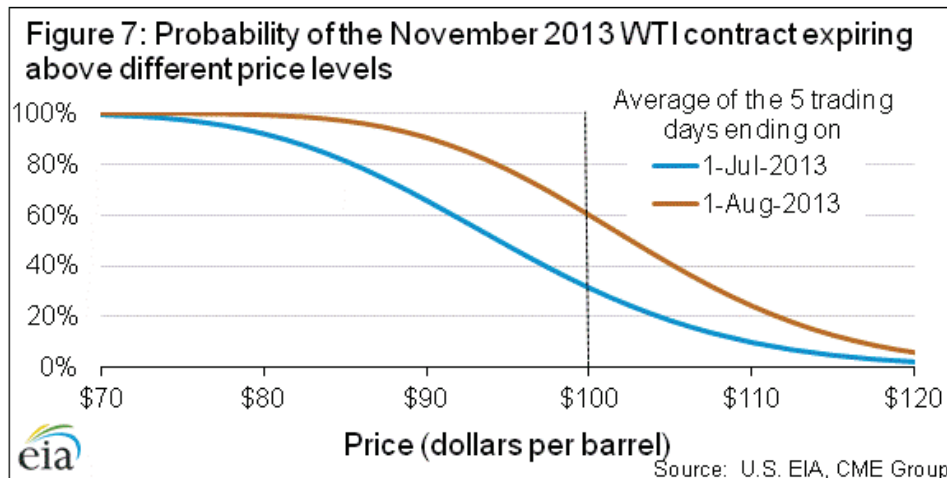
WTI over the last month has contributed to the substantial upward movement in the energy sub-index.

Figure 5: Energy vs Non-Energy GSCI components
sub-index level (indexed to March1 2013)

Volatility: Implied volatility for the front month Brent contract fell over the last month, settling at 18.6 percent on August 1 **(Figure 6)**, while implied volatility for the front month WTI contract rose, settling at 21.7 percent on August 1. The difference between the implied volatilities partly reflects the large swings in the spread between the two, with WTI showing greater day-to-day movements than Brent.

Figure 6: Crude oil implied volatility
annualized percent

Market-Derived Probabilities: The November 2013 WTI futures contract averaged $103.06 per barrel for the five trading days ending August 1 and has a probability of exceeding $100 per barrel at expiration of approximately 60 percent. The same contract for the five trading days ending July 1 had a probability of exceeding $100 of 31 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.
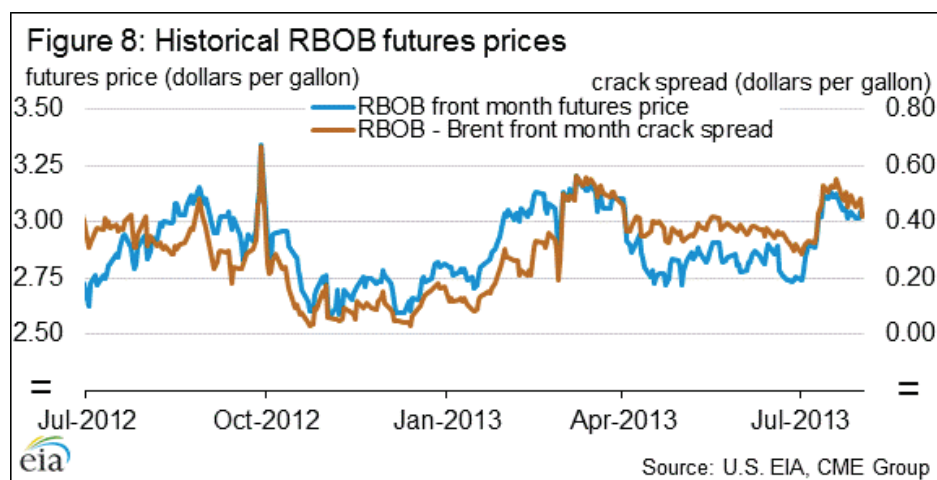
Figure 7: Probability of the November 2013 WTI contract expiring above different price levels

