



Short-Term Energy Outlook Supplement: Brent Crude Oil Spot Price Forecast

Since the mid-1980s, benchmark crude oil prices such as West Texas Intermediate (WTI) in the United States and Brent crude oil in Europe have served as reference points that the market uses for pricing other crude oils. The historically close relationships between the major benchmarks made WTI prices a reliable indicator of the average cost of crude oil to U.S. refiners, referred to as the refiner acquisition cost (RAC) of crude oil. As crude oil is the primary feedstock and cost component of refined petroleum products, RAC prices had been used to forecast refined product prices such as motor gasoline and distillate fuels in the U.S. Energy Information Administration's (EIA) *Short-Term Energy Outlook (STEO)*.

In late 2010, WTI began to sell at a large discount to Brent, as rapidly increasing production in the midcontinental United States and Canada had limited access to markets due to pipeline constraints. As a result, WTI has become less useful as a predictor of U.S. petroleum product prices. Beginning with the July 2012 *STEO*, EIA will supplement its traditional WTI and RAC forecasts with a forecast of the Brent crude oil spot price that will directly enter into price forecasts for gasoline and other refined products in the *STEO*.

Recent Crude Oil Price Trends

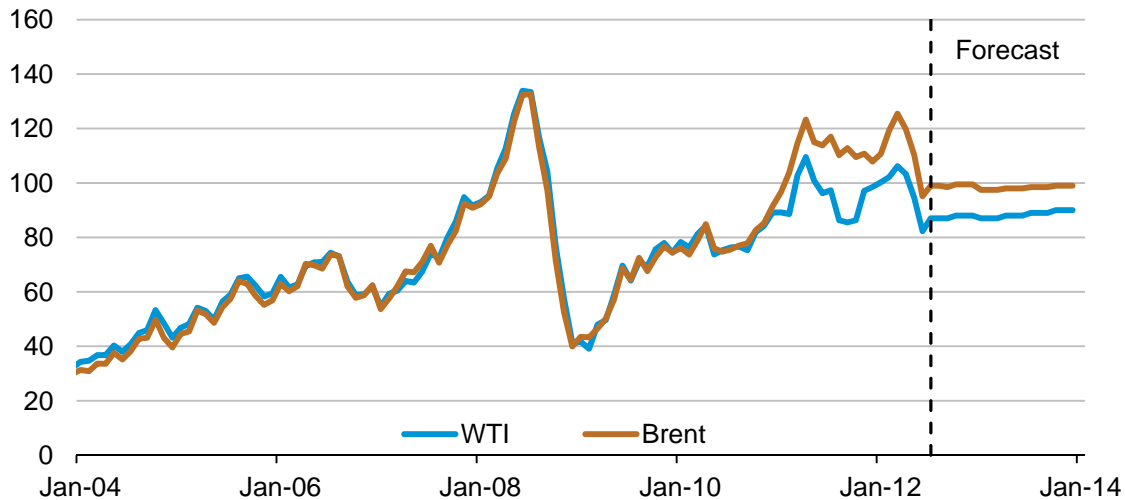
WTI crude oil, a light, sweet crude grade, is North America's most closely observed crude oil price benchmark and the commodity underlying the NYMEX light sweet crude oil futures contract. Until 2008, all North American crude oil grades broadly tracked fluctuations in the WTI price and were clustered within about \$8 per barrel of the WTI spot price ([Today in Energy](#), June 21, 2012). Pricing differences between crude oil grades were explained largely by the different quality characteristics of the crude oil in each location and relative transportation costs.

The divergence between WTI and other world crude oil prices over the last two years has made WTI a less reliable indicator of U.S. average refiner crude oil costs and petroleum product prices. Looking at data dating back to January 2004, WTI consistently sold at about a \$1 to \$3 premium to Brent crude oil as the two crude oil prices closely tracked each other until late 2010 (Figure 1). After 2010, WTI began to sell at a discount to Brent due to a strong increase in midcontinental production that surpassed the capacity of pipelines to deliver the crude oil to U.S. refining centers. The WTI discount to Brent continued to widen in 2011, reaching a monthly

average high of about \$27 per barrel in September 2011, before falling back to around \$16 per barrel in May 2012.

