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I'LL BE ALRIGHT WITHOUT YOU - U.S. GULF COAST REFINERS ADJUST TO THE VENEZUELA SANCTIONS

November 17, 2019

In February 2019, the U.S. Treasury Department announced new sanctions on Petr leos de Venezuela SA (PDVSA), the national oil company of Venezuela, which halted imports of Venezuelan crude oil into the U.S. Since then, refineries that relied on Venezuelan crude have had to backfill their import requirement with alternative sources of oil. This adjustment has had ramifications not only on the refiners that processed Venezuelan crude, but also on the entire U.S. Gulf Coast crude oil market. Today, we discuss the quality adjustments made to the U.S. crude oil diet.

When we last looked at crude imports from Venezuela nine months ago, the U.S. sanctions on PDVSA had just been announced. In that blog, we reviewed the quantity of Venezuela crude oil imported into the U.S. in 2018 (~420 Mb/d), the qualities of the types of crude oil being imported from Venezuela (primarily heavy-sour), and the U.S. destinations for the PDVSA-sourced crude (primarily the Gulf Coast, with Citgo and Valero refineries being the largest consumers). We then considered alternative grades of crude oil that could be utilized as substitutes for the Venezuelan varieties, assuming supplies could be made available.

We'll begin today by looking at pricing for major crude oil streams on the Gulf Coast. The decline in heavy crude supply since the Venezuela sanctions kicked in has had a predictable effect on heavy crude prices in the region. The price differential between West Texas Intermediate (WTI, the light-sweet benchmark) at Magellan East Houston (MEH) and Maya (a heavy-sour crude oil from Mexico) for Gulf Coast delivery (blue line in Figure 1), had been on a narrowing trend in recent years. However, in anticipation of the sanctions in December 2018 through a short period after the sanctions were announced, the price differential collapsed. This happened as absolute prices for heavy crude oils strengthened relative to their premium-priced light-sweet counterparts due to a perceived heavy-crude shortage. The differential has widened again in recent months but is still below the 2017 and 2018 average spreads. Similarly, the differential between WTI MEH and Mars, a medium-sour crude from the offshore Gulf of Mexico (orange line), actually turned negative multiple times this year (reflecting a Mars premium to MEH) and remains below \$2/bbl on average.



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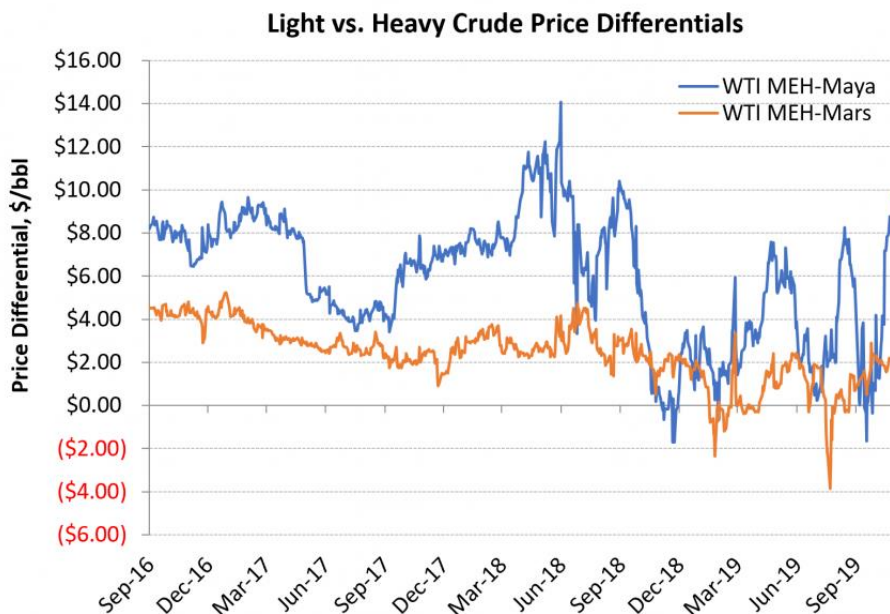


Figure 1. Light vs. Heavy Crude Price Differentials. Source: Bloomberg

With rising domestic supplies of light-sweet and medium-sour crudes, imports of “non-heavy” crude oil grades to the Gulf Coast, or PADD 3, have been declining for a number of years. By comparison, heavy crude imports had been holding relatively steady, since the complex refineries that dot the Gulf Coast have traditionally relied on them, and heavy crude is not produced in large quantities in the U.S. outside of California. However, the ban on imports of Venezuelan crude to the U.S. implemented in February (2019), combined with some regional refinery maintenance, resulted in a sudden drop in heavy crude imports to PADD 3 (gray bar segments in Figure 2). While imports of heavy crude rebounded somewhat going into the summer, they’ve remained below the level reached a year-ago, averaging 1.3 MMB/d in the first half of 2019, down 351 Mb/d from the full-year average for 2018.