Petroleum Products

Gasoline prices: The reformulated blendstock for oxygenate blending (RBOB) front month futures contract price increased by $0.29 per gallon from July 1, settling at $3.03 per gallon on August 1 **(Figure 8)**. The RBOB-Brent crack spread also increased by a large margin, settling at $0.42 per gallon on August 1, a gain of $0.13 per gallon since the beginning of July. Current RBOB front month futures prices are exhibiting a price pattern similar to last summer. In July 2012, the RBOB futures front month contract also increased by $0.29 per gallon, while the RBOB-Brent crack spread jump seen in July 2013 was slightly higher than the increase seen in July 2012 of $0.11 per gallon.

On average, the United States consumed and produced more gasoline in July than during the same time last year. The four week average of U.S. gasoline consumption and exports (combined) ending July 26 was 74 thousand barrels per day greater than in July 2012. Gasoline production was up 400 thousand barrels per day over the same timeframe, while gasoline imports have declined by 160 thousand barrels per day.
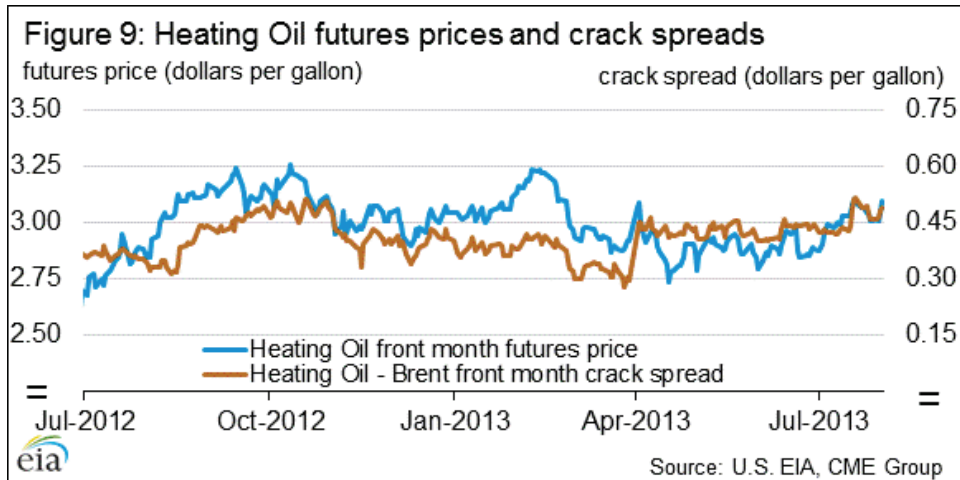
PADD 1: There is a growing disconnect in market behavior in PADD 1 and other PADDs, particularly 2 and 3. The four week average *refinery utilization* in PADD 1 ending July 26 was 87.3 percent, a decrease of 4.3 percentage points from the four week average ending June 28. On the other hand, PADD 2 had an average of a 93.8 percent refinery utilization rate, up 7.5 percentage points from the four week average ending June 28, while PADD 3 had a refinery utilization rate of 94.5 percent, up almost 2 percentage points. The *decline in gasoline imports* to the United States over the last year largely reflects a 200 thousand barrels per day decrease in imports into PADD 1. In addition, as of May 2013 when most recent PADD level consumption data is available, PADD 1 has experienced a *larger decline in gasoline consumption* than the U.S. average. PADD 1 saw consumption drop 37 thousand barrels per day compared to a 13 thousand barrels per day drop for the United States as a whole.

