



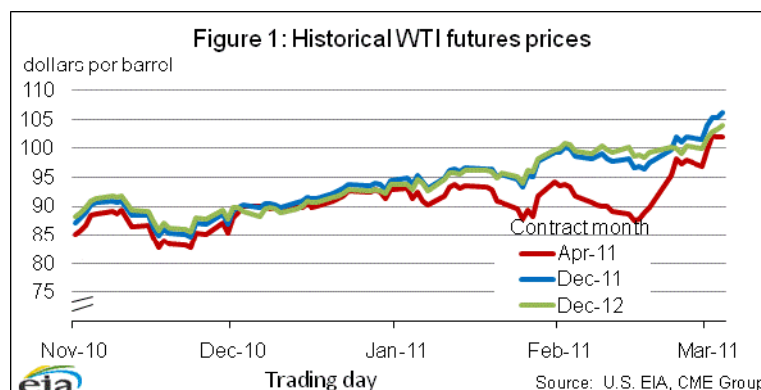
March 2011

Short-Term Energy Outlook Market Prices and Uncertainty Report¹

March 8, 2011 Release

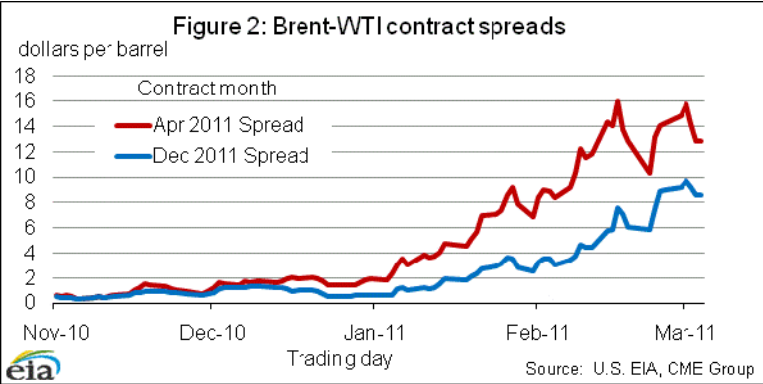
Crude Oil Prices. West Texas Intermediate (WTI) crude oil spot prices averaged \$88.58 per barrel in February, slightly lower than the January average, while over the same time period the estimated average cost of all crude oil to U.S. refineries increased by about \$4.50 per barrel to \$92.50. Growing volumes of Canadian crude oil imported into the United States contributed to record-high storage levels at Cushing, Oklahoma, and a price discount for WTI compared with similar quality world crudes such as Brent crude oil. Projected WTI spot prices rise to an average of \$105 per barrel in December 2011 and remain at about that level through 2012.

Energy price forecasts are uncertain ([Energy Price Volatility and Forecast Uncertainty](#)). WTI futures for May 2011 delivery over the 5-day period ending March 3 averaged \$101 per barrel and implied volatility averaged 36 percent. This makes the lower and upper limits of the 95-percent confidence interval for the May 2011 WTI price \$79 per barrel and \$129 per barrel, respectively. Last year at this time, WTI for May 2010 delivery averaged \$80 per barrel with the limits of the 95-percent confidence interval at \$65 per barrel and \$99 per barrel. Looking ahead to December 2011, current WTI futures and options prices imply a 36 percent probability that the monthly average price of WTI crude oil will exceed \$110 per barrel. Conversely, the probability that the monthly average December 2011 WTI price will fall below \$90 per barrel is about 34 percent.

