

REFINERY INDUSTRY IN FOCUS

Baker & O'Brien, Inc.

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Q1 2020

Q1 2020: U.S. Refining Margins Driven Downward by Coronavirus Impact

Including Special Topic: Demand shock: are merchant refiners feeling more pain than the rest of the industry?

Houston, May 7, 2020

Baker & O'Brien, Inc.'s 20Q1 *PRISM*¹ update showed a decline in U.S. refining cash margins compared to the prior quarter. The 20Q1 refining margins only reflect the beginning of the impact from the reduced gasoline and jet fuel demand from the Covid-19 outbreak.

During March, the total U.S. gasoline and jet fuel supply reported weekly by the Department of Energy's Energy Information Administration (EIA) showed a decrease of over 25%, while the decline continued further in April, as supply dropped another 15% reflecting a further decay in U.S. product demand.

All PADDs showed margin decreases versus the fourth quarter, with the largest drops coming in PADDs 1, 2, and 4. Given the Atlantic Basin lockdowns in New York and Europe towards the end of the quarter, the fall in PADD 1 is expected. Similarly, with limited product outlet, inland refineries in PADDs 2 and 4 are more susceptible to domestic demand falls than the U.S. Gulf Coast (USGC) refineries in PADD 3 that benefit from an export outlet. Therefore, the domestic product demand fall towards the end of the quarter is likely to explain much of the relatively large decline in the PADD 2 and PADD 4 cash margins.

The substantial reduction in gasoline and jet fuel demand during the current second quarter, weaker product crack spreads, and associated reductions in refinery utilization are expected to weigh even more heavily on 2020 second quarter refining margins.

Both the USGC 321 crack spread and Midwest Chicago crack spread

PRISM Cash Margins vs. Previous Periods (\$/Bbl.)

	20Q1 vs. 19Q4	20Q1 vs. 19Q1
PADD 1	-3.71	0.65
PADD 2	-4.15	-0.08
PADD 3	-1.69	2.16
PADD 4	-8.73	3.80
PADD 5	-1.31	5.02
U.S. Overall	-2.57	2.05

¹ *PRISM*[™] is Baker & O'Brien's refinery modeling and database system that includes operational and economic performance details for refineries in the U.S., Canada, Europe, and Asia.

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declined from the prior quarter reflecting the steep drop in product demand. The LLS – Maya price differential decreased by almost \$0.50/Bbl. in the first quarter despite the IMO 2020 sulfur specifications that became effective for marine heavy fuel oil at the beginning of 2020. Any impacts from the IMO 2020 specifications have been overshadowed by the severe global reduction in petroleum product demand.

Key Refining Margin Metrics, \$/Bbl.

	2020 <u>March</u>	2020 <u>Q1</u>	2019 <u>Q4</u>	2019 <u>Annual</u>	2018 <u>Annual</u>
WTI	29.86	45.86	56.95	57.02	64.92
LLS	29.54	48.16	60.76	62.67	69.96
Brent	31.82	50.14	63.18	64.29	71.06
LLS – Maya	6.15	7.11	7.56	4.67	7.49
USGC LLS 321*	9.54	9.22	10.97	10.82	11.29
USGC LLS 6321**	7.91	6.20	6.29	7.91	8.27
Chicago WTI 321***	5.48	9.20	13.66	17.54	17.40