The East Coast saw retail prices for gasoline increase $0.152 per gallon from this time last year, virtually the same as the $0.154 per gallon jump in the United States as a whole. However, residents on the East Coast, and especially in the major metropolitan areas in the Northeast, have a variety of options for transportation, which allow for easier shifts in commuting habits during periods of sustained high gasoline prices. This can contribute to a lower gasoline consumption rate and provide less of an incentive for Northeast refineries to increase utilization rates absent a way to ship petroleum products to other PADDs or a favorable price environment for exports.
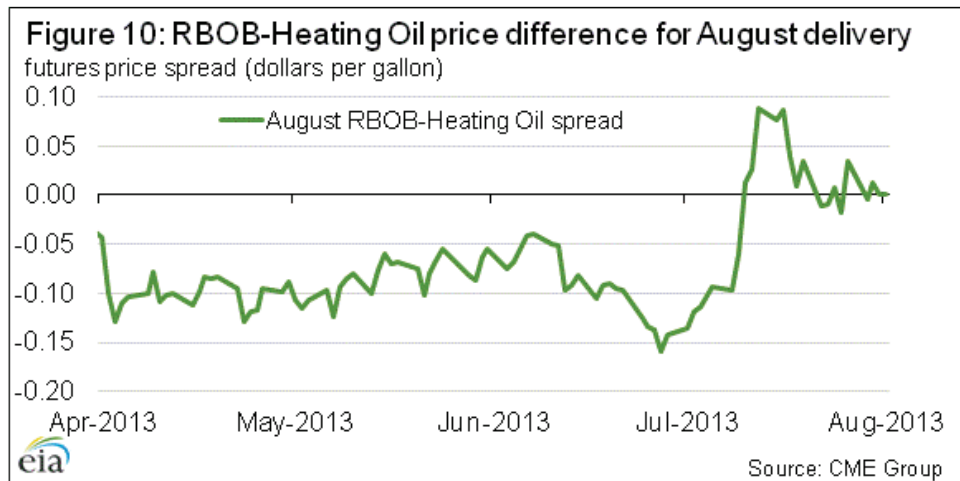

Figure 8: Historical RBOB futures prices

Heating Oil prices: Heating oil front month prices increased by $0.23 per gallon in July, settling at $3.10 per gallon on August 1. The heating oil-Brent crack spread increased slightly to settle at $0.49 per gallon on August 1 **(Figure 9)**. On July 19, the heating oil-Brent crack spread hit its highest level so far this year of $0.52 per gallon.
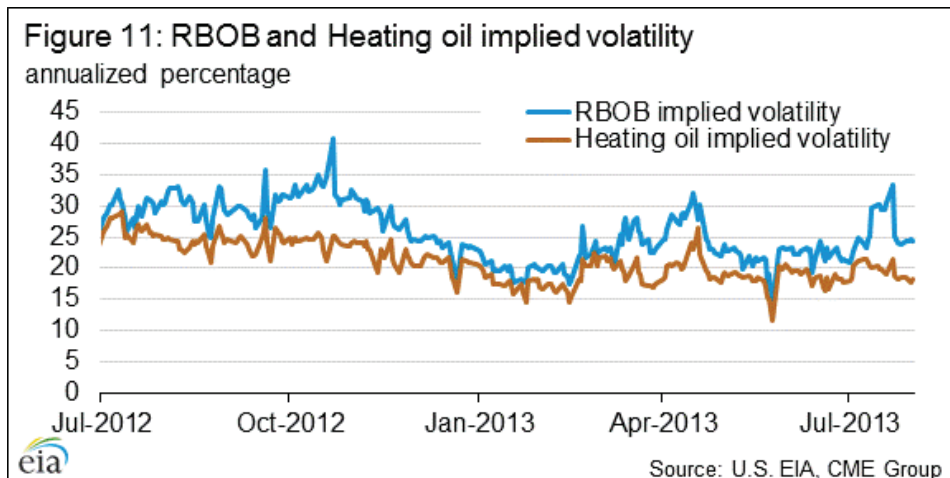
Distillate prices did not experience the same magnitude of increase in July as gasoline prices. The four week average of distillate consumption and exports ending July 26 was up 340 thousand barrels per day over the same time last year, while distillate production was up 320 thousand barrels per day. Imports of distillate have not changed significantly. The higher crack spreads for both gasoline and distillate have supported the higher runs witnessed since the end of May.
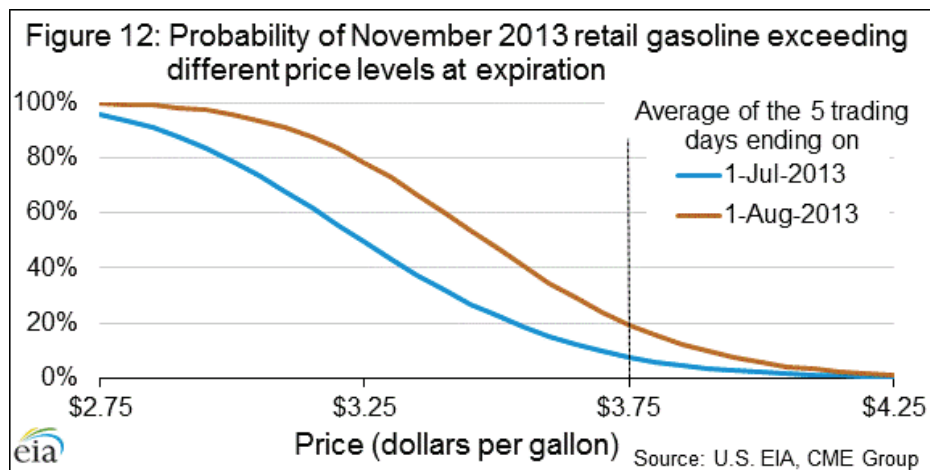
Figure 9: Heating Oil futures prices and crack spreads

