Independent Statistics & Analysis
U.S. Energy Information Administration

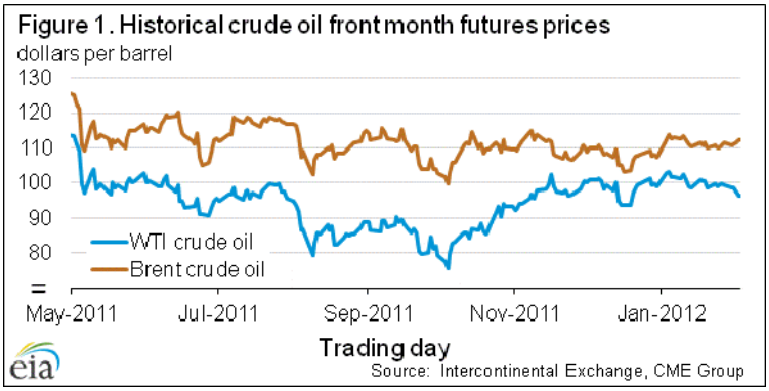
February 2012

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

February 7, 2012 Release

Crude Oil

Prices: On February 2, Brent settled at $112.07 per barrel, unchanged from its closing price on January 3, and West Texas Intermediate (WTI) settled at $96.36 per barrel, a decrease of $6.30 per barrel over the same time period. Both Brent and WTI traded in narrow ranges of $4 and $7 per barrel, respectively, over the past month, continuing the trend of crude oil price stability seen since November 2011 **(Figure 1)**. As a percentage of the average price, the trading range for Brent in January was the smallest in over 10 years.



There have been several developments related to the crude oil market over the last month but none have provided new direction to prices. A dispute over oil transportation and transfer fees between South Sudan and its northern neighbor, Sudan, have resulted in reports that South Sudan has shut in its production of about 350,000 barrels per day. Additionally, the European Union agreed last week to impose a ban of all oil imports from Iran into its member countries beginning in July of this year, which could lead to a reallocation of global crude oil flows. Lastly, negotiations for a voluntary write-down of Greek debt are continuing between the government and its bondholders, a reminder of continuing financial challenges impacting economies within the Euro zone, which still have the potential to affect near-term economic growth prospects and demand for petroleum products.

[1] This is a regular monthly companion to the EIA *Short-Term Energy Outlook*. (http://www.eia.doe.gov/emeu/steo/pub/contents.html)
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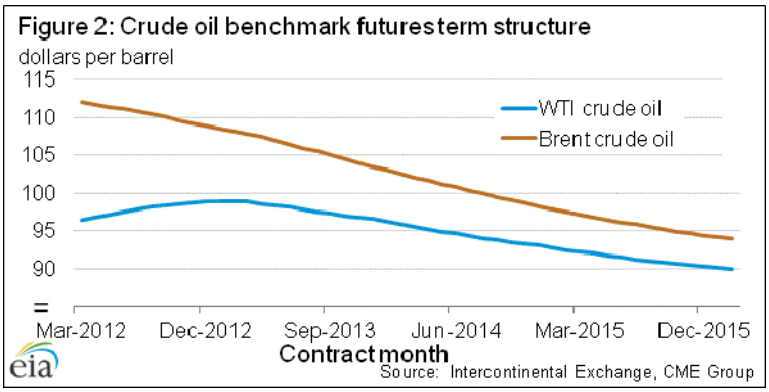
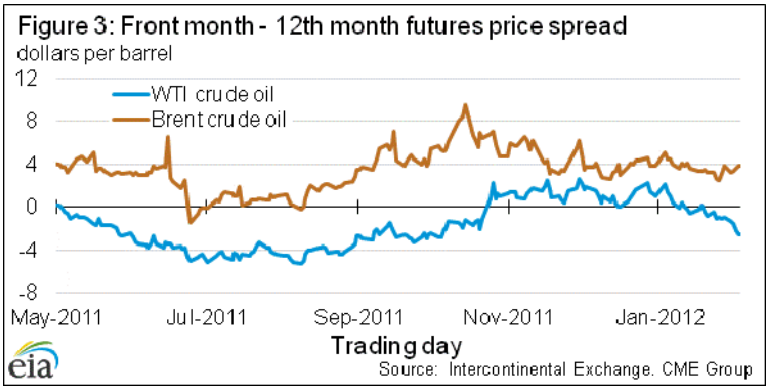
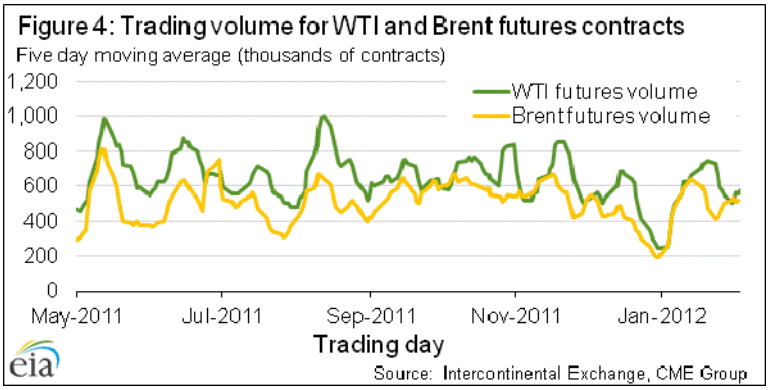
The current Brent – WTI spread is about $15 for futures contracts that expire in March 2012. The spread between these two benchmarks narrows further out in time, reaching $10 per barrel for delivery of crude oil in December 2012 and only $4 per barrel in December 2015 **(Figure 2)**.