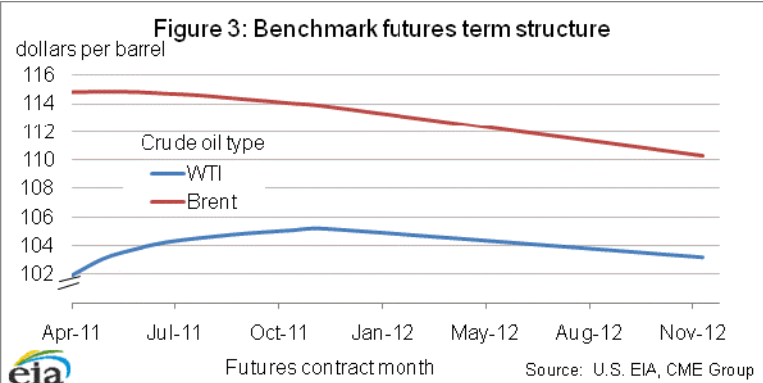


¹ This is a regular monthly supplement to the EIA *Short-Term Energy Outlook*.
(<http://www.eia.doe.gov/emeu/steo/pub/contents.html>)
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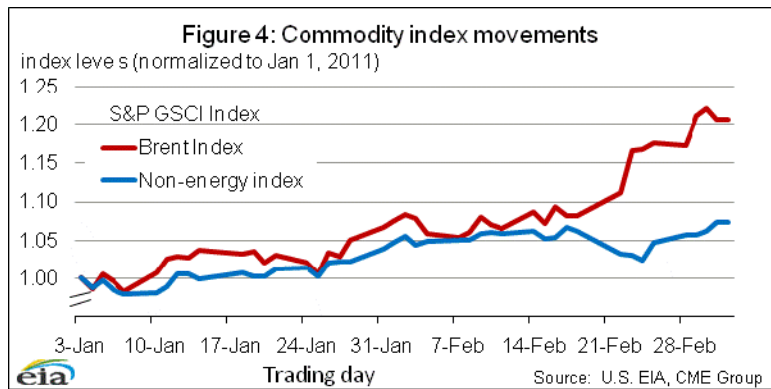
Crude oil prices during the month of February rose with the spread of political unrest in north Africa (Figure 1). WTI prompt futures prices, a Midcontinent crude oil benchmark, increased \$8.86 (9.8 percent) from February 1 to March 1. During the same time period, Brent, a similar North Sea oil grade, rose \$13.68 (13.4 percent). This larger relative rise in Brent prices during the period continued the trend towards a widening spread trend between Brent and WTI apparent over the last few months (Figure 2). Persistently high inventories in Cushing, Oklahoma, the delivery point for WTI, and bottlenecks that constrain the transport of oil from that market hub have muted WTI's response to events that are affecting world oil prices. Prompt Brent – WTI spreads have retreated from a high of \$18.79 on February 16, though some of that reduction occurred as an effect of WTI March contract expiration on February 22.



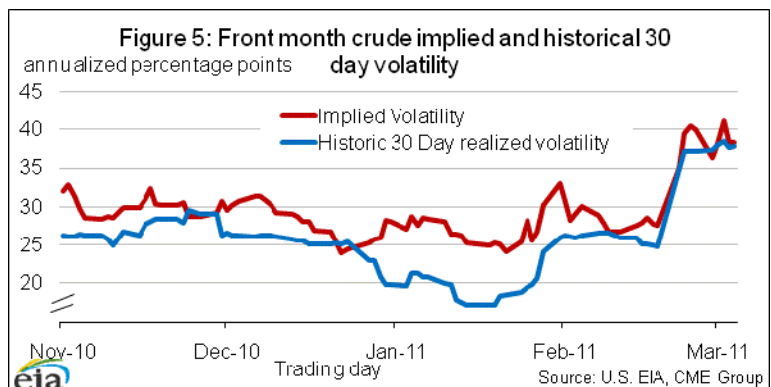
The Brent and WTI futures curves reflect the market perception of greater tightness for Brent (Figure 3). While the near-term WTI futures market year to date has remained in contango (where near-month contracts trade at a discount to those further out), Brent has flirted with backwardation throughout 2011. It last switched into backwardation on February 23, and has remained in that state through the first week of March. As of March 3, front-month Brent trades at a \$0.98 premium to December 2011 delivery.



