
Louisiana Sweet/Sour Crude Reversal Upsets Margins

Light crude more profitable to process.

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Data Sources for This Publication
U.S. Energy Information Administration
U.S. International Trade Commission
CME Group
To discover more about the data sources used, click [here](#).

Changing Refinery Economics

Louisiana Gulf Coast refineries have been navigating a changing crude marketplace since the start of 2017, when OPEC production cuts came into effect. These refineries usually process a diet of medium sour crude from offshore Gulf of Mexico production or Middle East imports. The cuts resulted in lower availability of Mideast supplies and pushed up prices relative to lighter sweet grades, narrowing the sweet/sour spread. The trend was exaggerated by the impact of Hurricane Harvey on imports and Gulf of Mexico production. A narrow sweet/sour crude spread changes refinery economics to make processing lighter sweet crudes more profitable than heavier sour grades—an unusual turn of events. The sweet/sour spread can be expected to widen again when OPEC cuts are lifted and to remain wide when new international bunker fuel regulations come into effect in 2020.

Sweet and Sour

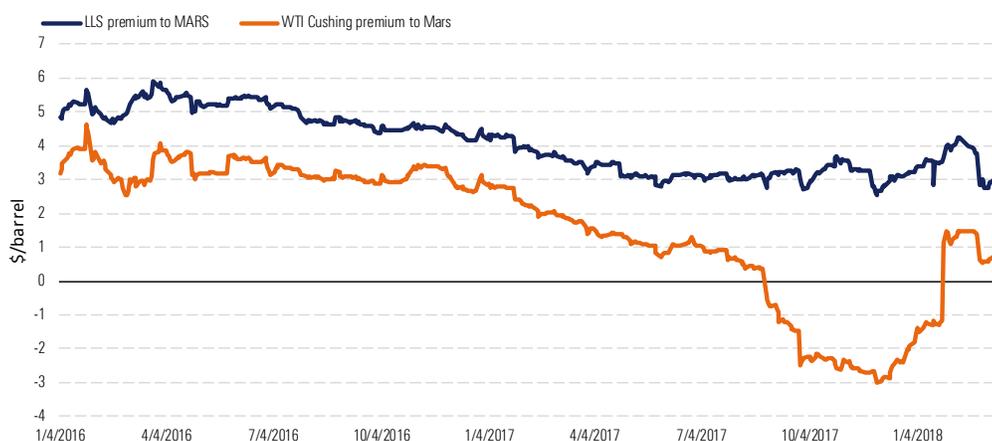
The sweet/sour spread on the Louisiana Gulf Coast is typified by the price relationship between two crudes: the light sweet benchmark Light Louisiana Sweet and the medium sour benchmark Mars blend. LLS is a mix of offshore and onshore domestic crudes with a typical API density of 38.5 and 0.39% sulfur content, delivered to the St. James, Louisiana, hub. LLS generally trades at a premium to the heavier and sourer Mars grade, which has a maximum API of 28 and a 1.93% sulfur content. Mars is produced offshore in the Gulf of Mexico Mississippi Canyon field and delivered to the Louisiana Offshore Oil Port terminal at Clovelly and a Chevron terminal at Port Fourchon, Louisiana. Between 2010 and 2015, LLS traded at an average \$4.54/barrel premium to Mars, according to CME Group data. The LLS premium to Mars averaged \$4.95/barrel in 2016 but narrowed to an average \$3.32/barrel in 2017, recovering to \$3.52/barrel between Jan. 1 and March 14, 2018 (Exhibit 1).

Gulf Coast Disruption

As we detailed in a note earlier this month (see "[Shale Holds Cards in OPEC's Houston Gambit](#)"), the OPEC/NOPEC agreement to curb oil production, which commenced in January 2017, was designed to revive oil prices from their 2015 slump by trimming excess inventories and balancing supply with demand. Group producers tended to favor lighter, more expensive crudes at the expense of heavier, less valuable grades when implementing the curbs. This resulted in a shortage of heavier sour crudes that boosted prices for these grades. In June 2017, cartel leader Saudi Arabia decided to reduce crude exports to the U.S. Gulf (see our July 2017 note "[Saudi June Export Cuts Penalize Gulf Refiners](#)") including medium sour grades typically processed by Louisiana refiners. That action increased demand and prices for Mars and other Gulf of Mexico sour crude grades. The disruption to Gulf Coast refinery and port infrastructure from Hurricane Harvey in late August 2017 and the September disruption to