Figure 1: WTI and Brent Crude Oil Prices

dollars per barrel



Source: Energy information Administration, *Short-Term Energy Outlook*, July 2012

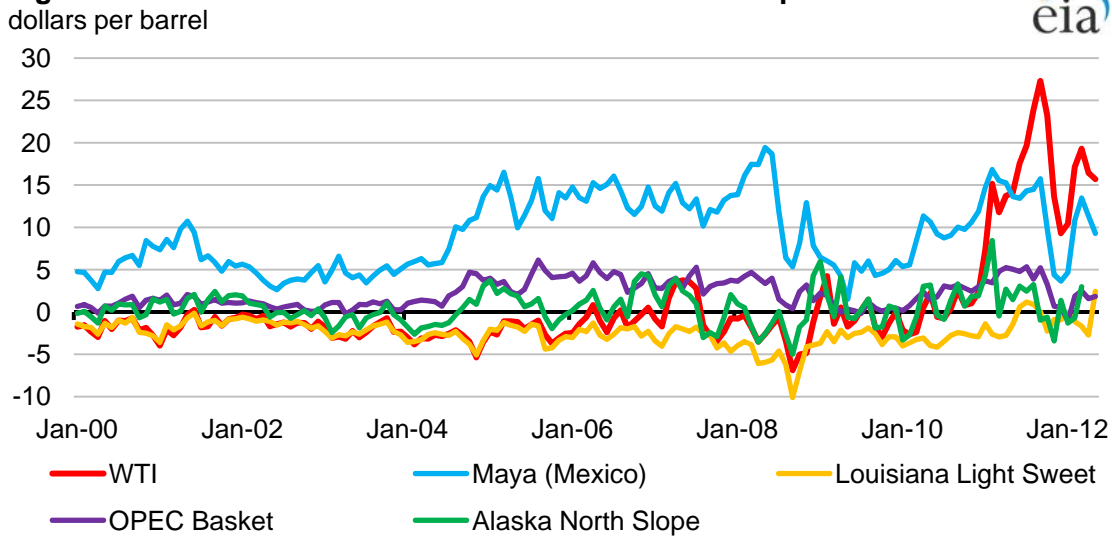
Rapid increases in crude oil production from tight oil formations ([This Week In Petroleum](#), March 14, 2012), primarily from the Bakken formation in North Dakota and the Eagle Ford shale in Texas, led to transportation bottlenecks of WTI crude oil in and around the Cushing, Oklahoma storage hub ([This Week In Petroleum](#), May 16, 2012). Total production volumes from the Williston, Western Gulf, and Permian Basins, which include the Bakken and Eagle Ford, increased by a total of about 300,000 barrels per day (bbl/d) in 2010 and 500,000 bbl/d in 2011. Production increased more rapidly than the existing pipeline infrastructure could accommodate, thereby contributing to WTI price discounts relative to waterborne crude oils such as Brent ([This Week In Petroleum](#), November 30, 2011). With limited pipeline capacity, additional crude oil volumes have been moved out of the region by truck and rail. The \$6 to \$12 per barrel cost of transportation by truck and rail has been cited by some analysts as a floor for the WTI-Brent spread.

Because of transportation constraints in the U.S. mid-continent, new pipeline takeaway capacity has been constructed and more is planned. In May 2012, the Seaway pipeline, which had transported crude oil from the Gulf Coast region to the storage hub at Cushing, was reversed with an initial capacity of 150,000 bbl/d and plans to reach 400,000 bbl/d in late 2012. In June 2012, Sunoco announced plans for a pipeline reversal that would transport Permian Basin crude oil to Gulf Coast refineries with a capacity of 150,000 bbl/d by the second half of 2013. There are several other capacity additions that are expected to come online through 2013, but the majority of these are either rail projects or pipeline expansions focused on the Midwest. As a result, while new capacity is being added to handle forecasted growth in midcontinent crude oil

production, it is assumed much of this crude oil will still be shipped to refineries outside of the Midwest by rail, implying that the WTI discount will likely persist to at least the end of 2013.

