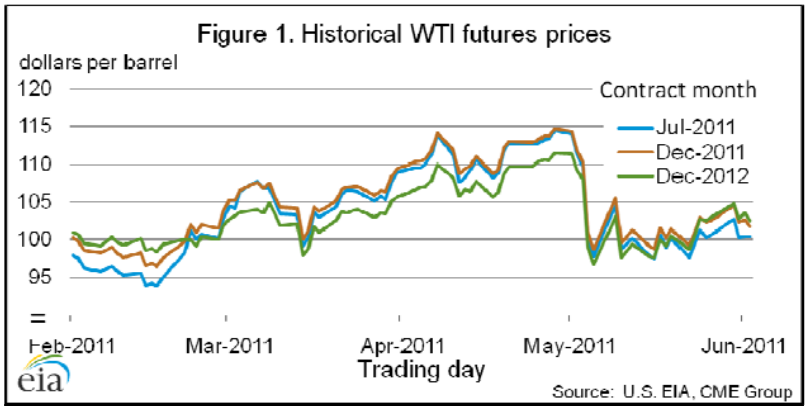
U.S. Energy Information Administration
Independent Statistics & Analysis

June 2011

Short-Term Energy Outlook
Market Prices and Uncertainty Report[1]

June 7, 2011 Release

Crude Oil Prices. West Texas Intermediate (WTI) crude oil spot prices averaged $103 per barrel in March, $110 per barrel in April, and $101 per barrel in May. The WTI crude oil price in the beginning of May was $113 per barrel, but by the end of the first week in May, WTI crude oil prices had fallen by nearly $16 per barrel to $97 per barrel (**Figure 1** for equivalent futures movement). For the remainder of May, WTI prices fluctuated within a relatively narrow range of between $96 and $103 per barrel. EIA still expects oil markets to tighten as growing liquid fuels demand in the emerging economies and slowing growth in non-OPEC supply maintain upward pressure on oil prices. EIA expects that WTI spot prices, which averaged $79 per barrel in 2010, will average $102 per barrel in 2011 and $107 per barrel in 2012, about the same as last month's *Outlook* (West Texas Intermediate Crude Oil Price Chart).



Growing volumes of Canadian crude oil imported into the United States contributed to record-high storage levels at Cushing, Oklahoma of over 41 million barrels at the end of March 2011 (86 percent of working capacity at Cushing), and a price discount for WTI compared with similar

[1] This is a regular monthly supplement to the EIA *Short-Term Energy Outlook*.
(http://www.eia.doe.gov/emeu/steo/pub/contents.html)
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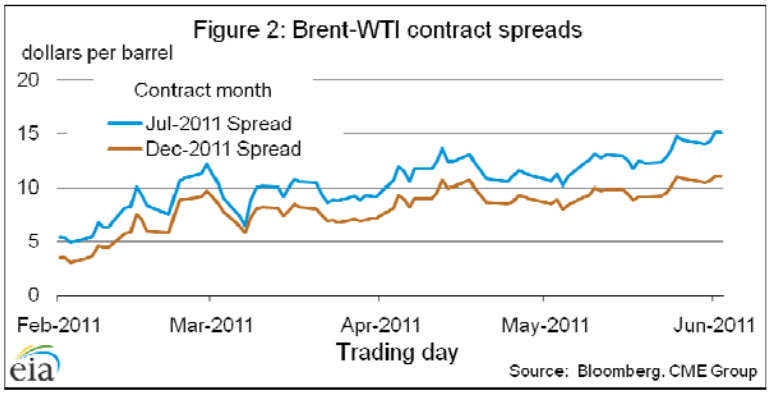
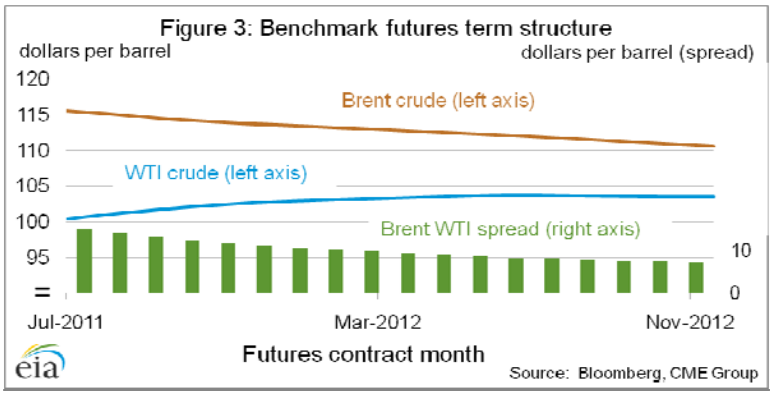
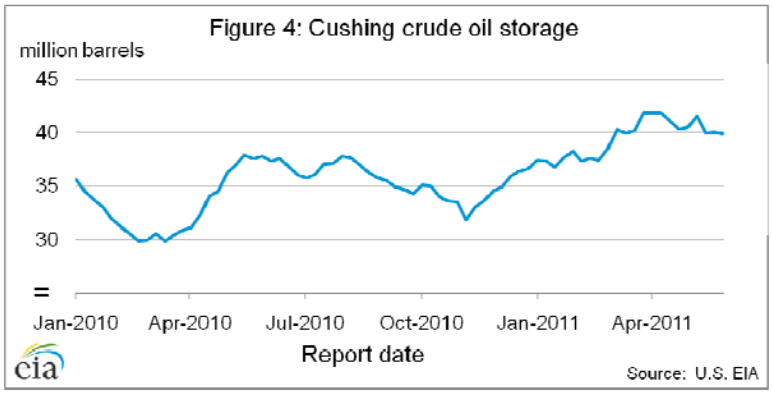
quality world crudes such as Brent (**Figures 2 through 4**). A discount for WTI is expected to persist until transportation bottlenecks impacting the movement of mid-continent crude oil to the Gulf coast are relieved. Consequently, the projected U.S. refiner average acquisition cost of crude oil, which was about $2.70 per barrel below WTI in 2010, is $1.60 per barrel above WTI in 2011 and $1.10 per barrel above WTI in 2012.