offshore Gulf of Mexico production caused by Hurricane Irma further strained supplies of imported crudes and increased Mars prices relative to LLS. Harvey also led to a buildup of unprocessed crude in Texas that caused prices for international benchmark crude Brent to widen to a \$6/barrel premium over domestic benchmark West Texas Intermediate, delivered in Cushing, Oklahoma. The higher Brent premium pushed Gulf Coast crude prices higher relative to WTI, leading to Mars trading at an unprecedented \$2/barrel average premium to Cushing between late August 2017 and January 2018, reversing the normal sweet/sour relationship (orange line in Exhibit 1).

Exhibit 1 LLS Premium to Mars and WTI Cushing



Source: CME Group, Morningstar

Crack Spreads

With Mars more expensive, margins for processing this medium sour grade in Louisiana narrowed during 2017, making LLS more profitable to process after Harvey struck in late August. Margins for individual refineries vary with the mix of crudes they process and their unit configuration. However, as we noted in August 2016 (see "[Gulf Coast Refiners Enjoy Higher Margins From Processing Heavy Crude](#)"), over 80% of Gulf Coast crude refineries have coking units to fully process residual fuel oil from heavy sour crudes into transport fuels. These sophisticated investments were made at a time before shale, when heavy sour crude from Mexico and Venezuela was expected to be the largest feedstock source. The economics of these refineries are predicated on heavy sour crudes being cheaper than light sweet alternatives.

Exhibit 2 compares crack spread margins for Mars and LLS since the start of 2016 to show the impact of the changing sweet/sour spread. For Mars we used a 6-3-2-1 crack spread, where six barrels of Mars are processed to produce three barrels of gasoline, two barrels of diesel, and one barrel of fuel oil based on Gulf Coast product prices. For LLS we used a 2-1-1 crack spread, reflecting two barrels of LLS processed to produce one barrel each of gasoline and diesel. Note that generally refiners processing light sweet crudes would produce twice as much gasoline as diesel, but Gulf Coast refiners have increased their yields of diesel in response to export demand. U.S. Customs data shows that Louisiana refiners exported

3 times as much diesel as gasoline on average during 2016 and 2017. In 2016, the average 6-3-2-1 crack for Mars was \$12.88/barrel, which was \$1.68/barrel higher than the \$11.20/barrel average LLS 2-1-1 crack. In 2017, the Mars advantage narrowed to an average \$0.44/barrel higher than LLS, and in 2018 through March 10, the LLS 2-1-1 crack was \$0.29/barrel higher than Mars 6-3-2-1.

Exhibit 2 Gulf Coast Crack Spreads



Source: CME Group, Morningstar

Temporary Reversal

While the reversed sweet/sour relationship on the Louisiana Gulf Coast reduces refinery margins on expensive coker investments in the short term, we believe the phenomenon is only temporary. Apart from Hurricane Harvey, market disruption caused by the OPEC cuts is largely to blame and will change when the producer group increases sour crude production again. And Gulf Coast refiners can run lighter crudes such as LLS when margins are better for these grades; they just aren't making the best use of their configuration. The ongoing surge of domestic light shale has at times depressed domestic values enough to encourage greater processing of these crudes. New refinery investments such as the ExxonMobil Beaumont, Texas, plant expansion that we discussed earlier this month (see "[Exxon Bets on Downstream U.S. Returns](#)") will be configured to process shale crude.

Bunker Boost

Existing plants able to process heavier sour crudes can still expect to perform well in the long term, given the lower value generally attached to these grades because of their environmentally undesirable components. A clear upcoming example is the change in January 2020 to the International Maritime Organization's specifications for ships' bunker fuel (see our November 2016 note "[Marine Bunker Deadline to Benefit Refiners and Traders](#)"). The new lower-sulfur bunker fuel rules significantly reduce the market for high-sulfur fuel oil, making heavy sour grades cheaper. This is already reflected in futures markets; for example, CME Group forward curves for Mars swaps on March 8, 2018, show relative prices falling by \$1.37/barrel during 2019 while the equivalent LLS curve is flat over the same period.

Light Menu Changes

In the meantime, Louisiana Gulf Coast refineries also face changes to their light sweet crude menu choices because northbound volumes on the Capline pipeline have fallen to a trickle, putting the future of LLS blend crude in question. We'll cover that topic in a future note. ■■

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