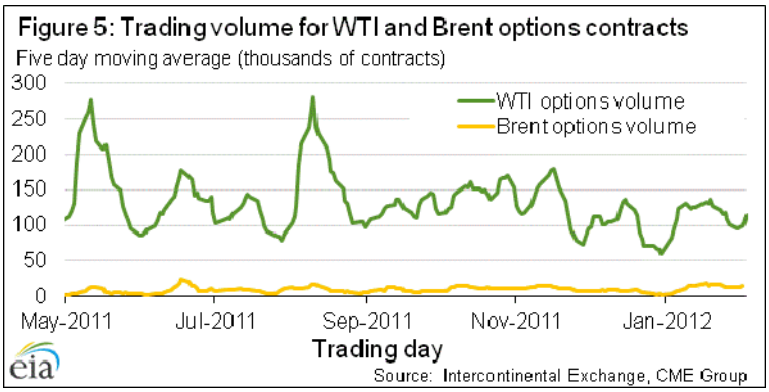
The difference between the price of the front month and 12th month futures contracts is one way to measure current market tightness relative to expectations for the coming year. The WTI time spread fell below zero, indicating a market in contango, for the first time since October 2011 **(Figure 3)**. Meanwhile, even though the 1st – 12th month spread for Brent has moved down by almost $2 per barrel in January, it remains in backwardation, signaling a relative current tightness in the world waterborne crude market. The Brent curve has been in backwardation since summer of 2011 when it very briefly went into contango following a coordinated release of strategic petroleum stocks.



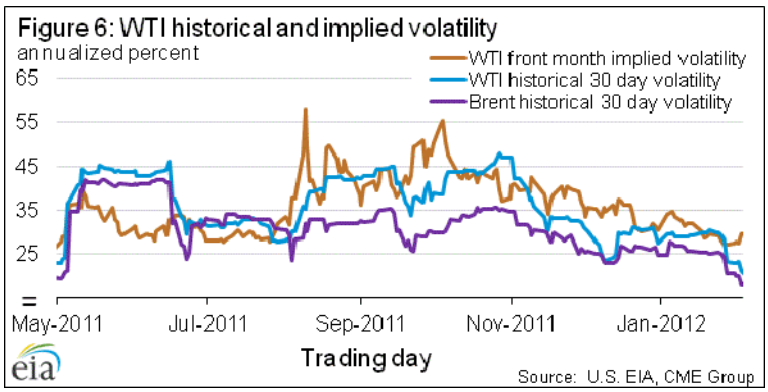
Volume: The ICE Brent market provides a place for hedgers and speculators to shed or take on risk associated with the price of world waterborne crude. An average of 514 thousand Brent futures contracts per day were traded on the Intercontinental Exchange (ICE) in the month of January, only 18 percent below the average daily volume of 627 thousand contracts for WTI on the New York Mercantile Exchange (NYMEX). These volumes are up from December when holidays can depress the number of contracts traded on exchanges **(Figure 4)**. The Dubai Mercantile Exchange (DME) also has a crude oil futures contract based on oil produced in Dubai but the volume on this contract has not approached that of either Brent or WTI.



