WHERE ARE YOU GOING - WHAT'S NEXT FOR THE U.S. REFINING SECTOR?

August 12, 2020

For U.S. refineries, the severe demand destruction that occurred this spring led to the worst financial performance in recent history. Not only did refiners produce less diesel, motor gasoline, and jet fuel in the second quarter than any quarter in recent memory, their refining margins were sharply lower than the historical range — a one-two punch that hit their bottom lines hard. The situation has improved somewhat this summer, but it's still tough out there. So tough, in fact, that it's reasonable to ask, does the coronavirus and its impacts to the energy sector signal the end of an era for refiners across the U.S.? Today, we review the decline in fuel demand and profitability in the second quarter and discuss the uncertainties refiners face in the second half of 2020 and beyond.

Baker & O'Brien and RBN have blogged extensively over the past few months about the upheavals that COVID has caused in every part of the energy industry. The pandemic's effects on refining were first explored in Strange Brew in late March, where we explained that even before the initial coronavirus outbreak in China started to grab headlines around New Year's Day, refineries in the fourth quarter of 2019 and first two months of 2020 had been incentivized to shift their refined products output toward diesel, which can be used to help make IMO 2020-compliant low-sulfur bunker. Then, in our three-part Baby Break It Down series in April and May, we detailed what refiners were doing to reduce their overall output and minimize their gasoline and jet fuel production to help return refined-product demand and supply into closer balance. Now, in the middle of what used to be known as "the summer driving season," we examine where things currently stand for refineries, and what likely lies ahead.

Fuel Demand

To better understand what led to the severe decline in refiner profitability in the second quarter, we first look at demand for gasoline — by volume, the #1 product of U.S. refineries (approximately 50% of total output). With the country going into lockdown as the winter of 2019-20 was winding down, vehicle miles traveled (VMT) plummeted by an almost unimaginable 41% from February through April. VMT rebounded modestly in May as stay-at-home restrictions eased and states tentatively re-opened, but still remain well below the historical average. As a result, 27% less gasoline product was supplied during the second quarter of 2020 (red line in **Figure 1**) compared to the same period last year (blue line), according to the Energy

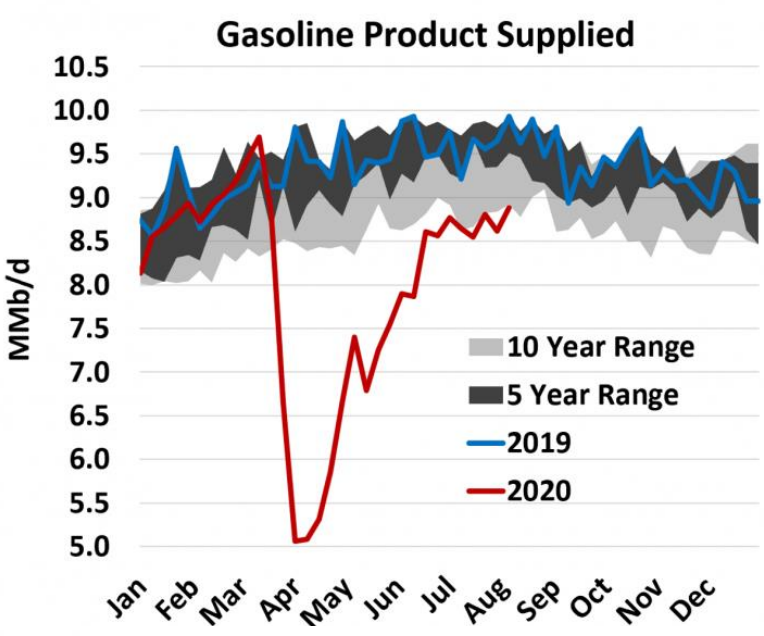

Figure 1. U.S. Gasoline Product Supplied. Source: EIA

Information Administration (EIA). The good news is that gasoline "product supplied" — a proxy for demand — continued rebounding in June and July and is now approaching the bottom edge of the 10-year range (gray-shaded area).

Jet fuel implied demand (approximately 10% of total refiner output pre-COVID) was severely impaired this spring as business travelers and leisure passengers alike canceled their travel agendas and countries around the world implemented border shutdowns or mandatory quarantines. Airline passenger miles dropped over 55% in 2020's second quarter compared to the same period a year ago. This resulted in a 64% year-on-year (YOY) decline in jet fuel demand (red line vs. blue line in **Figure 2**). However, unlike gasoline, the demand rebound has been limited.