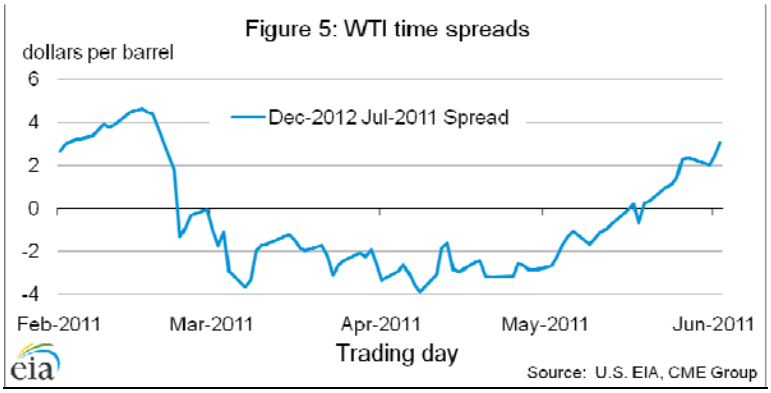


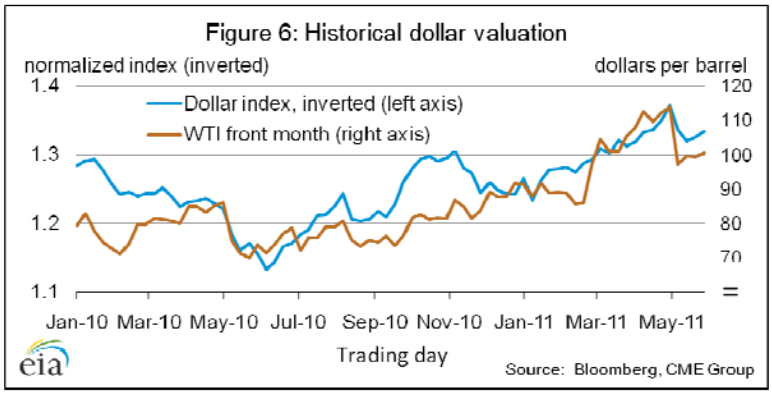


WTI futures for August 2011 delivery over the 5-day period ending June 2 averaged $101.49 per barrel and implied volatility averaged 29 percent, establishing the lower and upper limits of a 95-percent confidence interval for the market's expectations of monthly average WTI prices in July of $83 per barrel and $124 per barrel, respectively. Last year at this time, WTI for August 2010 delivery averaged $75 per barrel and implied volatility averaged 39 percent. The corresponding lower and upper limits of the 95-percent confidence interval were $58 per barrel and $97 per barrel.