futures price (dollars per gallon)　　　crack spread (dollars per gallon)

— Heating Oil front month futures price
— Heating Oil - Brent front month crack spread

Source: U.S. EIA, CME Group

The RBOB-heating oil spread increased $0.14 since July 1, settling at $0.001 on August 1, and well off the lows seen at the end of June **(Figure 10)**. This is the first positive price difference for the August 2013 contract since April. The stronger than anticipated seasonal demand for gasoline has helped to support higher RBOB prices. Gasoline consumption and export numbers from July have shown the first year over year increase since July 2009, when there was a 40 thousand barrel per day gain.

Figure 10: RBOB-Heating Oil price difference for August delivery

futures price spread (dollars per gallon)

— August RBOB-Heating Oil spread

Source: CME Group

Volatility: RBOB experienced a jump in implied volatility mid-month while heating oil exhibited a more muted change in implied volatility. The implied volatility for the front month RBOB contract settled at 24.4 percent on August 1 while the implied volatility for the front month heating oil contract settled at 18.2 percent, an increase of 3.4 and 0.3 percentage points since July 1, respectively **(Figure 11)**.

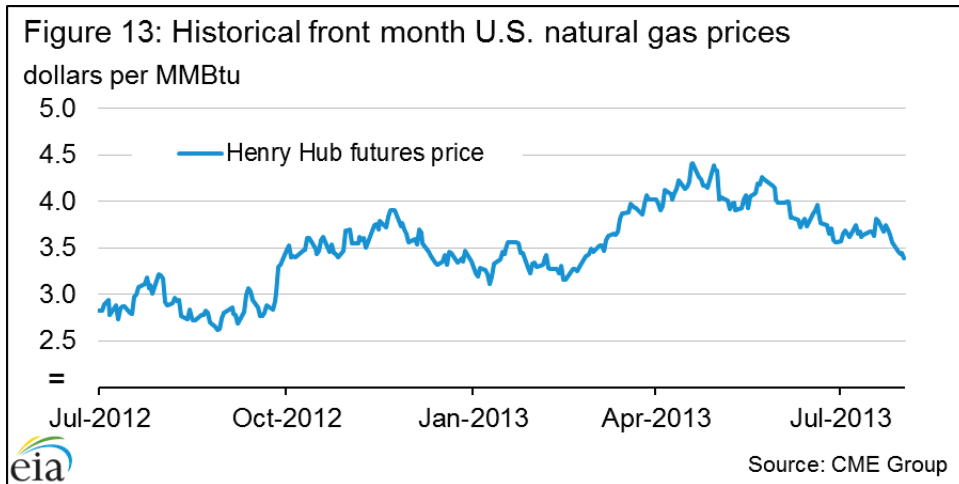Figure 11: RBOB and Heating oil implied volatility
annualized percentage

Market-Derived Probabilities: The November 2013 RBOB futures contract averaged $2.79 per gallon for the five trading days ending August 1 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 19.5 percent. The same contract for the five trading days ending July 1 had a probability of exceeding $3.05 of 7.6 percent **(Figure 12)**.