Figure 2 shows that spreads between Brent and other crude oil benchmarks have been relatively consistent over time, a marked contrast to the major divergence between Brent and WTI. Similar to Brent, other high quality crude oils such as Louisiana Light Sweet are the marginal source of crude oil for many refiners, and their prices consequently drive the wholesale and retail price of gasoline and other petroleum products in most U.S. and global markets. In contrast, the disconnect between the prices of WTI and waterborne crudes since late 2010 has significantly weakened the link between WTI prices and product prices over the last two years.

Figure 2. Brent Crude Oil - Reference Crude Oil Price Spreads



Price spread = Brent crude oil spot price - reference crude oil spot price

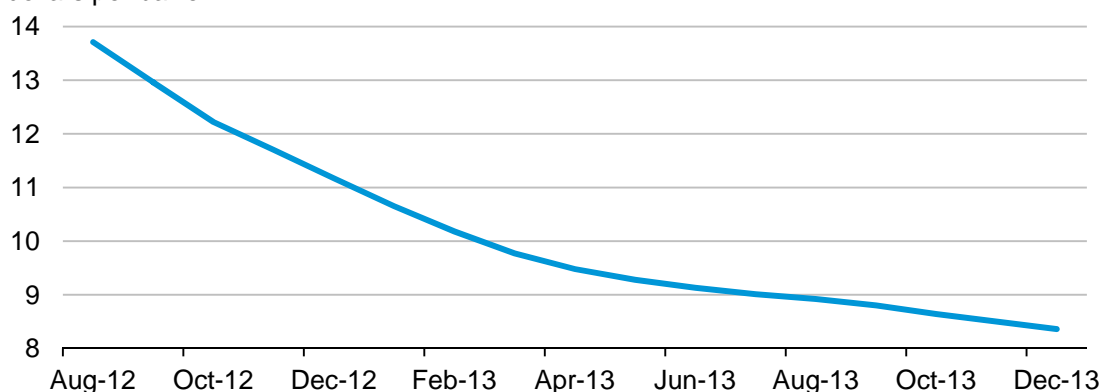
Source: Bloomberg, LP.

As of July 6, 2012, futures market prices through 2013 show the Brent-WTI spread declining from around \$14 per barrel for the August 2012 contract to approximately \$8 per barrel for the December 2013 contract, falling within the range of estimated rail transportation costs out of the U.S. midcontinent to refineries in other regions (Figure 3). The narrowing futures spread highlights the market's future expectations of improved WTI availability outside of the midcontinent, as the spread falls for contracts next year when more pipeline capacity is expected to be available and supply and demand imbalances are reduced. However, the large and persistent WTI price discount to Brent and other world crude oils suggests that WTI has become an increasingly region-specific crude oil benchmark, and one that does not accurately represent the marginal cost of crude oil paid by most U.S. refiners.

Figure 3. Brent Crude Oil Futures - WTI Crude Oil Futures Price Spread



dollars per barrel



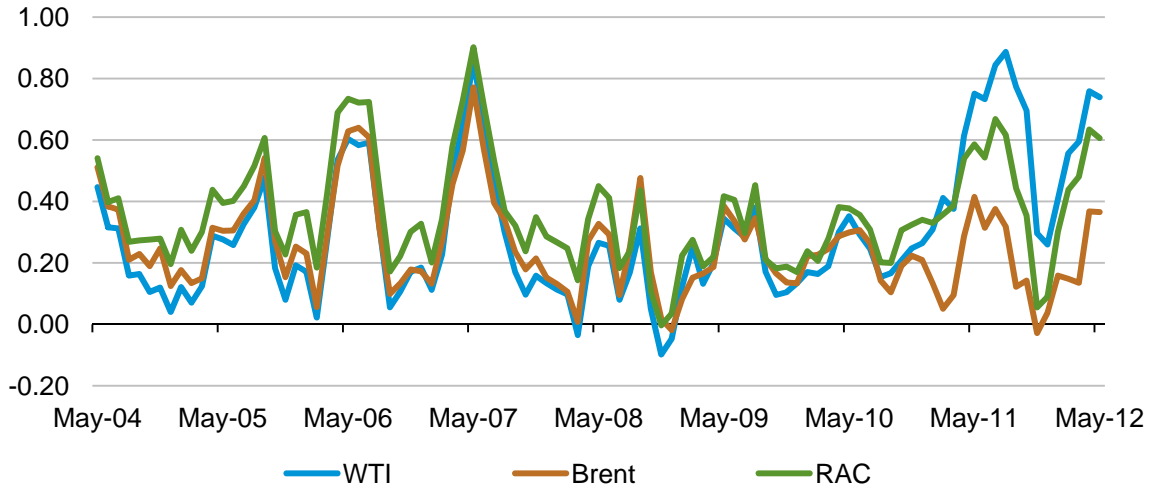
Price spread = Brent crude oil futures price - WTI crude oil futures price. Futures prices as of July 6, 2012. Sources: New York Mercantile Exchange light, sweet crude oil (WTI) and IntercontinentalExchange (Brent)