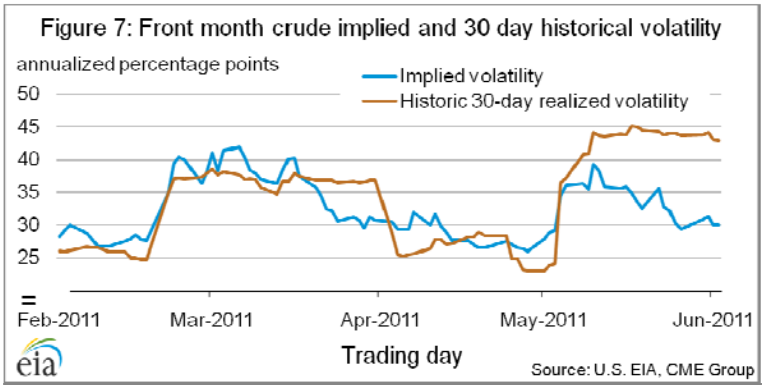


The continued high inventory levels in Cushing has resulted in a large price discount for WTI relative to comparable world crude oils and growing differentials between near-term contracts and those for more distant delivery dates. For example, the WTI futures contract for delivery in December 2012 is trading $3.11 per barrel above the July 2011 contract (the current active front month) the highest premium since the start of unrest in the Middle East and North Africa raised concerns over short term supply losses **(Figure 5)**. The strengthening contango in WTI over an 18-month horizon is consistent with a diminished concern over additional supply disruptions, and is matched by similar movement in Brent time spreads, which also loosened through May. The large price declines in early May permeated through most of the commodities complex, with indices in energy, softs (including sugar, coffee and cocoa), precious and industrial metals all down from their levels one month ago. The price declines coincided with strengthening in the dollar (**Figure 6**), equities weakness, and continued weak economic manufacturing data throughout the world (including the United States, Japan and China). Out of all these commodity categories, energy declined the most in May, though it has seen some of the strongest previous gains for the year to date.

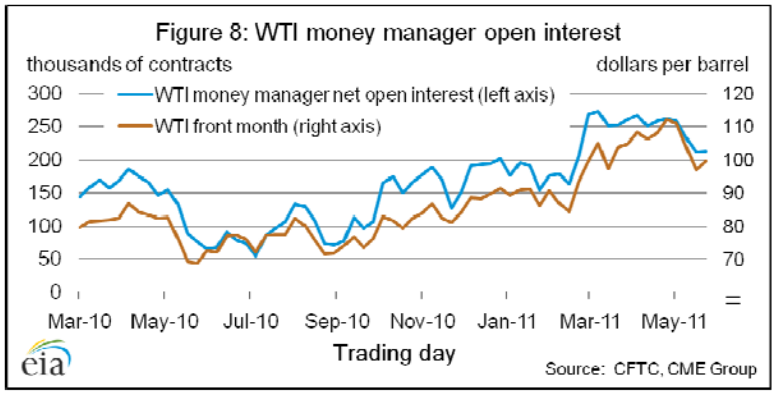


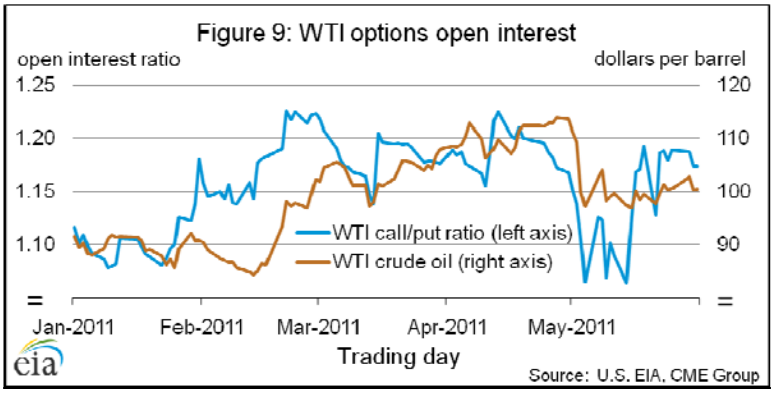


With the broad selloff in commodities in the first week of May, volatility quickly moved higher. As of May 5th, implied volatility had risen to 34.5 percentage points and realized volatility similarly rose to 36.4 percentage points. However, implied volatility for WTI crude oil drifted lower through May, shaking off most of the increase seen on May 5 where crude oil experienced an intraday movement of over $10 **(Figure 7)**. Since that extreme price movement, average changes between settlement prices have been just under $2, closely aligned with that implied by option volatilities (30-day realized volatility will still remain high until the May 5 trading date rolls off). The low for the month of May was set on the 27th, at a level of 29.3 percentage points, the equivalent of a close-on-close price movement of approximately $1.86.