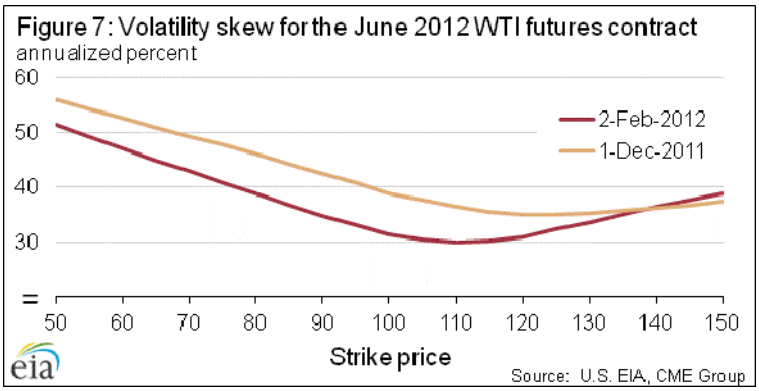
Unlike Brent futures, the market for call and put options traded on Brent contracts on the ICE has not come close to the market volume of its WTI option counterpart. The average volume for all puts and calls traded on WTI futures contracts averaged a robust 118 thousand contracts per day in January; however, the volume for Brent options on the ICE averaged just 14 thousand contracts per day **(Figure 5)**. The lack of liquidity in this market means that there are higher trading costs and reduced clarity in price discovery. It is for this reason that we focus our implied volatility analysis on the WTI market as implied volatility is derived from the prices of options traded on futures contracts.



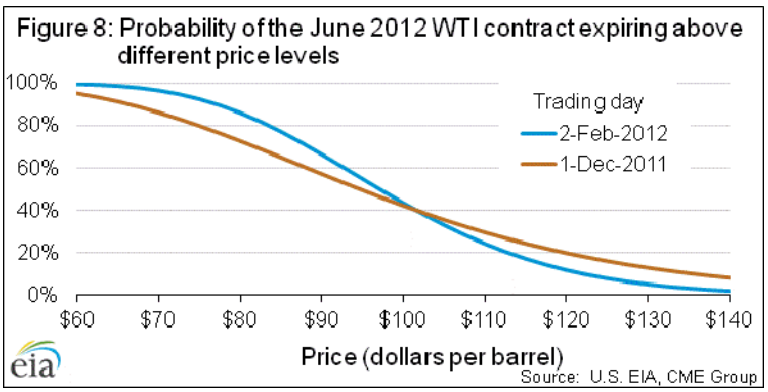
Volatility: Historical realized volatility and implied volatility for the front month WTI futures contract ended the month of January at their lowest points since the second quarter of 2011. Implied volatility was 29 percent as of the market close on February 2, a drop of 5 percentage points since January **(Figure 6)**. Historical volatility, which is calculated from daily price movements over the previous 30 trading days, closed at 20 percent on February 2.



The implied volatility that is most often quoted is based on the price of options that are near-the-money but it can also be calculated for individual options contracts with strike prices both higher and lower than the current futures price. The volatility skew is constructed by graphing the implied volatility of WTI options contracts against their strike prices. Over the last two months, the implied volatility for most options traded on the June 2012 WTI futures contract has decreased, with the largest being 7 percentage points for the $105 call option **(Figure 7)**. The only exception is for out-of-the-money call options as they have shown much smaller decreases, or even increases, in implied volatility. The change in shape of the volatility skew shows that the risks associated with an upward price movement in crude oil prices have not abated over the last two months as has been seen with risks for potential downward movements.