Figure 12: Probability of November 2013 retail gasoline exceeding different price levels at expiration
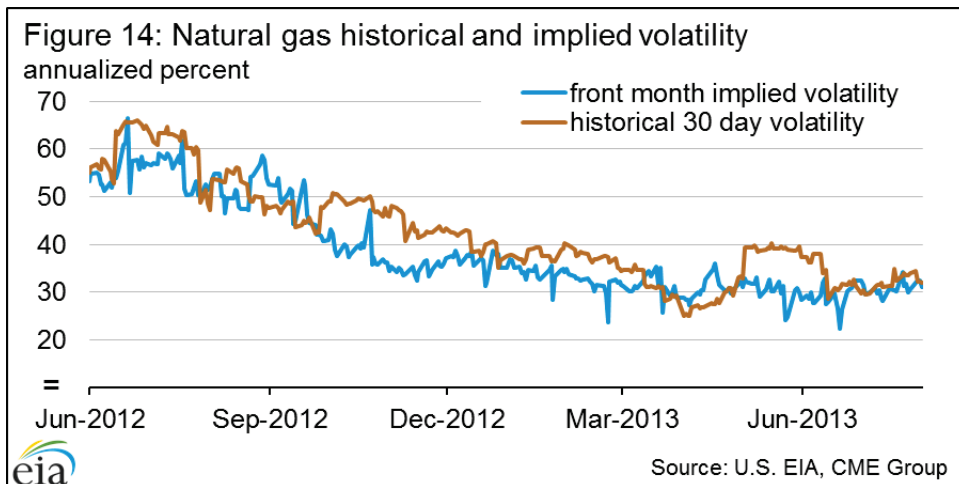
Natural Gas

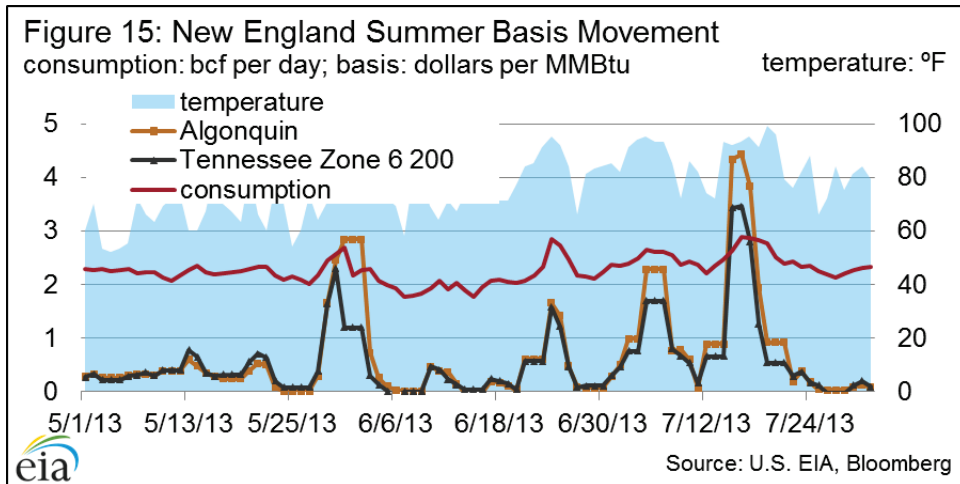*Prices:* The front month futures price settled at $3.39 per MMBtu on August 1, decreasing $0.19 per MMBtu from the price at the beginning of July **(Figure 13)**. Despite high temperatures in the middle of July, cooler than average temperatures at the end of the month and supply increases in the Eagle Ford and Marcellus shale plays supported lower prices.
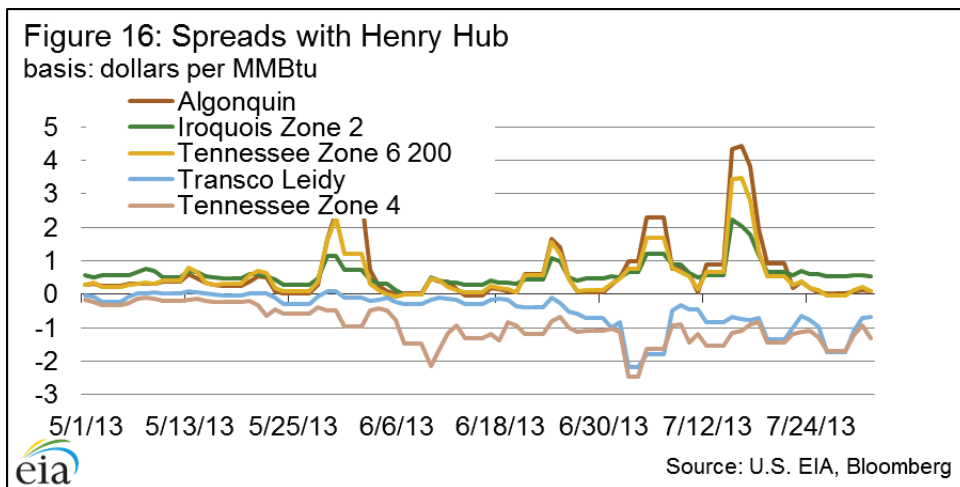
Figure 13: Historical front month U.S. natural gas prices
dollars per MMBtu