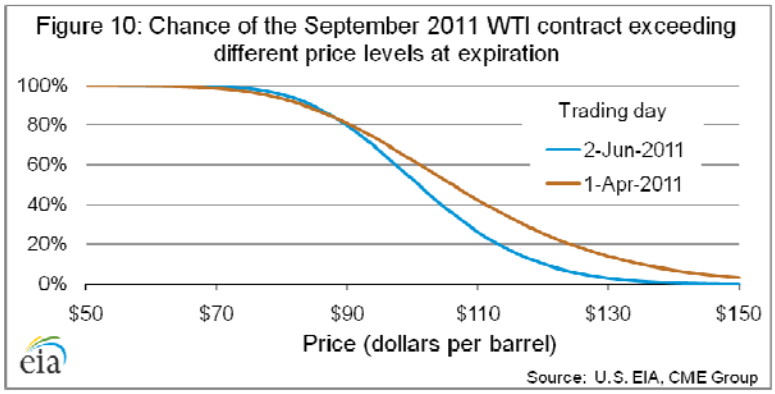


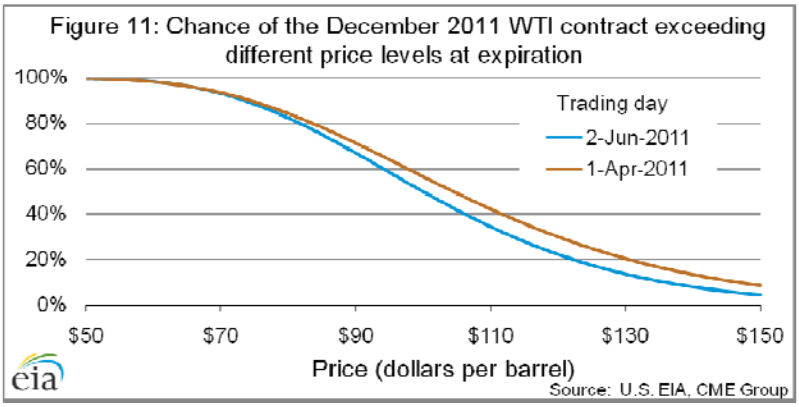
Net open interest in WTI futures contracts currently held by money managers (primarily hedge funds) continues to closely track price movements, with record contract interest pulling back at the beginning of this past month at the same time as the price declines **(Figure 8)**. Price declines, however, did not seem to deter general investment in May, as total futures energy open interest on NYMEX grew to over 1.6 million contacts on May 9, setting a new record. In the options market, traders moderated their concerns over extreme price movement **(Figure 9)**. The call/put ratio of options on WTI futures contracts now stands at 1.17, almost exactly its 2011 average.





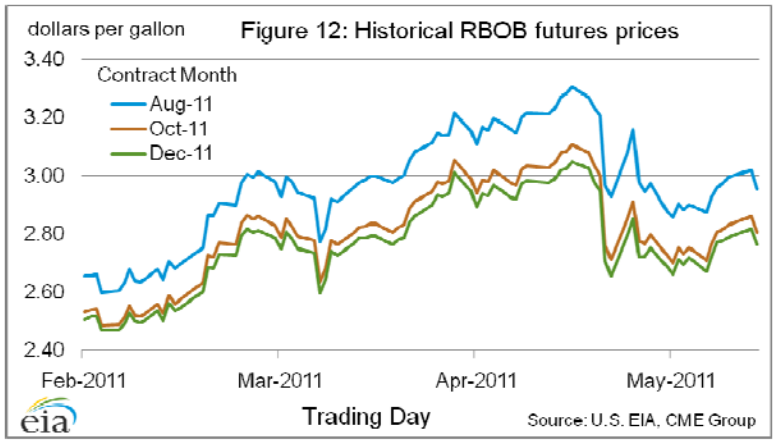
Falling implied volatilities and reasonably stable prices after the price declines early in the month have been reflected in the value of options. Consequently, there was a decrease in the market's assessment of the probability of exceeding high future price points compared to those calculated previously and an increase for lower price points as we move closer to expiration (**Figures 10 and 11**). Over the 5-day period ending June 2, the probability of the September 2011 NYMEX WTI futures contract expiring above $130 per barrel was only 3 percent, compared to a heftier probability of 14 percent in the March STEO. The same story is told for those contracts further out, with the prices of futures and options of WTI crude oil for December delivery indicating a probability of expiring above $130 per barrel of 14 percent, falling from the 20 percent on March 1. These probabilities are based on the cumulative normal densities derived from market expectations using futures and options prices. (See Appendices I and II of EIA's October 2009 *Energy Price Volatility and Forecast Uncertainty* article for discussion of how these probabilities are derived.)