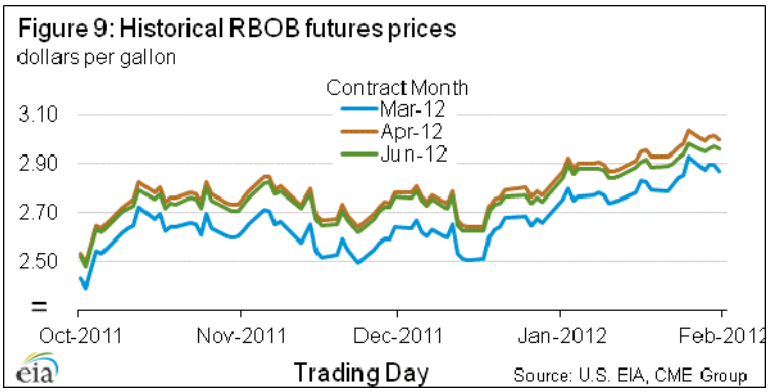


Market Derived Probabilities: The price of WTI crude oil for June delivery has decreased by $3 per barrel since December 1 and the implied volatility for that futures contract has decreased by 7 percentage points. Combined with a shorter time to expiration, the result is a lowered market expectation for the June contract to expire at higher prices. The probability of the June 2012 futures contract expiring above $120 per barrel is now 12 percent, an 8 percentage point decrease from December 1 (**Figure 8**). It should be noted that these probabilities do not reflect the future price distribution of world waterborne crude oil. 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 on how these probabilities are derived.)

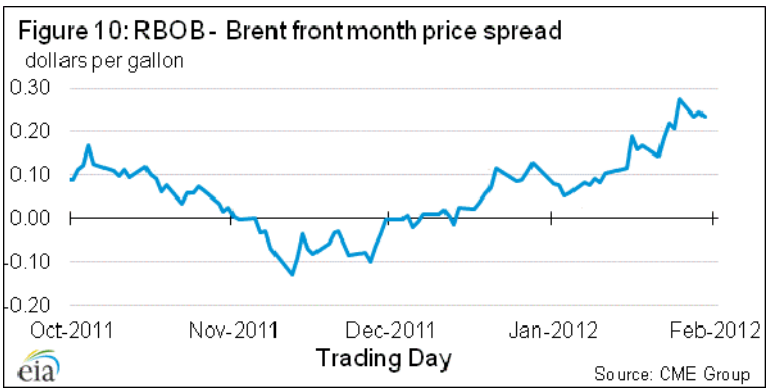


Gasoline

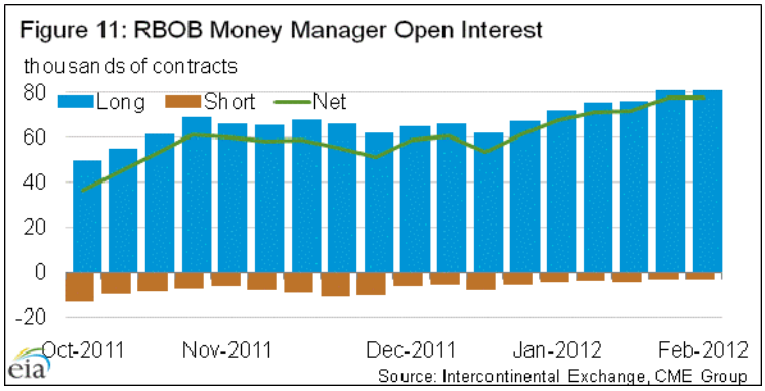
Prices: New York Harbor Reformulated Blendstock for Oxygenate Blending (RBOB) prices increased over the month of January, with the average prompt month price from January 1 through February 2 up $0.20 per gallon from the December average **(Figure 9)**. Looking further out on the curve, gasoline prices for delivery in April and June are consistently higher than for gasoline for March delivery. This pattern follows the usual trend of prices for summer RBOB contracts being higher than winter contracts due to seasonal differences in fuel formulations and the level of gasoline demand.