* LLS deemed conversion to 67% conventional 87R gasoline and 33% ULSD

** LLS deemed conversion to 50% conventional 87R gasoline, 33% ULSD and 17% Fuel Oil

*** WTI deemed conversion to 33% conventional 87R gasoline, 33% RBOB and 33% ULSD

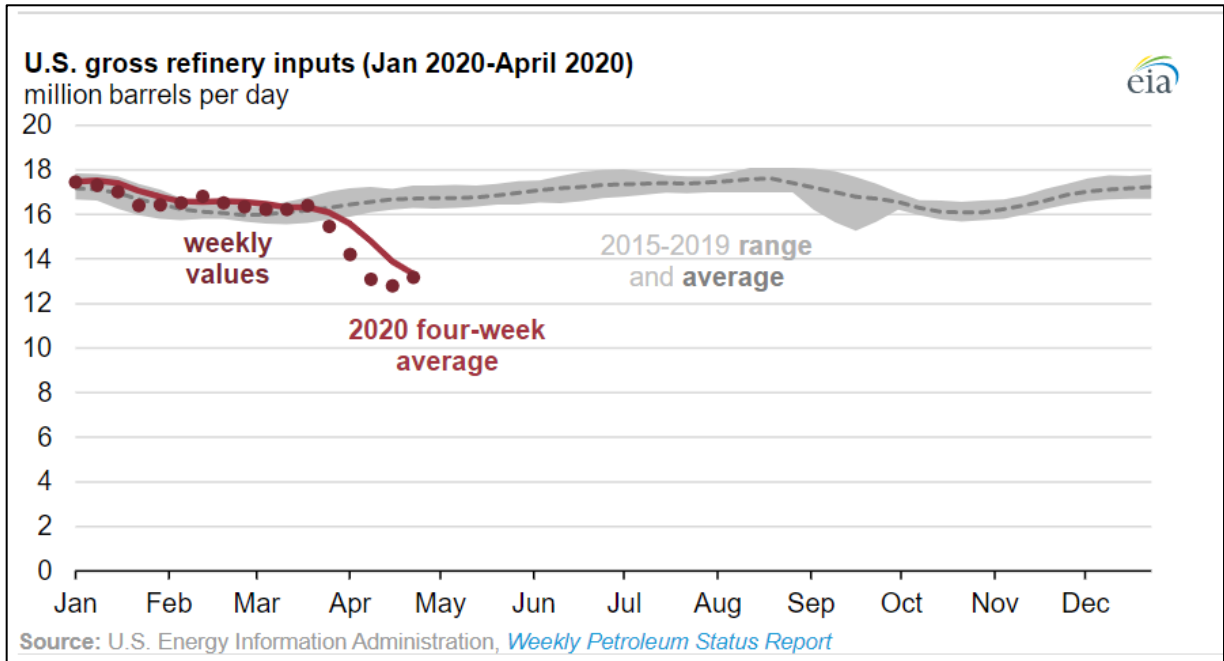
Special Topic: Demand shock: are merchant refiners feeling more pain than the rest of the industry?

Over the past month, U.S. refining companies have quickly adapted to the largest demand shock in the history of the industry. All are lamenting the gasoline fallout with reduced crude runs, select unit outages, and in the extreme cases, idling entire refineries in the weakest markets. Are all refiners suffering equally or are companies with lower costs and integrated marketing channels (i.e., logistics, storage, and retail outlets) better positioned than merchant refiners?

Demand Snapshot

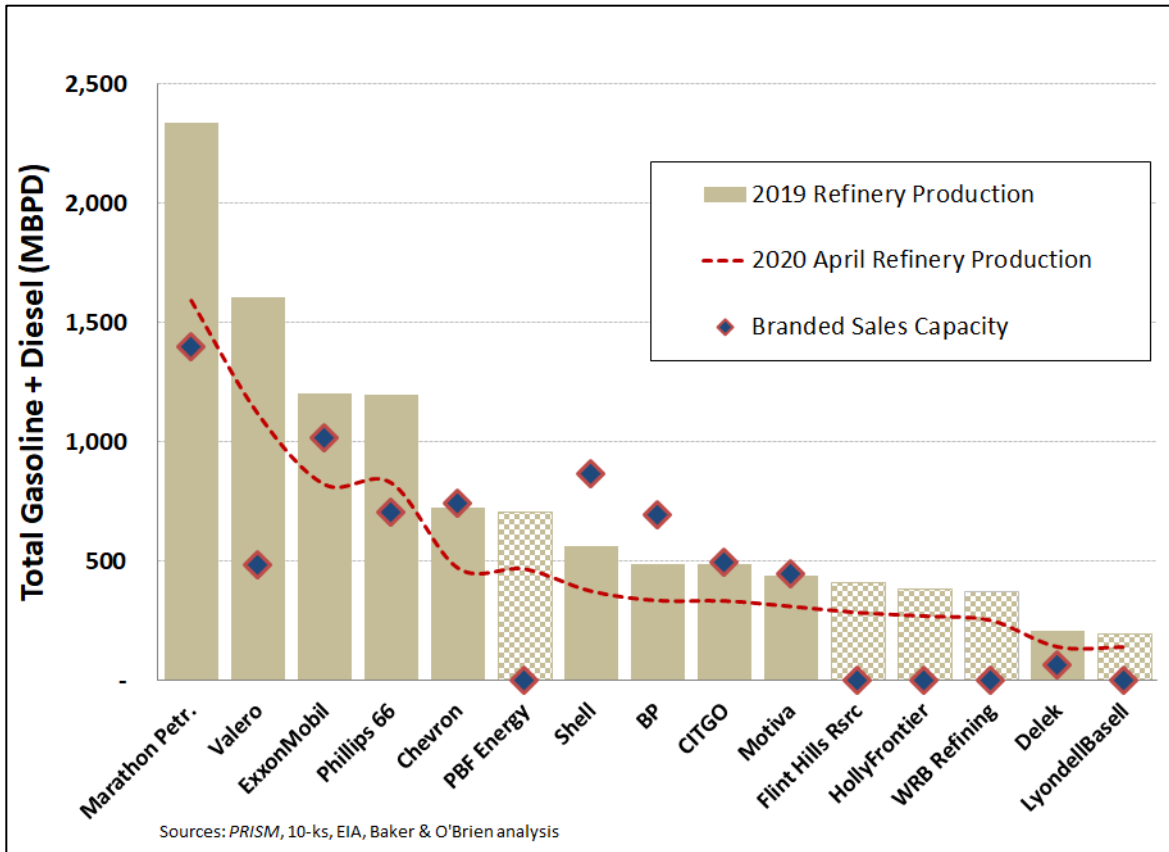
The EIA reports U.S. gasoline demand falling to just over 5 million barrels per day in April, a staggering 45% decline compared to a year ago! Jet demand has fallen nearly 62% since a year ago, as measured by the same metric. In contrast, diesel demand, while down, has fallen 15%. This has created a product supply imbalance, with yields requiring dramatic shifts and utilization taking a hit. Gasoline cracks are negative in some regions and barely positive in other regions, even amidst record low crude prices. Refiners have turned every knob to balance their systems, just as we enter what has historically been the summer driving season.