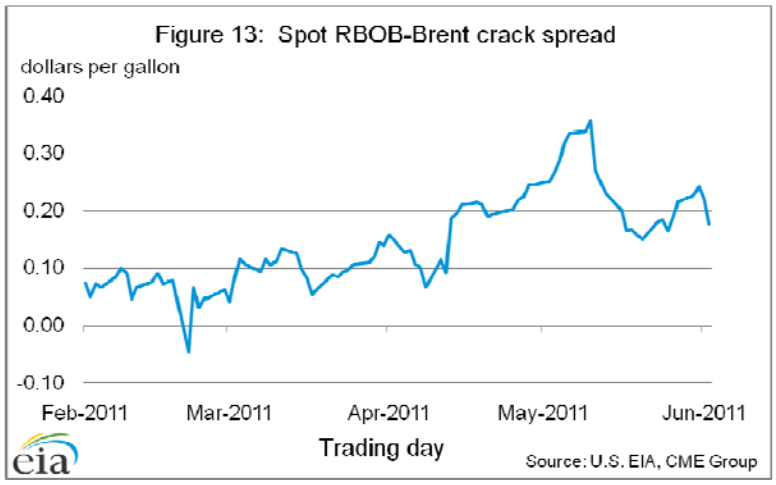


Gasoline. EIA forecasts that the annual average regular-grade gasoline retail price will increase from $2.78 per gallon in 2010 to $3.60 per gallon in 2011 and to $3.67 per gallon in 2012. The sizable jump in retail prices this year reflects not only the higher average cost of crude oil but also an increase in U.S. refinery margins on gasoline (the difference between refinery wholesale gasoline prices and the average cost of crude oil) from an average of $0.34 per gallon in 2010 to $0.47 per gallon in 2011, still 6 to 9 cents per gallon below the record margins set in 2006 and 2007. Unexpected shutdowns of U.S. refining capacity in March and April, with a large drop in gasoline stocks on the East Coast, along with flooding of the Mississippi River in May, contributed to the increase in margins this year. The projected refinery gasoline margin falls back to $0.44 per gallon in 2012.

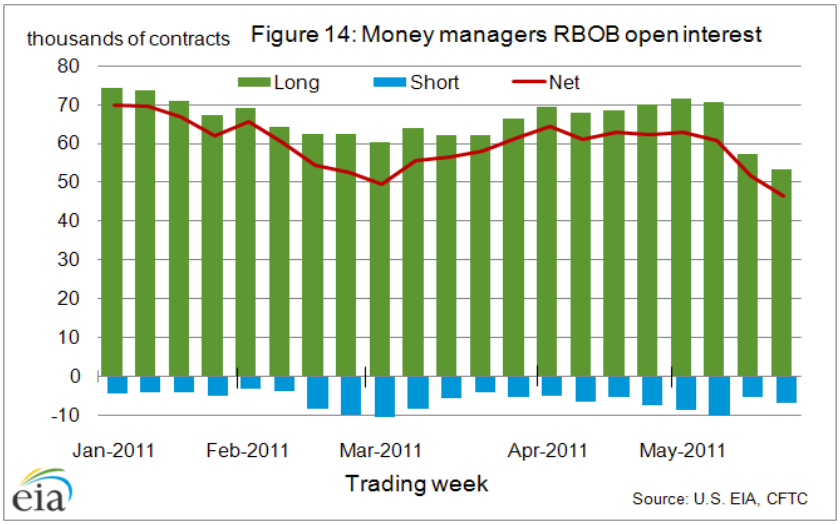
EIA expects that on-highway diesel fuel retail prices, which averaged $2.99 per gallon in 2010, will average $3.87 per gallon in 2011 and $3.95 per gallon in 2012. Projected U.S. refinery diesel fuel margins increase by 21 cents per gallon, from an average $0.38 per gallon in 2010 to $0.59 per gallon in 2011, then fall to $0.53 per gallon in 2012.



