

 *Short-Term Energy Outlook***Energy Price Volatility and Forecast Uncertainty<sup>1</sup>**

December 7, 2010 Release

**Crude Oil Prices.** West Texas Intermediate (WTI) crude oil spot prices averaged over \$84 per barrel in November, more than \$2 per barrel higher than the October average. EIA has raised the average winter 2010-2011 period WTI spot price forecast by \$1 per barrel from the last month's Outlook to \$84 per barrel. WTI spot prices rise to \$89 per barrel by the end of next year, \$2 per barrel higher than in the last Outlook. Projected WTI prices average \$79 per barrel in 2010 and \$86 per barrel in 2011.

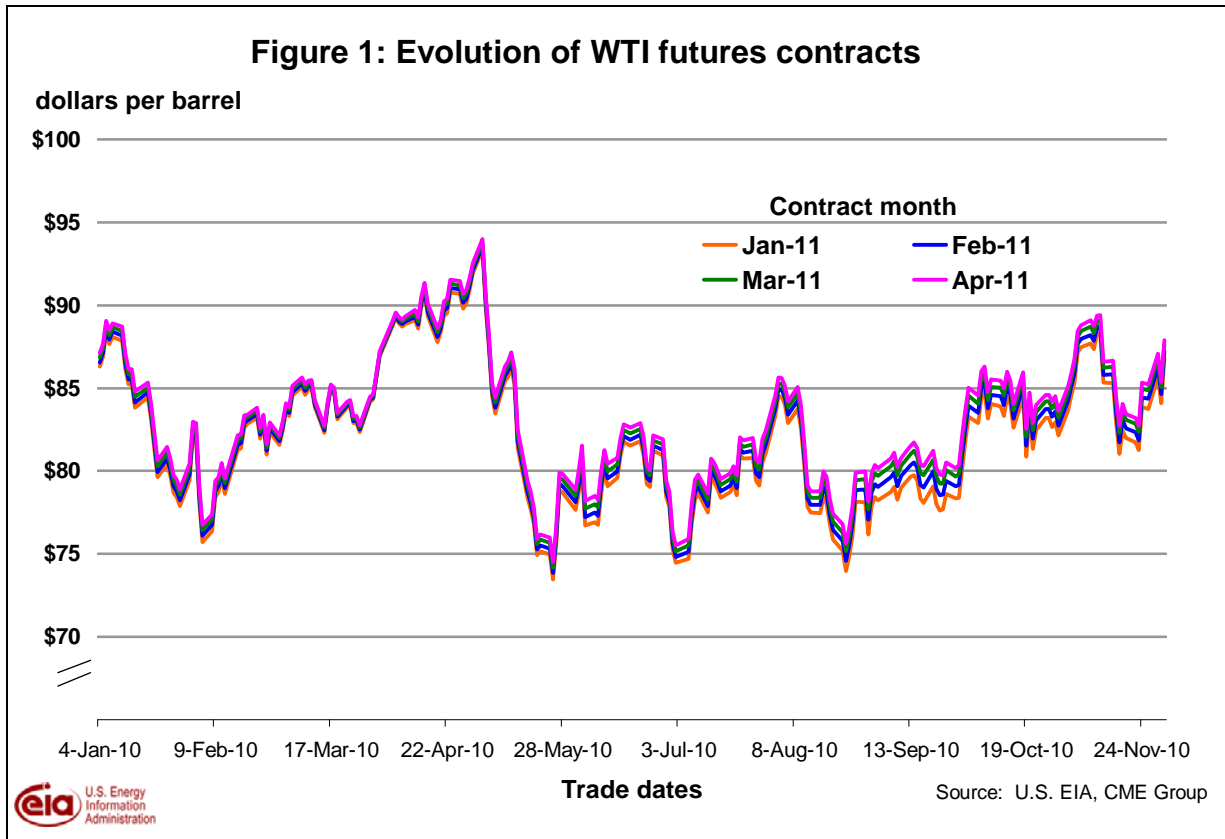
WTI futures for February 2011 delivery during the 5-day period ending December 2 averaged \$86 per barrel, and implied volatility – a market-based measure of price uncertainty – averaged 30 percent. This made the lower and upper limits of EIA's 95-percent confidence interval \$70 and \$106 per barrel, respectively, for WTI delivered at Cushing, Oklahoma, in February 2011. Last year at this time, WTI for February 2010 delivery averaged \$78 per barrel and implied volatility averaged 40 percent, with the limits of the 95-percent confidence interval at \$61 per barrel and \$102 per barrel. Figure 1 shows the evolution throughout 2010 of WTI futures contracts for delivery during the first 4 months of 2011.