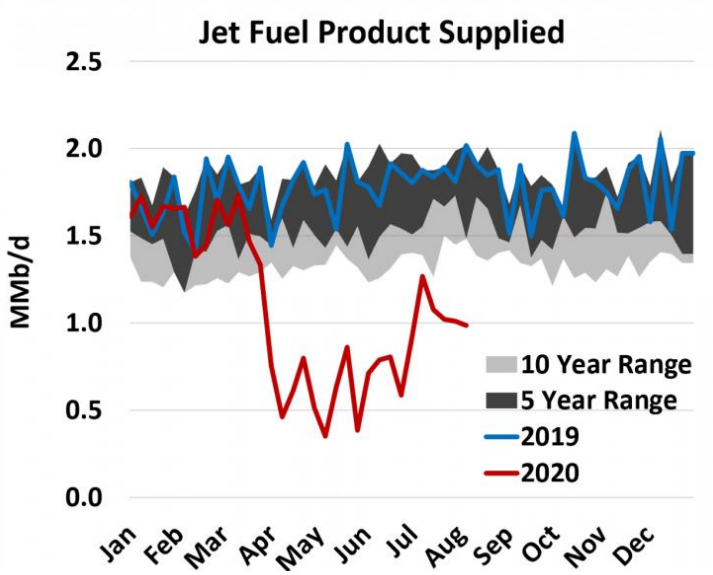

Figure 2. U.S. Jet Fuel Product Supplied. Source: EIA

While gasoline and jet fuel demand were battered by COVID, implied diesel demand (approximately 30% of total refinery output) took much less of a hit (red line in **Figure 3**). While most consumers stayed home, freight continued to move throughout the country by rail and truck to deliver goods to those consumers. U.S. diesel demand saw a YOY decline of "only" 14% in the second quarter. Consequently, refiners were challenged to substantially reduce gasoline and jet fuel production, while simultaneously limiting their cuts in diesel production.

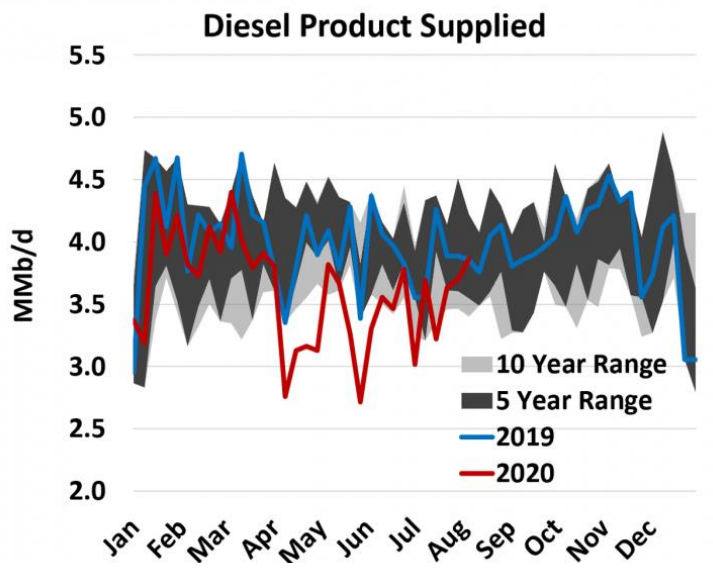

Figure 3. U.S. Diesel Product Supplied. Source: EIA

Refinery Utilization

The net, and unsurprising, impact of reduced product demand was lower refinery utilization. **Figure 4** shows U.S. refinery utilization by quarter over the past five years, with the median utilization indicated by the dashed black line and the top- and bottom-quartile performers among the refineries indicated by the upper and lower bounds of the gray-shaded area — all according to Baker & O'Brien's PRISM™ modeling system. In some cases, refiners that were unable to cover their variable operating costs did

shut down. Not even top-quartile performers were spared as U.S. refinery utilization decreased to just over 70%, on average, during the second quarter of 2020, a 20% YOY decrease. The last time U.S. refiners experienced utilization rates less than 80% was in February 2010 — you'd have to go all the way back to the early 1980s to find U.S. refinery utilization rates as low as what we saw this spring. On a positive note, recent weekly refinery utilization rates have begun to improve, suggesting that the bottom may be behind us — at least for now.