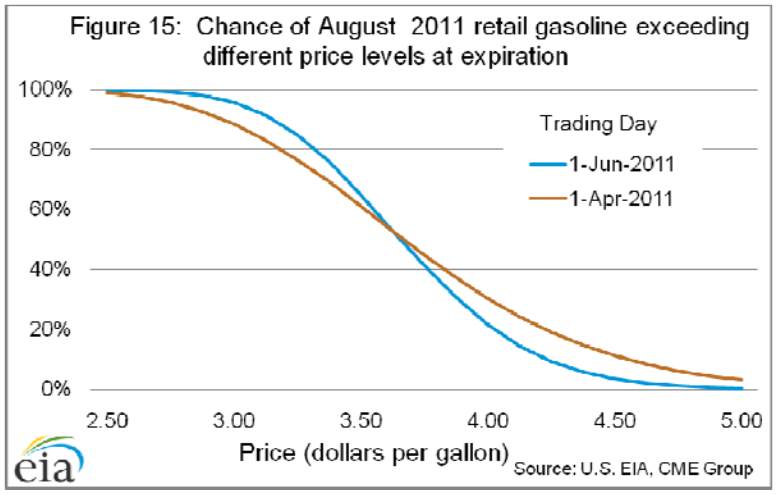
Gasoline prices have steadily increased since the beginning of the year but rose sharply from March through the end of April (**Figure 12**). Increases in the crack spread (crude spot price minus conventional gasoline spot price) were seen over this time period, partly as a result of downstream supply disruptions including unplanned refinery outages and concerns over flooding (**Figure 13),** as noted previously. This spread has fallen recently as the spot price for gasoline has fallen, consistent with the realized decrease in the reformulated gasoline blendstock for oxygenate blending (RBOB) futures curve over time relative to the crude futures curve.

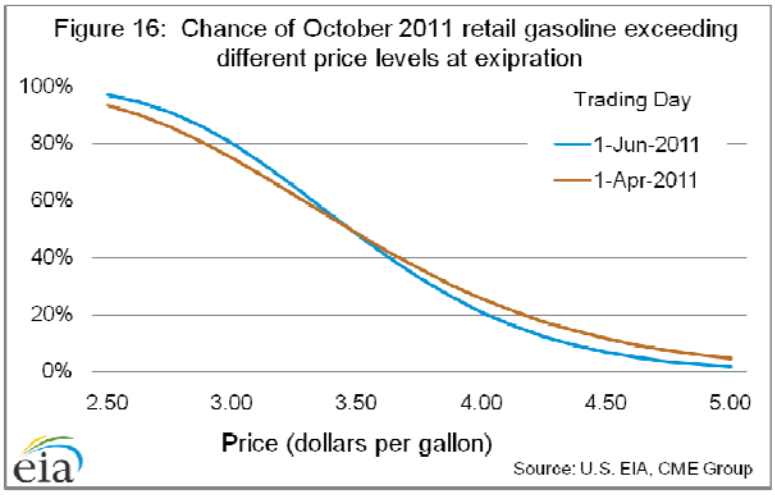


Along with decreasing spot and future gasoline prices, net positions held by money managers in gasoline futures contracts has fallen from its recent maximum of almost 63,000 contracts (at 42,000 gallons each) for the week ending May 3 to 46,000 the week of May 24 (**Figure 14**). Over this time period long positions declined 25 percent and short positions declined almost 20 percent, although from a much smaller number of contracts outstanding as compared to long positions. Reductions in managed money net long positions may signal that this segment of market participants expects the price of gasoline to continue its decrease in the near future.