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<sup>1</sup> This is a regular monthly supplement to the EIA *Short-Term Energy Outlook*.

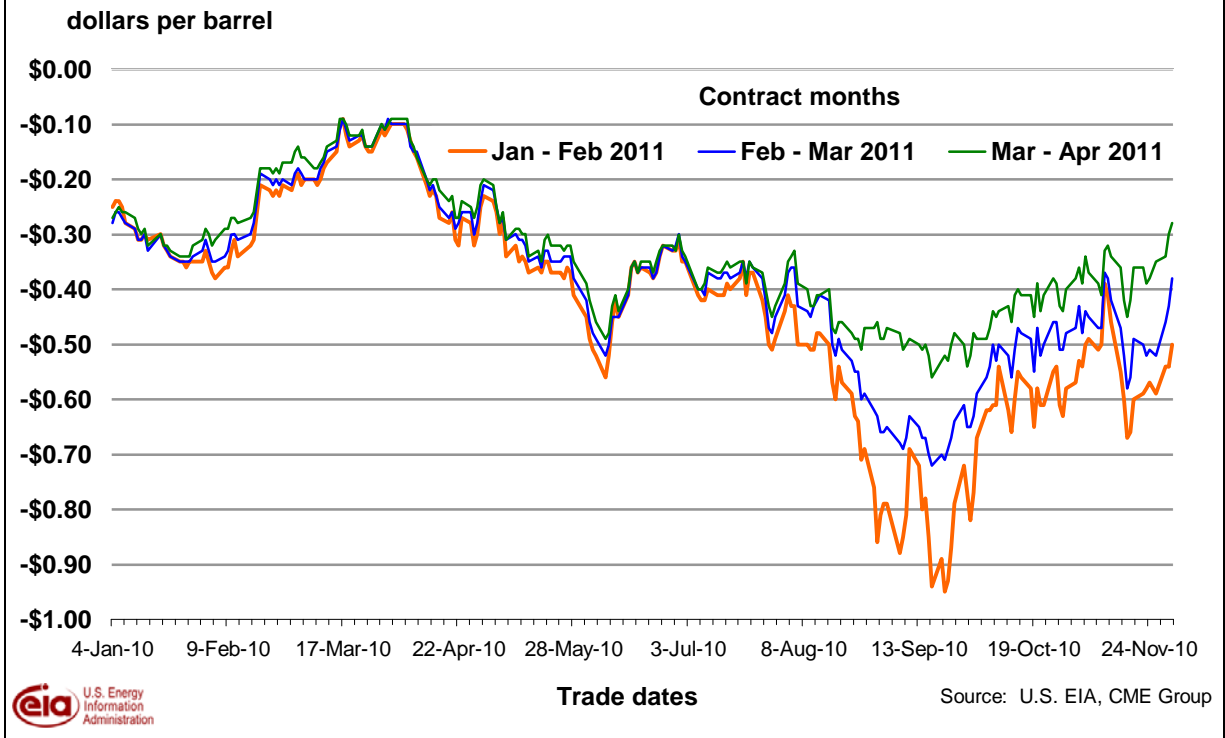
(<http://www.eia.doe.gov/emeu/steo/pub/contents.html>)