Henry Hub futures price

Source: CME Group

Volatility: Implied volatility for the front month futures contract in August settled at 31.1 percent on August 1, 1.3 percentage points lower than at the beginning of July **(Figure 14)**. Historical volatility settled at 31.8 percent on August 1, 2.2 percentage points higher than at the beginning of July.

Figure 14: Natural gas historical and implied volatility
annualized percent

front month implied volatility
historical 30 day volatility

Source: U.S. EIA, CME Group

Summer Market in New England: Last month's MPUR pointed out that the New England market can face price spikes in extreme weather conditions. Boston reached a July 19th high of 99°F as part of a week-long heat wave **(Figure 15).** Consumption increased to nearly 3 billion cubic feet per day (bcf/d) during the heat wave to meet air conditioning demand and the Algonquin basis rose to more than $4.00 per MMBtu on two days. Despite the recent heat wave, temperatures and consumption remained lower than last summer, when the basis rose as high as $6.28 per MMBtu.
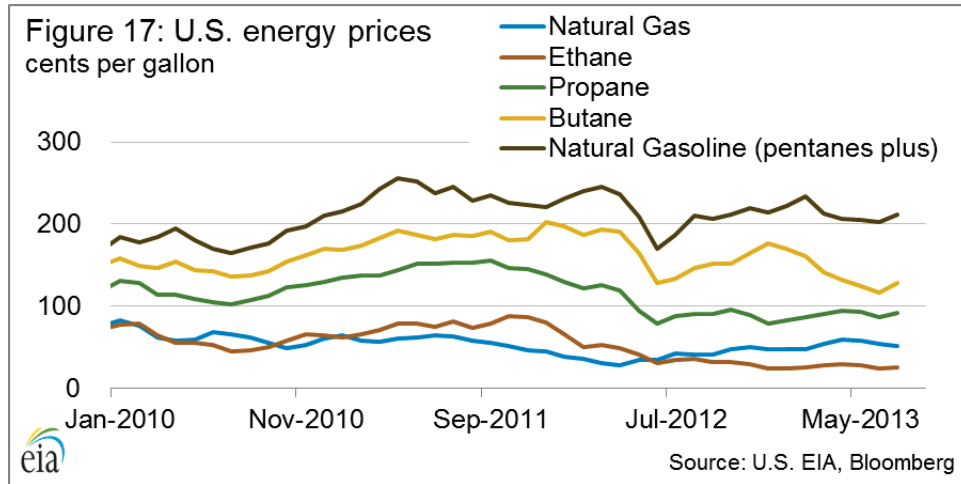
Figure 15: New England Summer Basis Movement
consumption: bcf per day; basis: dollars per MMBtu   temperature: ºF