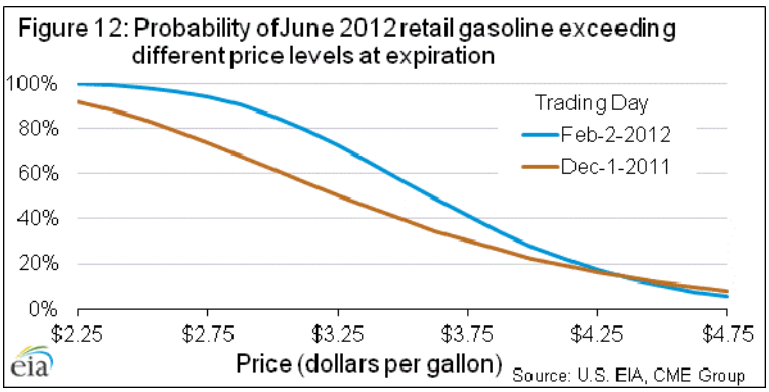
Brent crude prices increased from December to January, averaging $111.50 from January 1 through February 2, up from an average of $107.72 in December. The gasoline crack spread (the gasoline prompt month price minus the crude benchmark prompt month price) continued to increase in January after being near or below zero for much of November and December **(Figure 10**). The average crack spread for January was $0.15 per gallon, up from $0.03 in December. The 4-week average U.S. finished gasoline product supplied (a measure of consumption) is 9 percent below the December 2011 average and at its lowest level since September 2001. Gasoline inventories built steadily over the month of January and are now at an 11-month high: this inventory build may have contributed to the decrease in the crack spread seen towards the end of January.



Money Manager Positions: Money managers increased their net positions of RBOB futures to almost 80,000 contracts in the last week of January. Both net positions and long positions were at record highs (**Figure 11**). This indicates increased interest by money managers in insuring against or profiting from rising gasoline prices. Recent announcements of decisions to idle several refineries serving the Atlantic basin (three on the U.S. East Coast and two in the Caribbean) could be affecting expectations for the market.

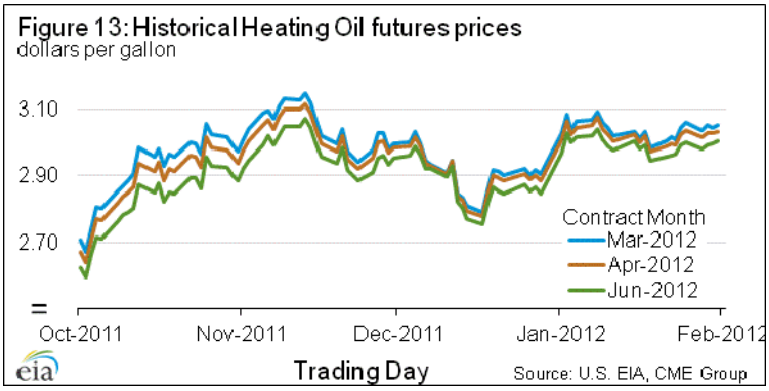


Market Derived Probabilities: The June 2012 RBOB futures contract price closed at $2.96 on February 2 and has a probability of exceeding $2.80 per gallon ($3.50 retail) at expiration of approximately 59 percent. The same contract as of December 1 had a probability of exceeding $2.80 ($3.50 retail) of 38 percent. These probability increases reflect a combination of higher prices, relatively unchanged implied volatility and less time to expiration (**Figure 12**).