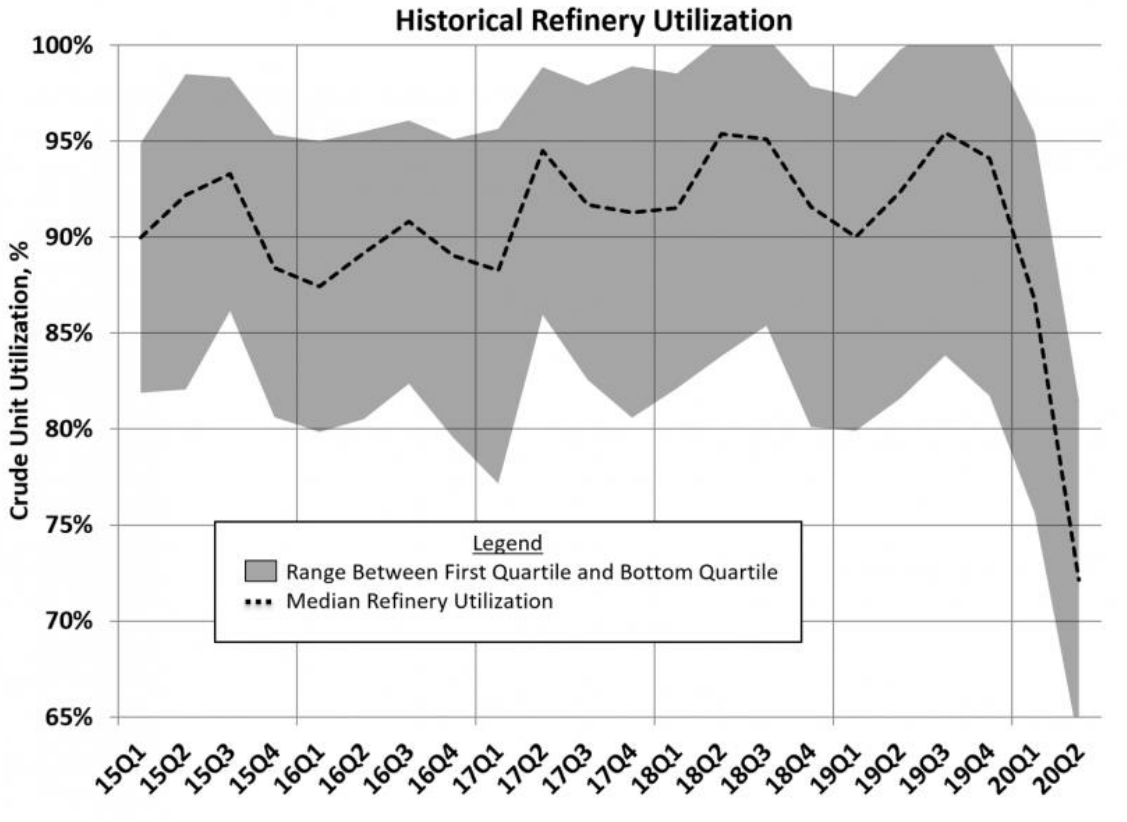

Figure 4. U.S. Refinery Utilization Median and Range. Source: Baker & O'Brien PRISM

As you would expect, the lower gasoline and jet fuel demand and lower refinery utilization resulted in lower profitability for refiners in the second quarter. While refiners are adept in adjusting their utilizations to maximize their realization, configuration limitations kept some facilities from going far enough. For a period of time, U.S. refineries were overproducing certain fuels due to a lack of demand, which led to very poor crack spreads in many regions of the country. Therefore, as we said in our introduction, refiners were making less fuel and selling it for lower margins — never a good situation.

Demand Outlook into the Fall and Beyond

While recent signs indicate that demand for refined products is recovering, these questions remain: 1) how long would it take for demand to return to "normal" 2019 levels?; and 2) has the COVID-19 pandemic permanently impaired transportation fuel demand and the U.S. refining sector?

We'll focus on the big three products: gasoline, jet fuel, and diesel.

- Gasoline demand recovered quickly over a period of about three months to within 85-90% of

2019 levels. A recovery to 100% is unlikely in the very near term as many companies are still allowing employees to work from home and school districts around the U.S. have generally delayed a return to in-school instruction. This will keep demand structurally impaired through the fall and potentially into the spring of 2021. Longer term, there will likely be a lingering negative impact on demand from the work-from-home trend this year, high unemployment rates, and the inherent improvement in fleet fuel efficiency as time moves on, which may keep the U.S. from returning to 100% of 2019 demand for another year or two, and perhaps longer.