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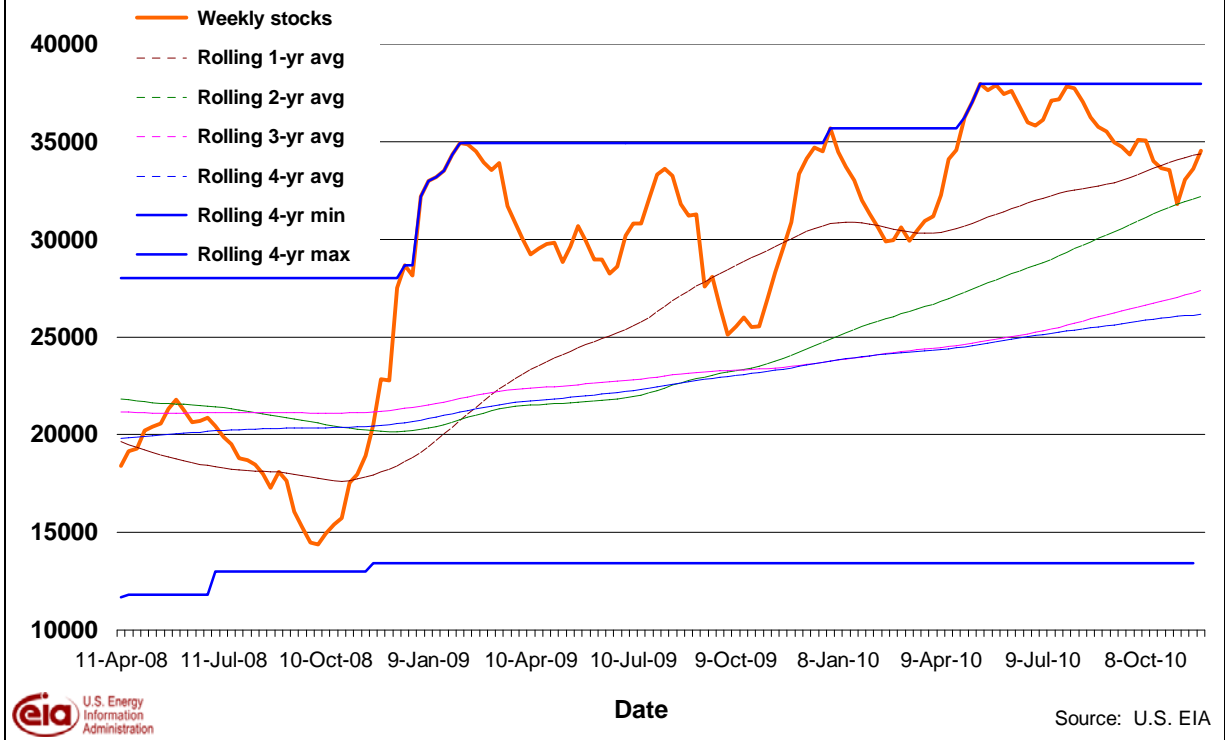


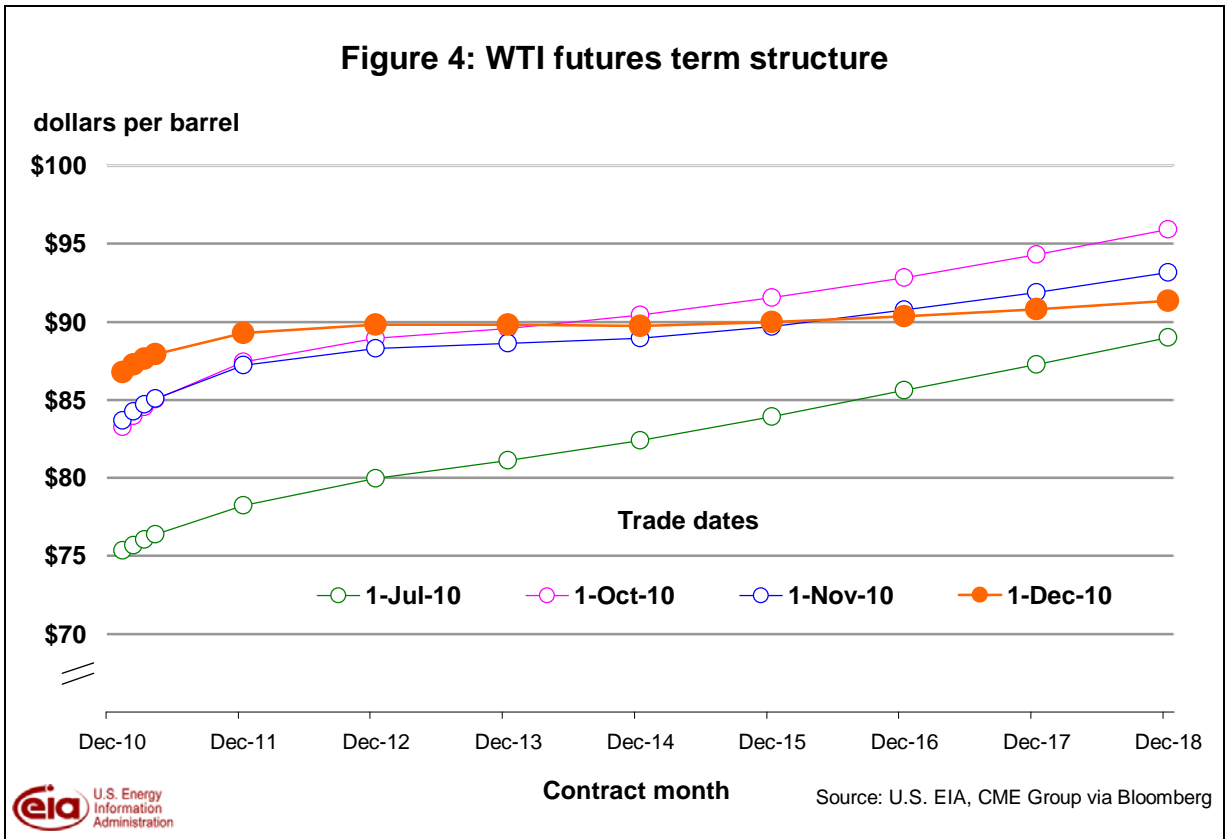
Intermonth price spreads in WTI futures (Figure 2) were supported by a continuation of a drawdown in Cushing, OK, crude oil stocks during November, a trend that began just prior to mid-year (Figure 3). The NYMEX WTI futures contract delivers at Cushing, which is why market participants closely follow crude-oil storage levels and intermonth price spreads there. The WTI forward price curve flattened by the beginning of December, with the front rallying and the deferred contracts largely holding steady (Figure 4).