Source: U.S. EIA, Bloomberg

Regional Price Variations with Henry Hub Benchmark: Pipeline constraints into New England prevent natural gas from reaching demand and tend to result in higher prices relative to Henry Hub, as measured at various regional pipelines such as Algonquin Citygate, Iroquois Zone 2, and the Tennessee Zone 6, 200 line **(Figure 16)**. In contrast, when pipelines transporting the increasing Marcellus shale production experience congestion, it means that they are unable to transport all available supply to markets. That results in a discount to Henry Hub in Appalachia, for example at the Transco Leidy line and Tennessee Zone 4. These regional price variations show the effect of transport capacity constraints limiting the capability to move product both into and out of particular markets.
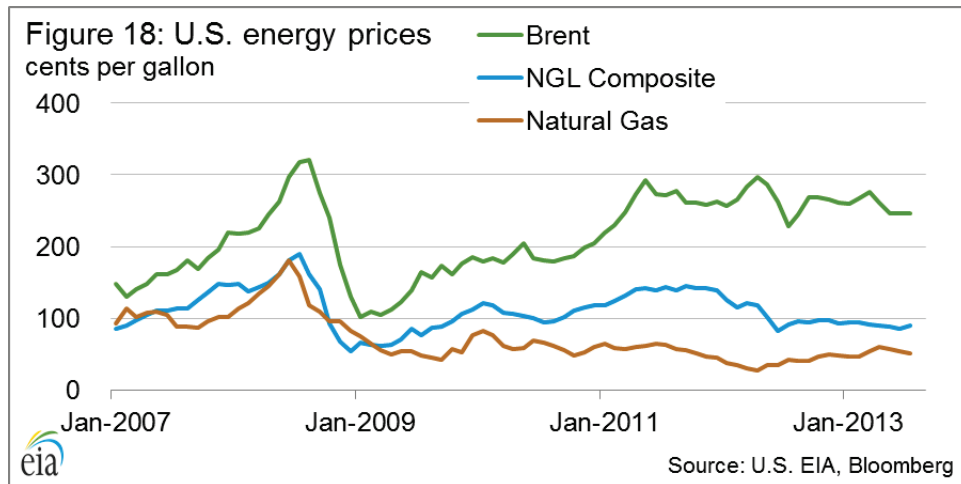

Figure 16: Spreads with Henry Hub
basis: dollars per MMBtu

Source: U.S. EIA, Bloomberg

Natural Gas versus Natural Gas Plant Liquids (NGPL): Following the recovery of natural gas prices in the second half of 2012, butane and natural gasoline began to diverge upward while ethane and propane remained flat. Since the beginning of the year, however, prices have converged as natural gasoline and butane declined by 5 percent and 25 percent, respectively, while natural gas, propane, and ethane have seen moderate price increases or continued flat over the same time period **(Figure 17)**. Low

ethane prices relative to natural gas have led to ethane rejection—when processors leave it in the natural gas stream.

Figure 17: U.S. energy prices
cents per gallon
Source: U.S. EIA, Bloomberg

Butane prices have recovered somewhat in July, but the averages for May, June, and July were below 2012 lows. Refiners blend less butane into gasoline in the summer because of tighter limits on vapor pressure. Lower butane prices combined with flat prices for other liquids and the natural gas price increases has narrowed the spread between the NGL composite and natural gas from a high of $0.95 per gallon in 2011 to under $0.39 per gallon in July **(Figure 18)**.

Figure 18: U.S. energy prices
cents per gallon
Source: U.S. EIA, Bloomberg

Market Derived Probabilities: The probability that the November 2013 contract will settle higher than $4.00 per MMBtu decreased 9 percentage points, from 30 percent to 21 percent, when compared to market conditions on the five trading days ending July 1 **(Figure 19)**. The decline in prices was the primary driver for the lower probability.

Figure 19: Probability of the November 2013 Henry Hub contract expiring above price levels