EIA: U.S. Gross Refinery Inputs 2020

**Squeezed sales channels – retail access is key**

Typically, gasoline can be sold through a wide variety of channels, broadly categorized into branded company owned and operated stores, branded dealer owned and operated stores, or unbranded channels in which product is sold to independent retailers. Branded channels typically yield better refinery netbacks than unbranded channels and provide greater flexibility to capture margin along the entire value chain. Currently, roughly half of U.S. retail stations sell fuel under the brand of one of the 15 largest refiner-suppliers. The chart below provides some insight into the interplay between refining and branded fuel sales. This chart ranks the top 15 U.S. refiners (based on gasoline and diesel production for 2019 using Baker & O'Brien's *PRISM* model), an estimate of their branded sales volumes, and an estimate of the April demand impact assuming each refiner's product demand declines proportionally to the nationwide statistics. Those refiners who predominantly sell only unbranded fuel that may lack a branded outlet advantage are denoted with a checkered hatch ("merchant" refiners). Some merchant refiners, including those not shown in the chart, sell a majority of their fuel in bulk quantities (e.g., pipeline batches) and may not sell significant amounts in truckload quantities (at the "rack"). It appears a majority of refining companies with branded operations can continue to supply volumes through their secure channels; but, in the current market, merchant refiners could be squeezed out by these same oil companies.

U.S. Refinery Production and Branded Sales Capacity



A decade ago, the trend for some refiners was to shift away from direct retail ownership and operation given the stronger margins in the refining segment and the contrasting differences in retail management. This does not mean that refiners gave up access to retail but, instead, they leveraged a broader mix of alternative branded retail outlets and supply agreements to deliver products to the end user. In some cases, oil companies sell fuel under an alternate retail name rather than their own flagship brand. One example is the select refiners that sell their fuels under the Shell brand following Shell's strategic divestures in the refining space. Regardless, in recent years, the fundamentals have directionally favored greater retail integration, as gasoline demand has flattened, biofuel mandates have increased and refineries have continued to run strong. For refiners, finding a secure home for their fuel has become increasingly critical. The present situation is an extreme example: many refiners are running at the minimum possible operating rates and attempting to place gasoline to avoid a total shutdown.

A diversified asset base helps

Similarly, various companies may leverage additional aspects of size and integration during this time of duress. Companies that own or lease tank capacity can leverage short-term storage plays to contain gasoline stocks and keep their refineries operating at minimum rates. In combination, these storage assets can also lead to what is being termed “super-contango,” in an attempt to capture future value on the expected price recovery following the extreme market lows. Additionally, the major refining companies have more options to optimize their product slate across multiple refining and logistic assets than operators with only one or two refining assets. For example, they can leverage their most advantaged (i.e., lowest cost) refineries to supply products to multiple regions, reducing rates at the weakest refineries, while still capturing value through their integrated supply chains.

Everybody is feeling the pain from recent events, clearly, some more than others. The market has been turned upside down with unprecedented impacts to demand, refinery operations, and profitability. The question is who has the advantage to weather this storm and come out ahead?

About Baker & O'Brien

Baker & O'Brien is an independent professional consulting firm specializing in technology, economics, and management practice for the international oil, gas, chemical, and related industries. With offices in Dallas, Houston, and London, the firm assists clients with strategic studies, mergers and acquisitions, and technology evaluations. The firm also provides expert services to support insurance claims, investigate operating incidents, and support a wide range of commercial and construction disputes in the energy industry.

About *PRISM*

Baker & O'Brien's *PRISM* software is used to perform detailed analysis of individual refineries and the refining value chain from crude oil load port to products truck rack. The system combines a large historical database with a robust refinery simulator to provide analytical support to competitive assessments, strategic planning, crude oil valuation, and delivered cost of supply. The *PRISM* database currently includes operational and economic performance details for all refineries in the U.S. and Canada, most refineries in Europe, and over 50 refineries in the Asia Pacific region. The *PRISM* system is available for license and is used in consulting assignments for Baker & O'Brien clients.

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