- Jet fuel demand has clearly been hit hardest by the pandemic, but it's also the smallest commodity on a volume basis of the big three transportation fuels. A recovery of demand for jet fuel is unlikely in the near term — we expect it will take two years or more for jet fuel demand to return to pre-COVID levels. Business travel may be permanently impaired at a somewhat lower level due to the rapid adoption of virtual conferencing technology.
- While diesel demand declined during the height of the lock-down period, we don't think it will be impaired in the long term and expect full recovery by early next year.

So what does all that mean for refiners? Well, overall refined product demand will remain below 2019 levels over the next 12 to 24 months, which will likely speed up the rationalization of refining capacity, particularly at lower-complexity facilities or those facilities in less strategic locations for crude supply and petroleum based product demand growth. We've already seen announcements that the following facilities will be closing:

- Marathon Petroleum announced that its Martinez, CA, and Gallup, NM, refineries will be closing. Both of these facilities were temporarily shut down during the worst of the coronavirus pandemic, but Marathon is making these closures permanent. Notably, Marathon is able to supply the market previously served by Martinez via its Los Angeles and Seattle area refineries. Marathon can also use its El Paso, TX, refinery to supply the market once served by Gallup. The company has also announced that they are exploring the option to convert the Martinez refinery into a renewable diesel facility, a common theme among the announced closures so far driven by the incentives provided by Low Carbon regulations in California and other regions (see Green Grow the Refineries).
- HollyFrontier announced its decision to cease crude oil processing at its Cheyenne, WY, facility in June and pursue a capital project to convert it to a renewable diesel manufacturing facility.
- Phillips 66 announced they will be ending their crude oil processing capabilities at their Rodeo and Arroyo Grande, CA, refineries by 2023. Similar to Marathon Petroleum, Phillips 66 could supply these markets via their refineries in Los Angeles and the Seattle area if the economics are competitive versus an imported barrel. Also similar to Marathon Petroleum, they plan to convert the Rodeo facility into a renewable diesel manufacturing facility.

Finally, Calcasieu Refining has announced that it will be shutting down its Lake Charles, LA, refinery for a period of time — nothing's been said yet on whether the closure will be permanent. Given that refined product supply is a global business, we'd expect further rationalization in Europe and parts of Asia as well.

Has the U.S. Refining Sector Lost Its Competitive Edge?

Rationalization aside, we still view the U.S. refining sector as having certain structural advantages

versus other refining centers around the world. The pandemic will certainly impact some of these advantages, but is unlikely to totally eliminate them. Consider:

- Crude Supply. The U.S. has unique access to several large basins of supply such as the Permian, the Bakken, U.S. Gulf of Mexico, and the Canadian oil sands that have resulted in pricing materially below international benchmarks for certain refining hubs. At present, these price differentials may not be as large as they once were, but the discount to international benchmarks is still an advantage to U.S. refiners that can access the domestic crude oils via pipeline (PADDs 2, 3, and 4).
- Lower Variable Costs. Natural gas production growth has rocketed upward and its abundance has resulted in steep price discounts to international markets. The characteristics of unconventional U.S. gas production will ensure that they remain some of the lowest-cost gas reserves on the planet. Similar to domestic crude oil, while these discounts may have vanished during the worst of the pandemic, they are expected to continue to provide a structural cost advantage to refiners in the U.S. versus their European and Asian counterparts. This cost advantage comes primarily in the form of purchased gas used for thermal energy and hydrogen production.
- Refinery Sophistication. The U.S. — particularly the Gulf Coast region and parts of the Midcontinent — are home to some of the most sophisticated refining assets in the world. These facilities come with all the upgrading and sulfur-removal capabilities required to process heavy sour crude oils and facilitate near-complete conversion to high-value finished products in a post IMO-2020 world.

To sum up, COVID turned the U.S. refining sector on its head and it will take a while for refined product demand to recover. But refiners already are taking steps to rationalize their fleets and the best of their assets should enable them to return to much improved profitability in relatively short order.

Note: The article was authored by Amy Kalt of Baker & O'Brien and published on RBN Energy's Daily Energy Post on August 12, 2020.

"Where Are You Going" was written by Dave Matthews and appears as the third track on the Dave Matthews Band's fifth studio album, Busted Stuff. Released as the first single from the album in July 2002, it reached #3 on the Billboard Adult Pop Songs chart and #39 on the Billboard Hot 100 Singles chart. Personnel on the record were: Dave Matthews (lead vocals, acoustic and electric guitars), Carter Beauford (drums), Stefan Lessard (bass, keyboards), LeRoi Moore (sax, flute, penny whistle), and Boyd Tinsley (violin).