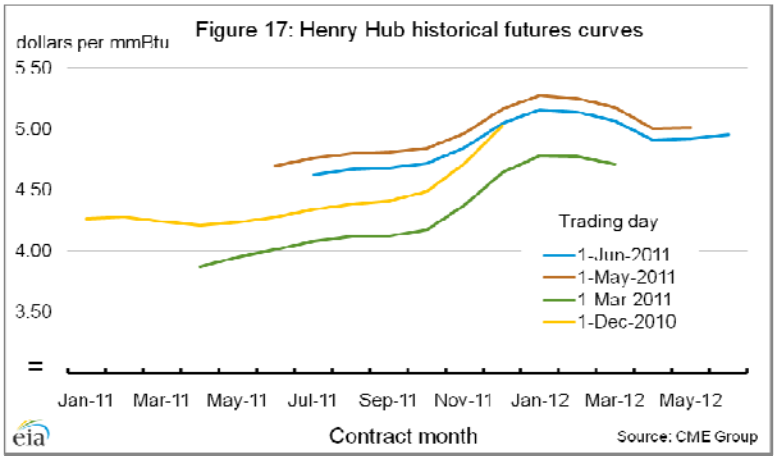
Market expectations of uncertainty in monthly average gasoline prices are reflected in the pricing and implied volatility of futures options contracts (**Figures 15 and 16**). New York Harbor RBOB futures contracts for August 2011 delivery settled on June 2 at $2.95 per gallon. The probability the RBOB futures price will exceed $3.30 per gallon (consistent with a U.S. average regular gasoline retail price above $4.00 per gallon) in August 2011 is approximately 17 percent. Looking further out on the curve, the RBOB futures contracts price on June 2 for October 2011 was $2.81 and has a probability of exceeding $3.30 per gallon ($4.00 retail) at expiration of approximately 16 percent.





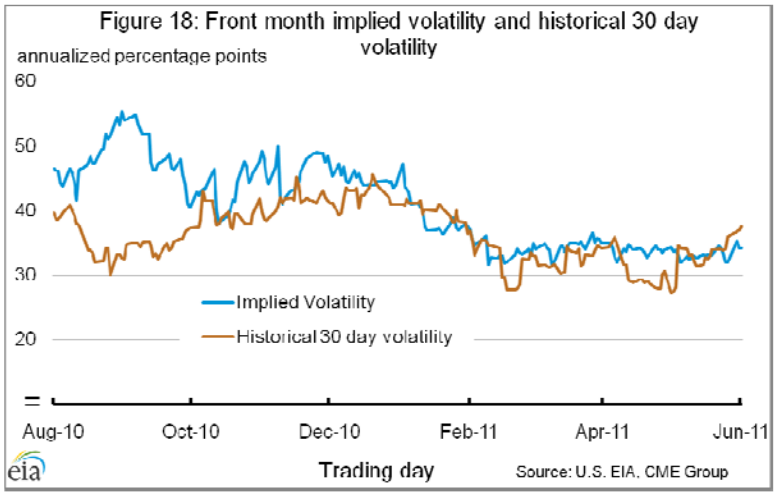
U.S. Natural Gas Prices. The Henry Hub spot price averaged $4.31 per MMBtu in May, 6 cents higher than the April average and 11 cents higher than forecast in last month's *Outlook* (Henry Hub Natural Gas Price Chart). EIA expects that the Henry Hub price will average $4.25 per MMBtu in 2011, a decline of 13 cents from the 2010 average. EIA expects that the slowing growth in production will contribute to a tightening domestic market next year, with the Henry Hub price averaging $4.58 per MMBtu in 2012.

Natural gas futures for August 2011 delivery (for the 5-day period ending June 2) averaged $4.66 per MMBtu, and the average implied volatility was 33 percent. The lower and upper bounds for the 95-percent confidence interval for August 2011 contracts are $3.91 per MMBtu and $5.47 per MMBtu. At this time last year, the natural gas August 2010 futures contract averaged $4.47 per MMBtu and implied volatility averaged 47 percent. The corresponding lower and upper limits of the 95-percent confidence interval were $3.22 per MMBtu and $6.20 per MMBtu.



In the month of May, implied volatility on the front-month natural gas futures contract was fairly flat as it traded in the 32- to 35.5-percent range (**Figure 18),** whereas realized volatility had

been on an uptrend for most of the last month. The 30-day realized volatility for the front month natural gas contract (currently July) started May at a low point of 27.2 percent and achieved its high of 37.5 percent on June 2.



Both the price and the implied volatility of the December natural gas futures contract are very close to their levels as of April 1. With price and implied volatility held constant, a contract with less time to expiration will have a lower probability of making a large absolute move (in either direction) from the current price, as reflected in **Figure 19**. These natural gas probabilities are cumulative normal densities generated using market-based inputs provided by futures and options markets, i.e., futures prices and implied volatilities. (See Appendices I and II of EIA's October 2009 *Energy Price Volatility and Forecast Uncertainty* article for additional discussion).