Crude Oil and Petroleum Product Prices

Comparison of New York Harbor (NYH) Reformulated Gasoline Blendstock for Oxygenate Blending (RBOB) spot prices -- which represent wholesale gasoline prices on the East Coast -- to Brent, WTI, and RAC crude oil prices illustrates the growing disconnect of gasoline prices from both WTI and RAC prices since late 2010 (see Figure 4). As the WTI discount to Brent and other world crude oils increased, wholesale gasoline prices did not fall in step, and price spreads between RBOB and WTI began to increase significantly. As a result of WTI price movements, the average RAC was driven downward, increasing the RBOB-RAC spread, while refiners on the East Coast continued to pay for marginal barrels of imported waterborne crude oil at prices best represented by Brent. In contrast, the RBOB-Brent price spread remained relatively consistent with historical norms.

Figure 4. NYH RBOB - Reference Crude Oil Price Spreads

dollars per gallon

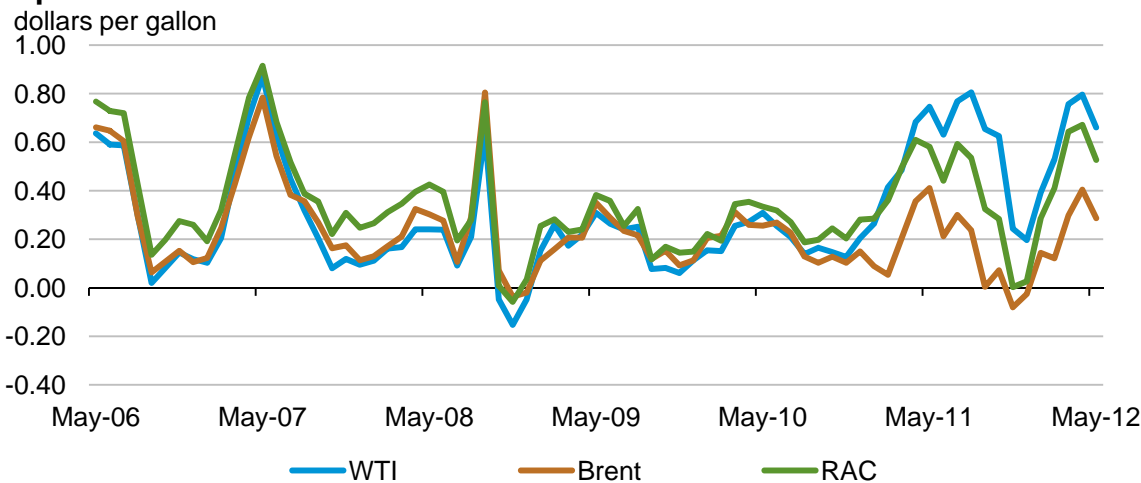


Price spread = New York Harbor RBOB spot price - reference crude oil spot price

Source: Bloomberg, LP.