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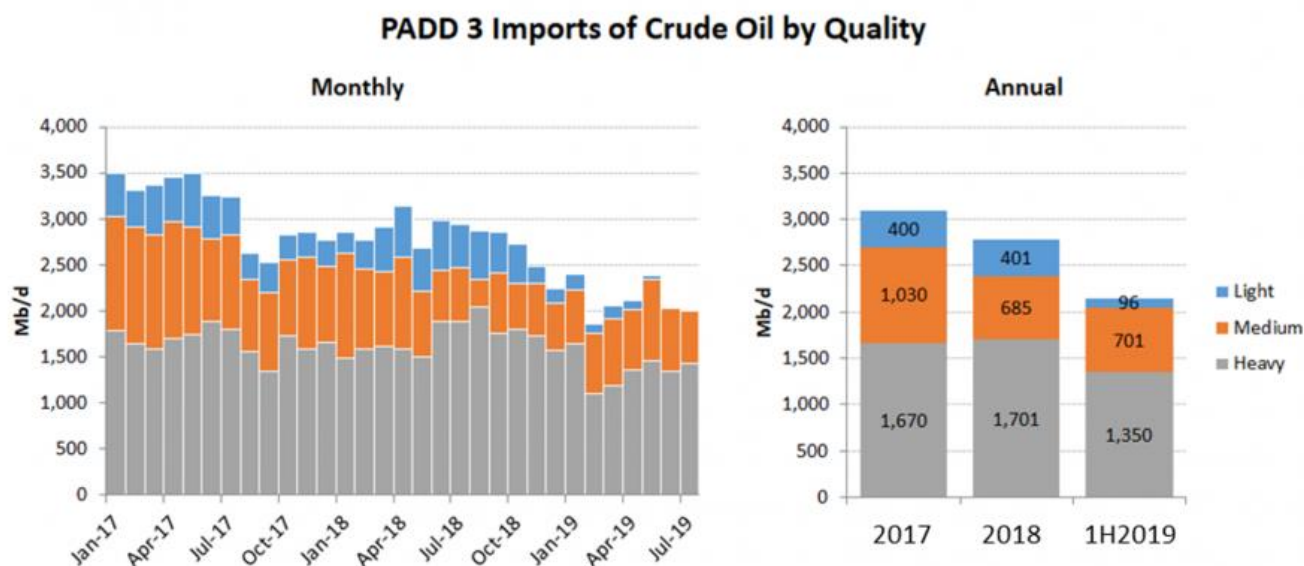


Figure 2. PADD 3 Imports of Crude Oil by Quality. Source: Baker & O'Brien analysis of EIA Data

Light crude imports (blue bar segments in Figure 2) also decreased in the first half of 2019 versus full-year 2018, declining by about 300 Mb/d, as domestic supplies from the Permian and other shale plays helped to replace remaining imports of light crude. (Interestingly, the Bayou Bridge pipeline from Lake Charles, LA, to St. James, LA, came online in this time period, increasing the access for pipeline delivered light crude oil in Louisiana.) Medium-crude imports (orange bar segments) broke rank, however, and climbed modestly for the same period, up about 16 Mb/d to 701 Mb/d in the first six months of this year (more on this trend in a moment). Overall imports of light, medium and heavy crude to PADD 3 dropped by 640 Mb/d, on average, from full-year 2018 to the first half of 2019.

Moreover, a closer look at imports by refinery suggests that declines in heavy-crude imports were almost across the board, with most refineries along the Gulf Coast reducing their heavy oil imports in the first half of 2019 from what they had been importing in full-year 2018. Did refineries stop running as much crude oil (i.e. lower utilization due to economics, operational issues, or turnarounds) or did they switch to alternative crude options? As is often the case, it appears to be a combination of multiple operational and economic factors that led to reduced heavy imports.

Refinery Utilization and Turnarounds

Total refinery crude throughput decreased by 209 Mb/d across PADD 3, from ~9 MMB/d in full-year 2018 (navy-blue bar to left in Figure 3) to ~8.8 MMB/d in the first half of 2019 (navy-blue bar to right), primarily due to turnarounds. Most of the reduction in crude inputs was in the Texas Gulf Coast sub-region of the PADD. Within that sub-region, eight of the 16 refineries experienced some sort of turnaround or operational upset that reduced overall crude inputs by a combined 231 Mb/d (biggest red bar segment in Figure 3 below). Crude throughputs in the other regions of PADD 3 generally experienced only minor changes from 2018 to the first half of 2019.