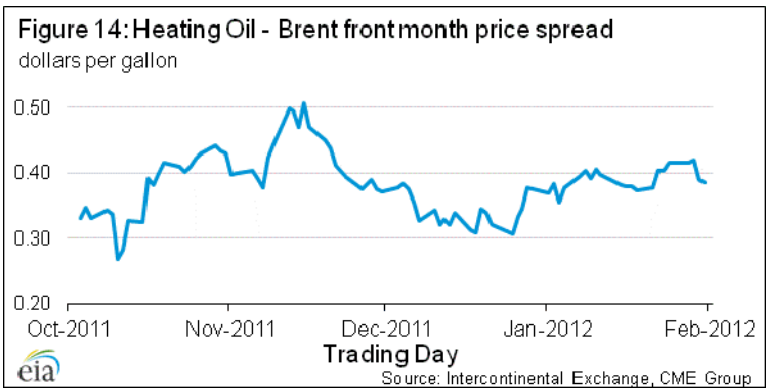


Heating Oil

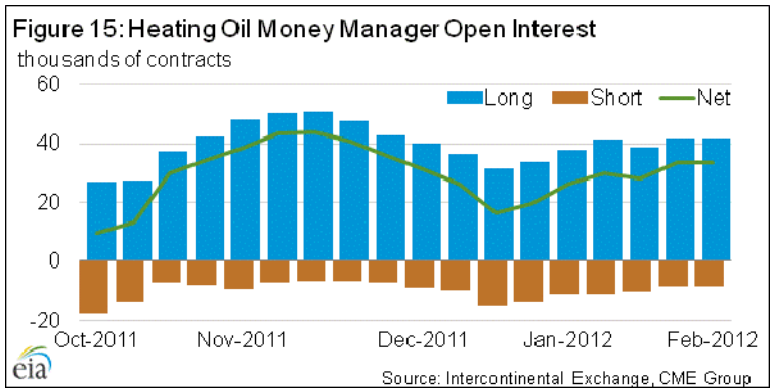
Prices: Heating oil prices increased in the beginning of January and stabilized over the remainder of the month, with prompt month contracts settling higher than contracts further out on the curve. The average prompt month price for January 1 through February 2 was $3.05, up from $2.91 in December (**Figure 13**).



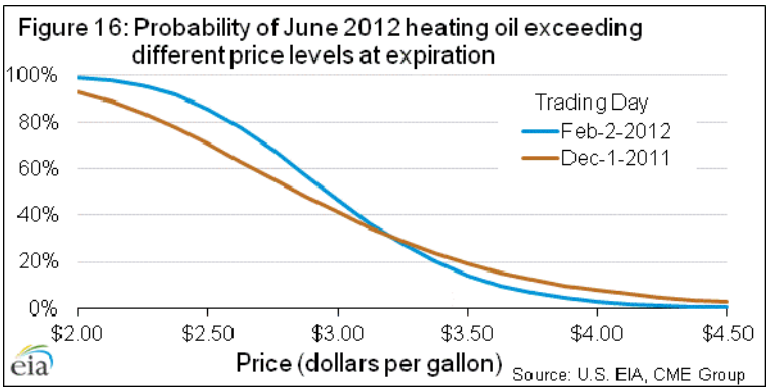
The 4-week average of heating oil and diesel fuel supplied to U.S. markets was down 15 percent at the end of January from the end of October and down 5 percent from the same time period last year, as a warmer-than-normal winter lowered consumption. Despite this decrease in U.S. apparent consumption, strong global distillate demand helped to keep the heating oil crack spread (prompt heating oil minus prompt Brent) at $.39 in January, up $0.05 from December (**Figure 14**).



Money Manager Positions: Money managers increased their net positions of heating oil futures to almost 33,000 contracts in the last week of January (**Figure 15**). This increase in open interest is a reversal from the decreases seen over the month of December.

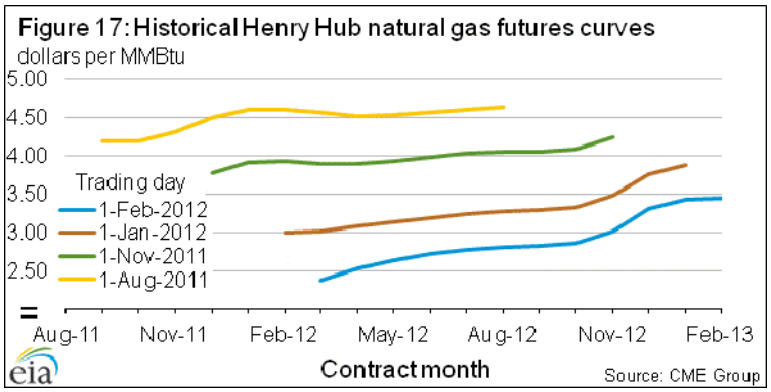


Market Derived Probabilities: The June 2012 heating oil futures contract price settled at $3.05 on February 2 and has a probability of exceeding $3.50 per gallon at expiration of approximately 14 percent. The same contract as of December 1 had a probability of exceeding $3.50 per gallon of 19 percent; this decrease reflects lower implied volatility and less time to expiration for the futures contract (**Figure 16**).