**Figure 2: WTI prompt time-spreads**

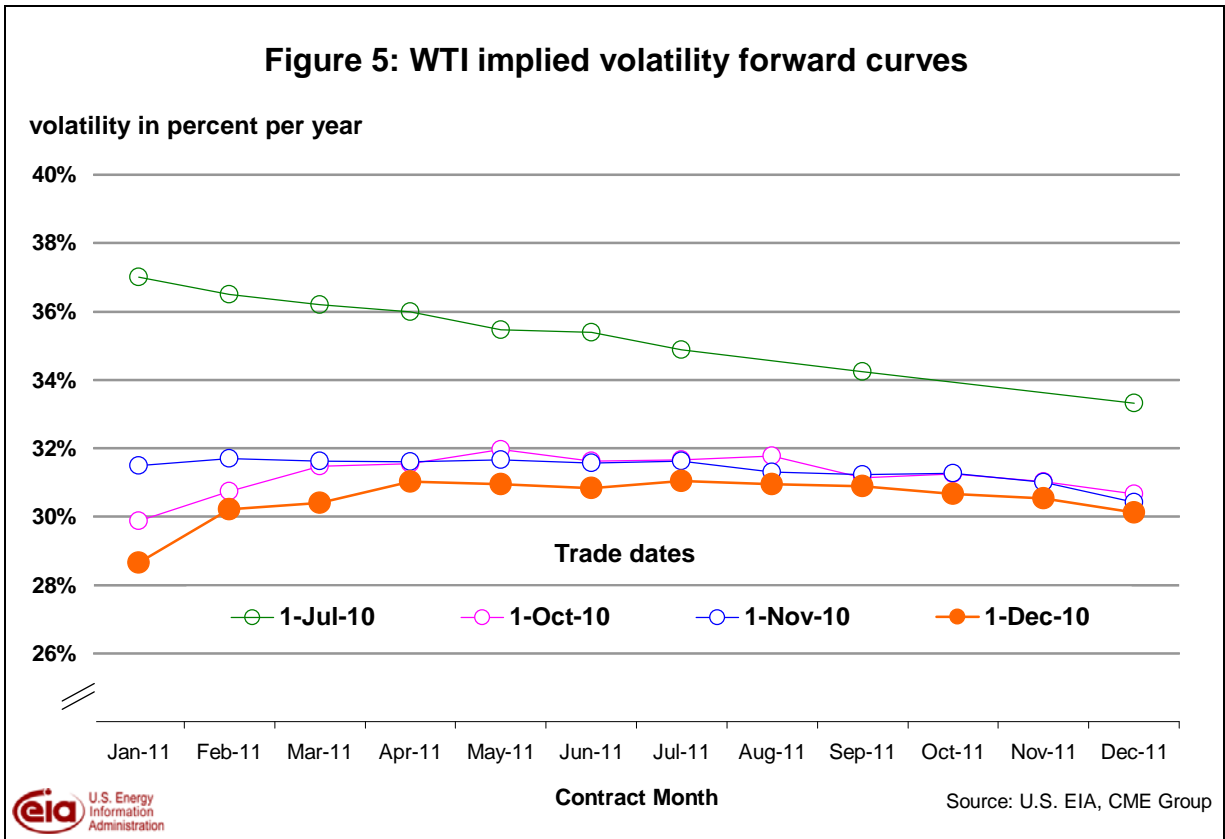


**Figure 3: Cushing, OK, crude oil stocks**

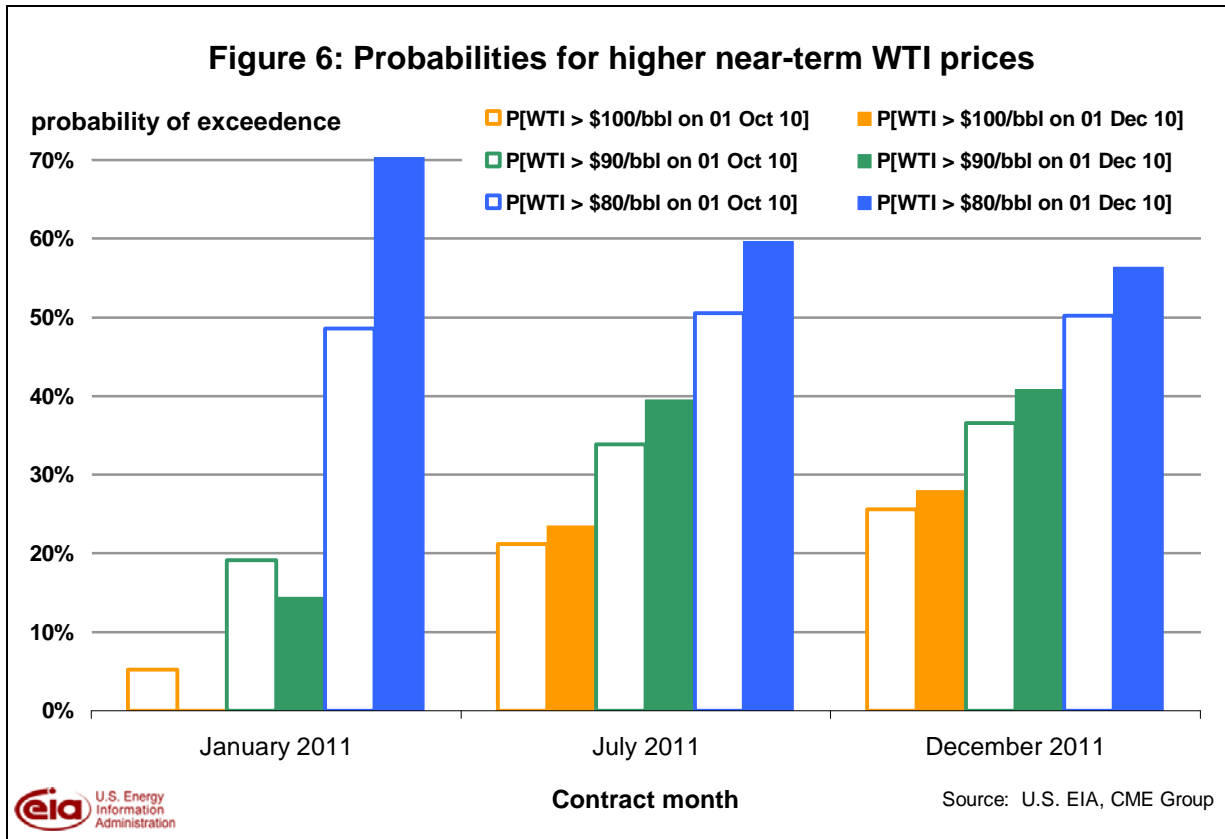




The implied volatility forward curve once again moved lower in the front of the curve, and was unchanged to lower toward the end of 2011 (Figure 5).