The same was true for RBOB and crude oil spreads in the largest U.S. refining region, the Gulf Coast (see Figure 5). The spreads between Gulf Coast RBOB and the Brent, WTI, and RAC crude oil prices showed a consistent relationship until late 2010, but since then only the Brent spread continued to operate within the historic range. Since late 2010, Brent has become more representative of the marginal cost of crude oil for the majority of refiners. In the Rocky Mountain region and in the Midwest, discounted inland crudes are widely used by refiners. However, because Midwest product markets still rely on products produced outside of that region, product prices still reflect the price of waterborne crudes that are best represented by the Brent benchmark.

Figure 5. U.S. Gulf Coast RBOB - Reference Crude Oil Price Spreads

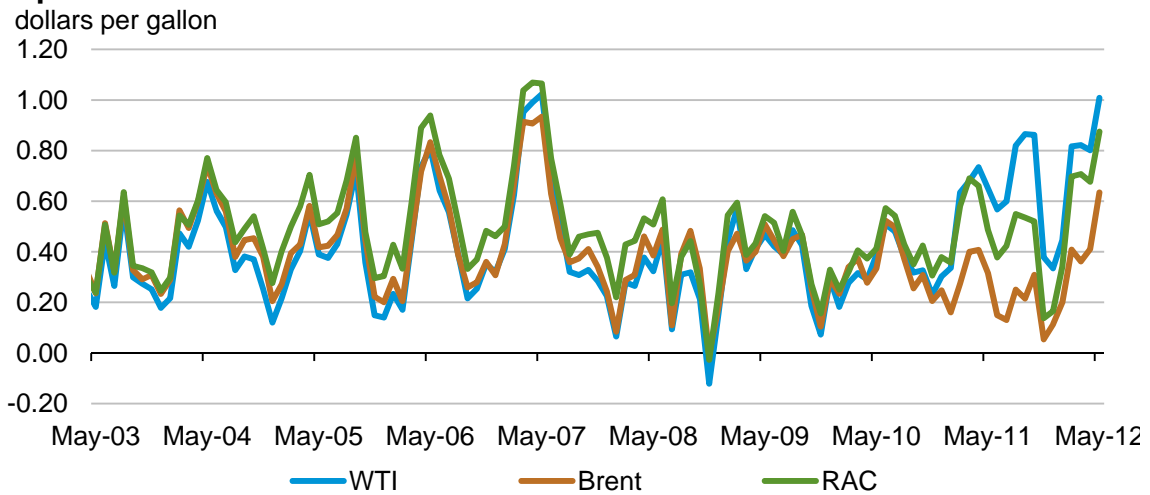


Price spread = U.S. Gulf Coast RBOB spot price - reference crude oil spot price

Source: Bloomberg, LP.

While the West Coast is somewhat detached from the majority of the U.S. refining market and uses a different crude oil mix, the gasoline-crude oil price spreads there have exhibited similar behavior as the other regions since late 2010 (Figure 6). The relationship between the price of CARBOB, or California RBOB (a more strictly regulated version of RBOB used in California) and WTI as well as RAC, has diverged from the CARBOB-Brent spread since late 2010. The CARBOB-Brent spread continued to operate within the historic range, but the CARBOB-WTI and CARBOB-RAC spreads moved higher. Unrelated to the cost of crude oil, West Coast refinery outage issues in 2012 caused gasoline prices to spike, which can be seen in the most recent monthly price spreads for all three crude oils ([This Week In Petroleum](#), May 23, 2012). Even on the West Coast, gasoline spreads based on Brent prices remained historically consistent, highlighting the disconnect of WTI and the influence of Brent on refiners' marginal cost of crude oil.

Figure 6. California RBOB - Reference Crude Oil Price Spreads



Price spread = California RBOB (CARBOB) spot price - reference crude oil spot price.

Source: Bloomberg, LP.

Conclusion

Beginning with the July 2012 *STEO* EIA will publish a forecast of the Brent crude oil spot prices in addition to its traditional WTI and RAC price forecasts. EIA expects the Brent crude oil spot price to be the price setter for the majority of refiners and refined product markets across the country. The inclusion of a Brent crude oil price forecast in the *STEO* will allow EIA projections to better reflect current market conditions and expectations over the *STEO* forecast horizon.