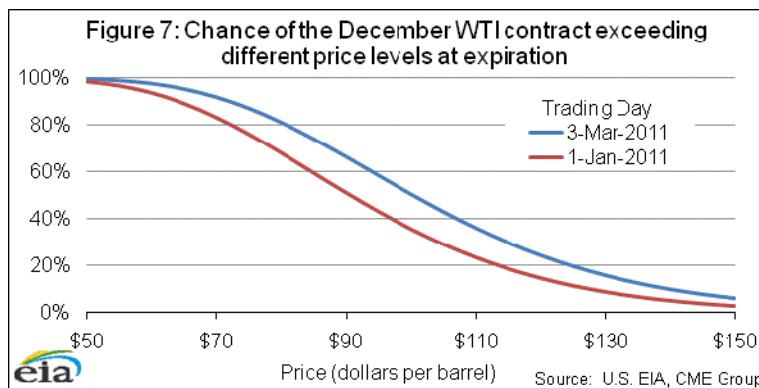
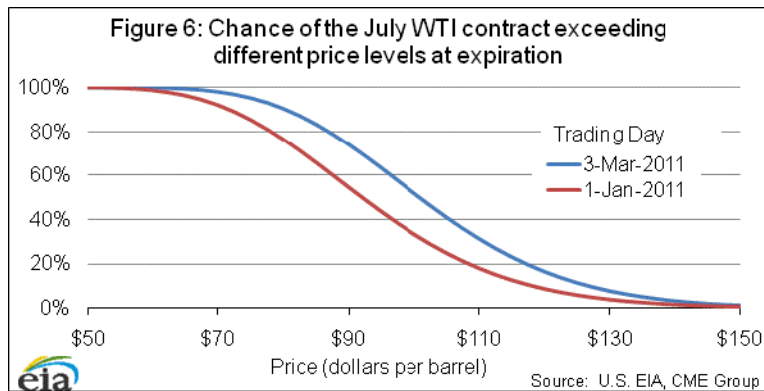
The sharp increase in energy prices since the beginning of political unrest in north Africa and the Middle East has not been fully matched by other tradable raw goods (Figure 4). This can be seen by comparing concurrent movements in commodity indices, normalized to the beginning of the year. Where the S&P GSCI Brent index has risen more than 21 percent since the first trading date of 2011, the S&P GSCI non-energy index (with components spanning metals, agriculturals, and livestock) has moved less than 8 percent during the same time frame. Upward price pressure, thus far, seems more highly concentrated within the energy complex.



Implied oil volatilities in February rose in general, with the largest increases occurring in the months with shortest time until expiration (**Figure 5**). From a year-to-date low slightly above 24 percentage points on January 21, WTI option implied volatilities have risen over the past 6 weeks. This movement has been matched almost lockstep with realized volatility, a measure of actual day-to-day price movements experienced in the financial market. Realized 30-day volatility on March 1 was 38 percentage points, almost identical to the level of implied volatility at that time. With the possibility of further price rises, volatility levels and trading activity for high strike calls (instruments which insure against large price increases) have both been rising.



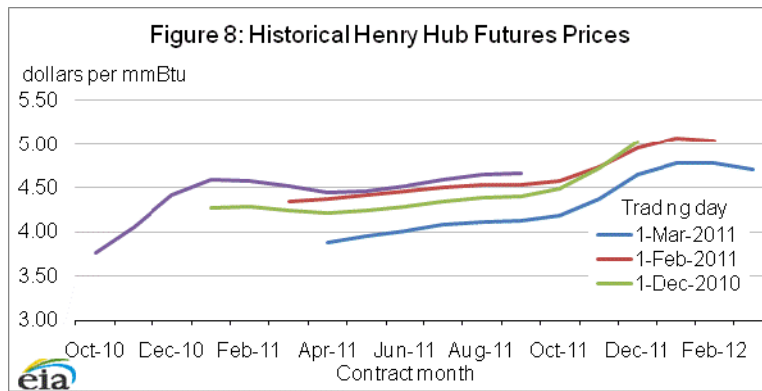
With both WTI prices and volatility higher than in recent months, EIA's probability assessments for higher prices by the middle of the year moved up from levels two months prior (**Figures 6 and 7**). On March 3, market prices for all expirations settled above \$100 per barrel, leaving probabilities of expiring above \$100 near or above 50 percent. Higher strikes saw similar increases in likelihood, with the probability of December 2011 delivery above \$120 per barrel at 24 percent and above \$130 per barrel at 16 percent. 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.)