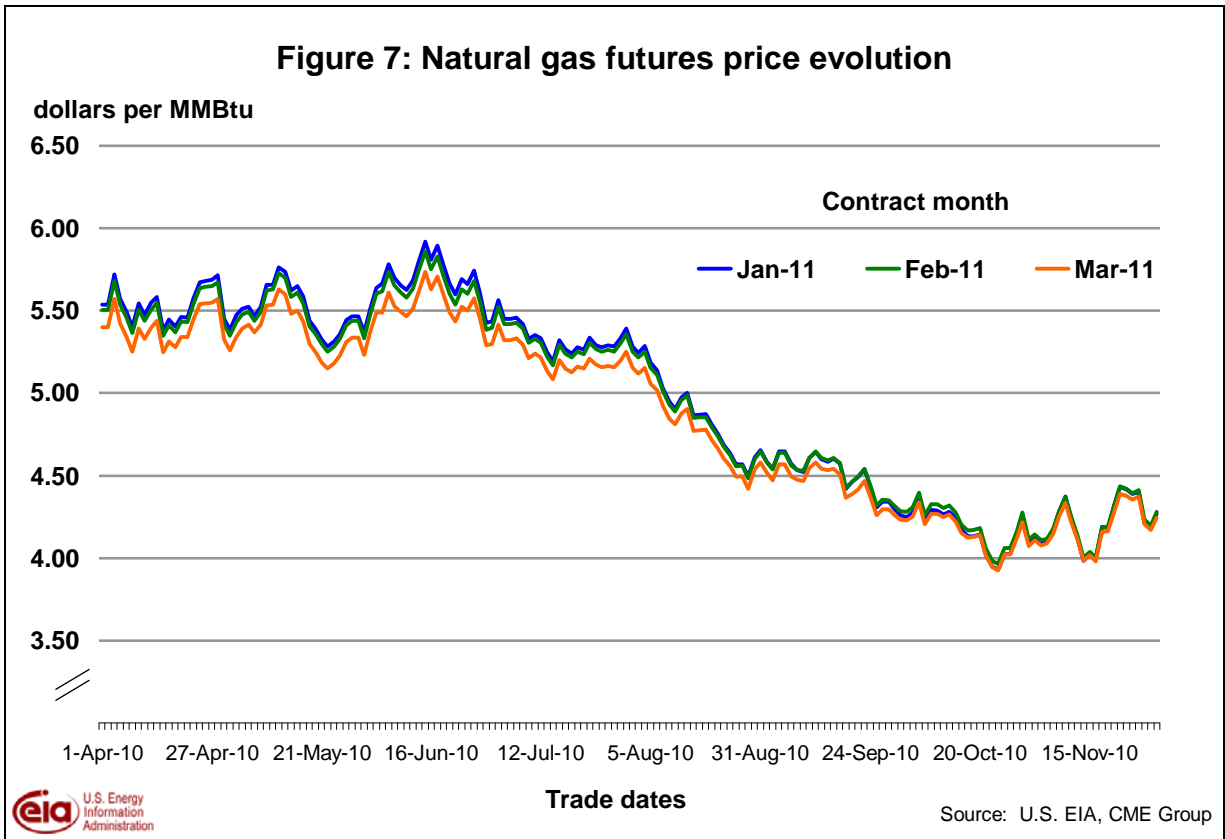
With WTI prices higher and volatility lower, EIA's probability assessments for higher prices in 2011 moved up slightly (Figure 6) from levels expected at the beginning of 2010's fourth quarter. The market is pricing slightly less than a 1-in-4 chance (23 percent) NYMEX WTI futures prices will exceed \$100 per barrel in July 2011; the likelihood prices will exceed \$100 per barrel in December 2011 increased 2 percentage points to just below 28 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.)