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**Crude Throughput Changes in PADD 3 Regions
(2018 vs. 1H2019)**

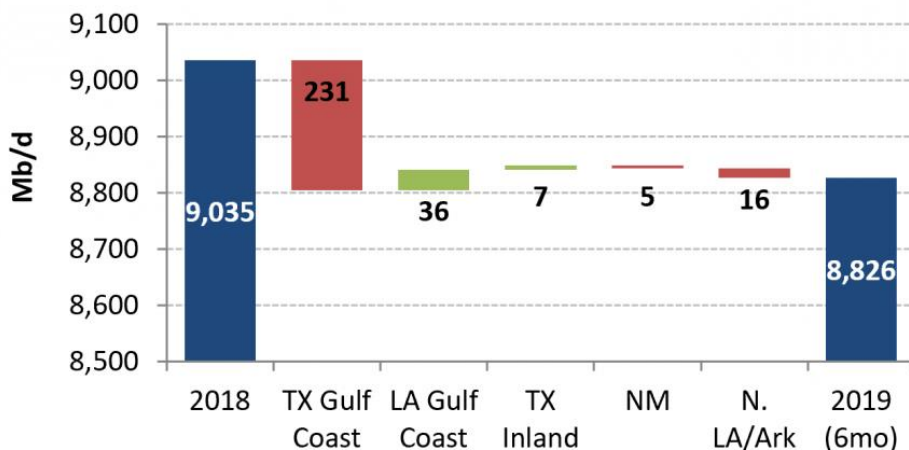


Figure 3. Crude Throughput Changes in PADD 3 Sub-Regions. Sources: EIA and Baker & O'Brien analysis

Crude-Slate Changes

Focusing just on the two coastal sub-regions of PADD 3 in Figure 3 above, refinery crude throughput decreased by a net 195 Mb/d, including a decline of 231 Mb/d in the Texas Gulf Coast sub-region and a gain of 36 Mb/d in the Louisiana Gulf Coast area. However, overall imports for processing in the coastal PADD sub-regions dropped by a much larger 597 Mb/d (a subset of the 640 Mb/d reduction seen across the entire PADD in Figure 2). Therefore, 402 Mb/d of the overall decrease in imports (597 minus 195) was accounted for by increased processing of domestically produced crude oil. Since the U.S. doesn't produce heavy crude oil in large quantities along the Gulf Coast, this means that certain refiners switched at least part of their crude slate from a heavy barrel to a medium or light barrel.

The reduction in heavy crude import volumes at coastal refineries can be broken down to three main causes (shown in Figure 4): 1) the decline in heavy imports that directly led to (or were due to) a reduction in utilization — either due to economics or process unit availability (orange bar segments), 2) reduced heavy imports that were balanced to some degree by an imported medium-gravity barrel (gray bar segments), and 3) reduced heavy imports that were offset to some degree by a domestic medium- or light-gravity barrel (blue bar segments).



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Reduction in Heavy Crude Oil Imports by Gulf Coast Refinery (1H2019 vs. 2018 Annual)