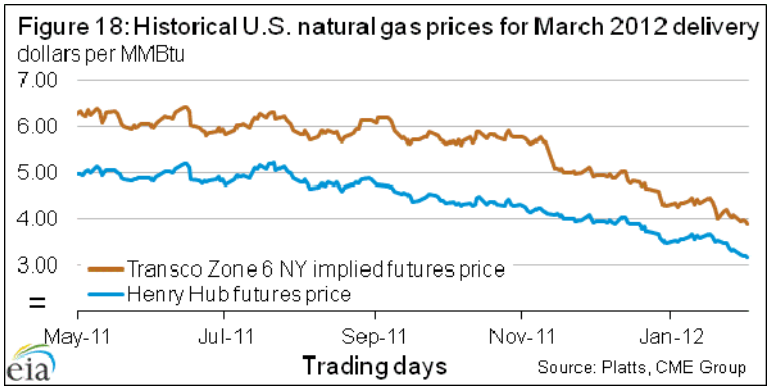


Natural Gas

Prices: The front month Henry Hub natural gas futures contract settled at $2.32 per MMBtu on January 19. Adjusted for inflation, this is the lowest closing price since January 2002, an event that is explored in more detail in a recent *Today in Energy* article. Natural gas futures prices have moved slightly higher off their mid-January lows over the last two weeks and settled at $2.38 per MMBtu on February 1 **(Figure 17)**.

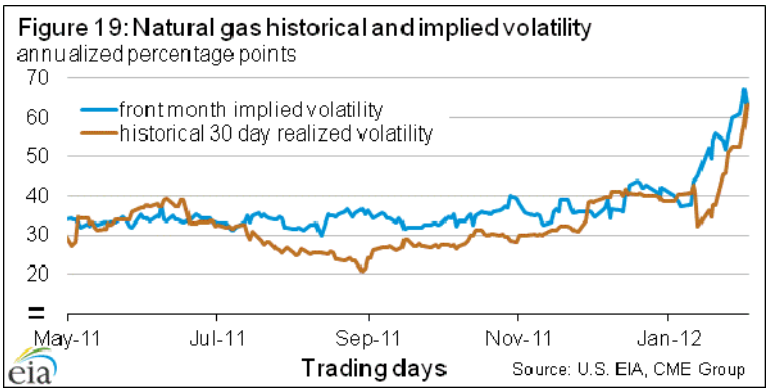


One of the factors contributing to recent downward movements in natural gas prices has been unusually warm weather throughout much of the United States, which has the effect of depressing natural gas demand for space heating. The National Oceanic and Atmospheric Administration in their *January Climate Forecast* expects temperatures to be average or above average for the rest of the winter heating season in the majority of the United States. Warmer weather in the future could potentially ease some constraints on natural gas flows into the New York area as less of the commodity will be needed, contributing to the reduction in the spread between the March Henry Hub futures price and the March Transco Zone 6 NY implied futures price, which is derived by adding the traded value of Transco Zone 6 NY basis swap to the Henry Hub futures price **(Figure 18)**.



Volatility: In the month of January, both historical and implied volatility for the NYMEX front month natural gas contract moved substantially higher. Historical volatility is now 25 percentage points higher compared to January 3 as there were seven single day movements where the price closed up or down by more than 5 percent in the previous month. On February

2, implied volatility for the natural gas contract nearest to expiration settled at 63 percent, an increase of 23 percentage points since the beginning of January **(Figure 19)**. The recent increase in volatility comes from the uncertainty surrounding the abundant supply of natural gas in the U.S. over next few months as the heating season comes to an end. Low prices and issues surrounding obligations to manage underground storage by withdrawing agreed volumes of natural gas are creating elevated volatility.



Market Derived Probabilities: The price for the June 2012 natural gas futures contract has fallen by $0.88 per MMBtu since December 1. Even though there was an increase of 11 percentage points in implied volatility for that contract, the price decrease had a much larger effect on lowering the probability of expiring above different price levels. The probability that the June contract will settle higher than $4.00 per MMBtu fell by 27 percentage points from 34 to 7 percent when compared to market conditions on December 1 **(Figure 20)**. 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).