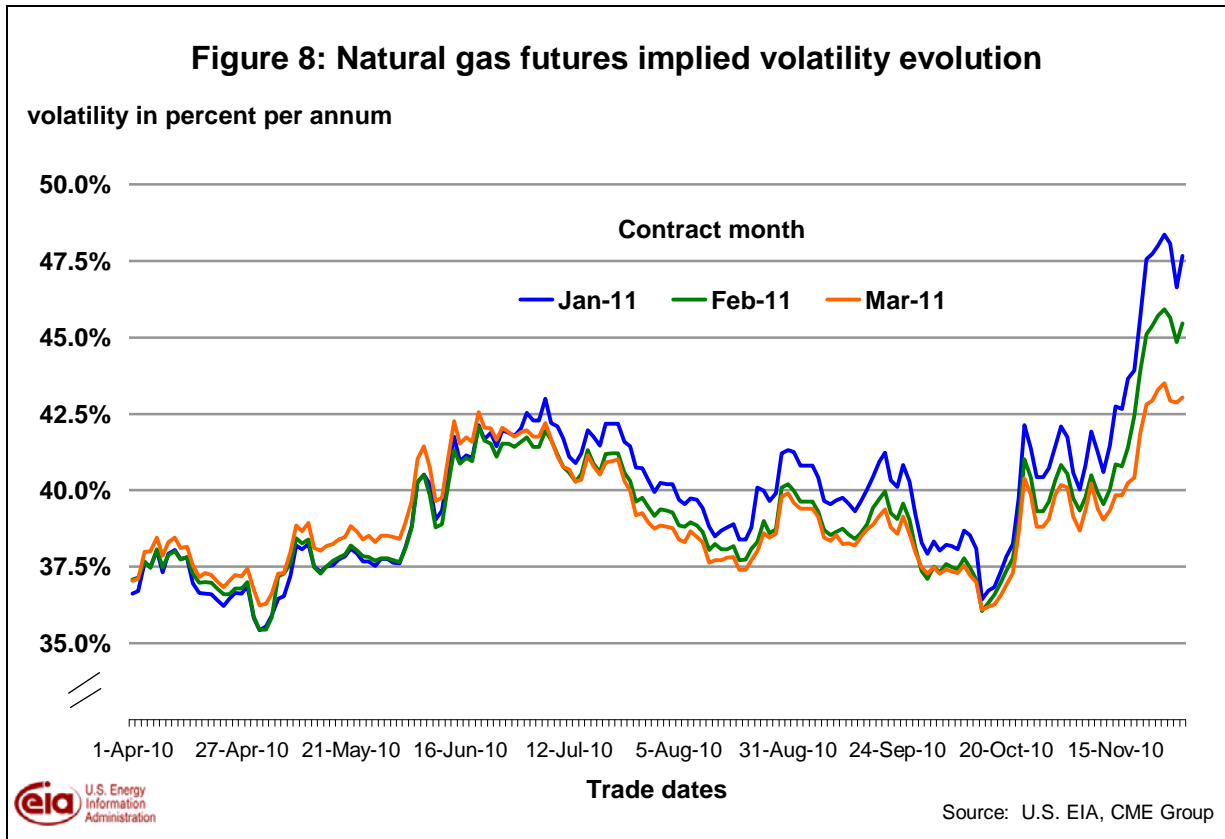
**U.S. Natural Gas Prices.** The Henry Hub spot price averaged \$3.71 per million Btu (MMBtu) during November, an increase of about 28 cents from October's price of \$3.43 per MMBtu. Over the winter heating season, the projected monthly average spot price peaks at \$4.29 per MMBtu in January 2011, before dropping back down to close to \$4.00 per MMBtu in June 2011.

Uncertainty over future natural gas prices is slightly lower this year compared with last year at this time. Natural gas futures for February 2011 delivery (for the 5-day period ending December 2) averaged \$4.29 per MMBtu, and the average implied volatility over the same period was 45 percent. This produced lower and upper bounds for the 95-percent confidence interval for February 2011 contracts of \$3.06 per MMBtu and \$6.03 per MMBtu, respectively. At this time last year, the natural gas February 2010 futures contract averaged \$4.84 per MMBtu and implied volatility averaged 57 percent. The corresponding lower and upper limits of the 95-percent confidence interval were \$3.20 per MMBtu and \$7.34 per MMBtu

Natural gas futures prices traded in a fairly narrow range during November, as the withdrawal season began in earnest (Figure 7).



Implied volatility nonetheless moved higher as inventory withdrawals began. February 2011 implied volatilities jumped approximately 6 percentage points during November (Figure 8), as market participants calibrated expected changes in supply and demand with changes in weather expectations.



EIA’s current assessment that prices would exceed specified threshold values during the first quarter of 2011 have declined slightly over the past month (Figure 9). By the end of November, natural gas market participants gave a less than 1-in-5 chance to Henry Hub prices exceeding \$5 per MMBtu each month during the first quarter of 2011. 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).



**Figure 9: Probabilities for higher NYMEX Henry Hub prices**