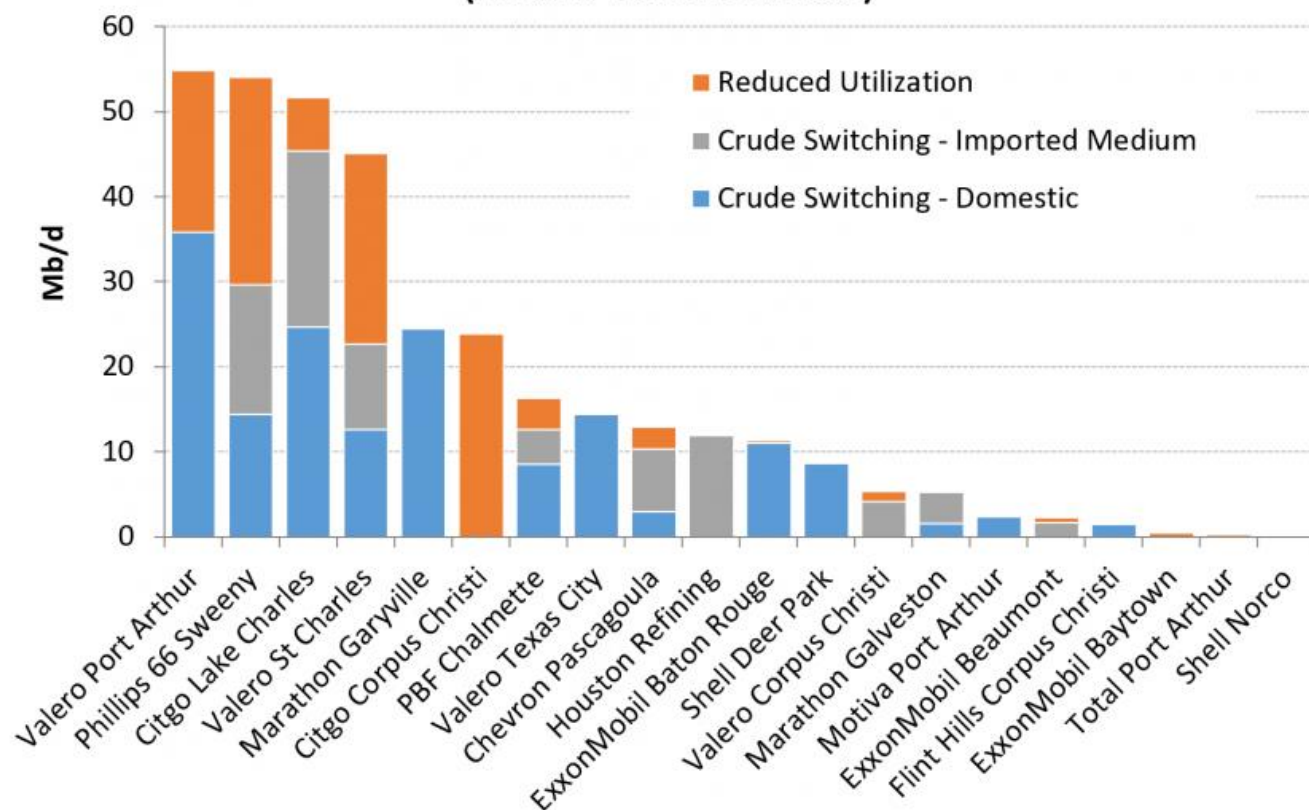


Figure 4. Reasons for Reduction in Heavy Crude Imports by Gulf Coast Refinery. Source: Baker & O'Brien analysis

The decline in heavy-crude imports at some refineries corresponded directly with lower utilization due to turnarounds, which lower a refinery's mechanical availability. For example, Citgo Corpus Christi (sixth bar from the left in Figure 4 above) had a major turnaround in early 2019 that accounted for the refinery's entire reduction in imported volumes. Other facilities, including Valero Texas City and ExxonMobil Baton Rouge, mitigated the loss of heavy crude imports with domestically produced barrels that were economically attractive. For other facilities, it was a mixture of both mechanically caused lower utilization and crude oil substitution economics. If a refinery is switching a portion of its crude slate away from a heavy barrel, the most likely source of replacement barrels would be some sort of medium-gravity crude oil, assuming the refinery has a configuration that can support this. In this case, offshore Gulf of Mexico production generally falls in the medium-gravity range. And, as it turned out, offshore production increased by 130 Mb/d in the first half of 2019 versus 2018, in effect helping to replace some imported heavy oil barrels.

So, we've determined that (1) the immediate reaction to the sanctions on Venezuela, and the resulting decline in supply of heavy crude oil on the market, was a collapse in the light-heavy differential; (2) heavy crude oil imports into the U.S. Gulf Coast declined in the first half of this year, but the reduction was not entirely due to the crude supply situation, since numerous refiners



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underwent maintenance during that time; and (3) the reduction in heavy crude oil imports that was not utilization-based (i.e. caused by turnarounds) was mitigated by either increased imports of medium-quality crude oil or by alternative domestic crudes (most likely from offshore Gulf of Mexico).

As we often note in refinery-related blogs, refiners are masters at optimizing crude slates and product mix to maximize their profitability. In this case, it was somewhat serendipitous that numerous processors of heavy crude oil went down for maintenance as the Venezuela sanctions were announced, which helped alleviate what could have been a much worse situation. In addition, the increase in Gulf of Mexico production helped alleviate some of the requirements for medium-gravity alternatives. We're entering an interesting time, with IMO 2020 regulations on low-sulfur bunker looming in just over a month, which will likely cause even more turbulence in the heavy crude oil market.

Note: The article was authored by Amy Kalt of Baker & O'Brien and published on RBN Energy's Daily Energy Post on November 17 2019.

"I'll Be Alright Without You," written by Jonathan Cain, Steve Perry and Neal Schon, was the second track on Side Two of Journey's ninth studio album, Raised on Radio. Released as the fourth single from the LP in May 1986, the song went to #7 on the Billboard Adult Contemporary chart, and #14 on the Billboard Hot 100.

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