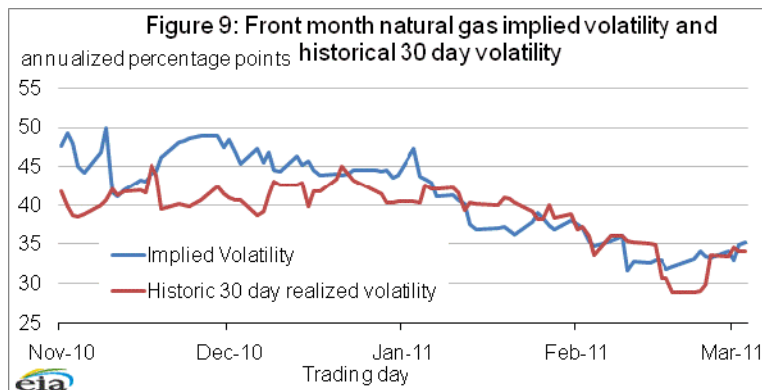
Gasoline. The projected monthly average regular gasoline price peaks this year at \$3.75 per gallon in June. New York Harbor RBOB (reformulated gasoline blendstock for oxygenate blending) futures contracts for July 2011 delivery over the 5-day period ending March 3 averaged \$2.97 per gallon and implied volatility averaged 33 percent. The probability the RBOB futures price will exceed \$3.30 per gallon (consistent with a U.S. average regular gasoline retail price above \$4 per gallon) in July 2011 is about 25 percent.

U.S. Natural Gas Prices. The Henry Hub spot price averaged \$4.09 per million Btu (MMBtu) in February 2011, \$0.40 per MMBtu less than the average spot price in January 2011 ([Henry Hub Natural Gas Price Chart, Figure 8](#)). EIA expects that the Henry Hub spot price will average \$4.10 per MMBtu in 2011, a drop of \$0.29 per MMBtu from the 2010 average. EIA expects the natural gas market to begin to tighten in 2012, with the Henry Hub spot price increasing to an average of \$4.58 per MMBtu.

Uncertainty over future natural gas prices is slightly lower this year compared with last year at this time. Natural gas futures for May 2011 delivery (for the 5-day period ending March 3) averaged \$3.98 per MMBtu, and the average implied volatility over the same period was 33 percent. This produced lower and upper bounds for the 95-percent confidence interval for May 2011 contracts of \$3.09 per MMBtu and \$5.11 per MMBtu, respectively. At this time last year, the natural gas May 2010 futures contract averaged \$4.77 per MMBtu and implied volatility averaged 39 percent. The corresponding lower and upper limits of the 95-percent confidence interval were \$3.57 per MMBtu and \$6.39 per MMBtu.



Over the last month, natural gas implied volatility has continued to drift downward (**Figure 9**). Compared to its value February 1, 2011, implied volatility on the front-month NYMEX Henry Hub futures contract has dropped by 2.3 percentage points. Further out on the futures curve, contracts for June and December delivery of natural gas have seen a slight rise in implied volatility of 1.3 and 0.5 percentage points respectively.



Combined with lower implied volatility, the drop in prices during the month of February has caused the probability of exceeding certain price points to decrease (**Figures 10 and 11**). The chance that natural gas prices will be greater than \$5 per MMBtu at expiration on the September futures contract has fallen by 9.9 percentage points since January 1. 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).

