

REFINING INDUSTRY IN FOCUS

Baker & O'Brien, Inc.

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Q2 2021

Q2 2021: U.S. Refining Margins Improve

Houston, August 18, 2021

Baker & O'Brien, Inc.'s Q2 2021 *PRISM*[™] update showed that the United States (U.S.) refining margins continued to improve over the quarter towards pre-COVID-19 levels. Average U.S. refining cash margins for the quarter were \$2/Bbl. to \$4/Bbl., above breakeven levels for all of the U.S. PADDs. The Q2 2021 cash margins were higher by as much as \$6/Bbl. (PADD 2) compared to the same quarter a year ago.

As we discuss further in the special topic below, the margin recovery is underpinned by improving demand and refinery utilization. Combined gasoline, jet fuel, and diesel fuel consumption increased 9% over the prior quarter, driven largely by gasoline. Similarly, refinery utilization, as reported in the Baker & O'Brien/RBN Energy **U.S. Refinery Billboard** weekly newsletter, recovered over the quarter to pre-COVID-19 levels. Utilization reached 92% in June 2021, compared to a dismal 79% average for 2020.

One headwind for U.S. refiners in Q2 2021 was the cost of Renewable Identification Numbers (RINs) required by the Renewable Fuel Standard (RFS). The increase in these costs during 2021 to record highs is the main subject of this issue's special topic.

Most of the Key Refining Margin Metrics showed noticeable improvement from the prior quarter. Crack spreads improved substantially despite the continued rise in crude oil prices. An increase in the LLS-Maya light-heavy spread from the prior quarter helped those refineries operating coking units and processing a heavy sour crude oil slate.

	Q2 2021 vs. Q1 2021	Q2 2021 vs. Q2 2020
PADD 1	-0.42	2.70
PADD 2	0.54	6.18
PADD 3	0.45	1.79
PADD 4	-1.05	3.41
PADD 5	1.36	3.45
U.S. Overall	0.43	3.12

	June 2021	Q2 2021	Q1 2021	2020	2019
WTI	71.37	66.13	57.78	39.30	57.02
LLS	72.90	68.01	59.91	41.20	62.67
Brent	73.04	68.82	60.82	41.50	64.29
LLS – Maya	5.50	5.08	3.57	4.88	4.67
USGC LLS 321	15.45	16.51	12.06	7.09	10.82
USGC LLS 6321	10.80	11.91	8.69	5.45	7.91
Chicago WTI 321	20.40	21.98	13.08	8.38	17.54

Special Topic: U.S. refining utilization and “cracks” are recovering, but RFS costs are impacting the bottom line

The impact of the COVID-19 pandemic on U.S. refined product demand appears to be fading. The EIA reports that in the first week of July 2021, the volume of gasoline supplied in the U.S. reached an all-time high, surpassing 10 million barrels per day for the first time ever (black circle in Figure 1). The supply of all refined products exceeded the same week in 2019. Only jet fuel demand remains depressed, but even it increased by 15% from Q1 2021 to Q2 2021.

In the July 2021 editions of the **U.S. Refinery Billboard** newsletter, we reported that the strong demand rebound was a driving force behind: a) higher refinery utilization; b) above-average refining gross margins in all major U.S. regions (Figure 2); and c) the recovery of gross refining margins for most oil refineries to pre-pandemic levels.

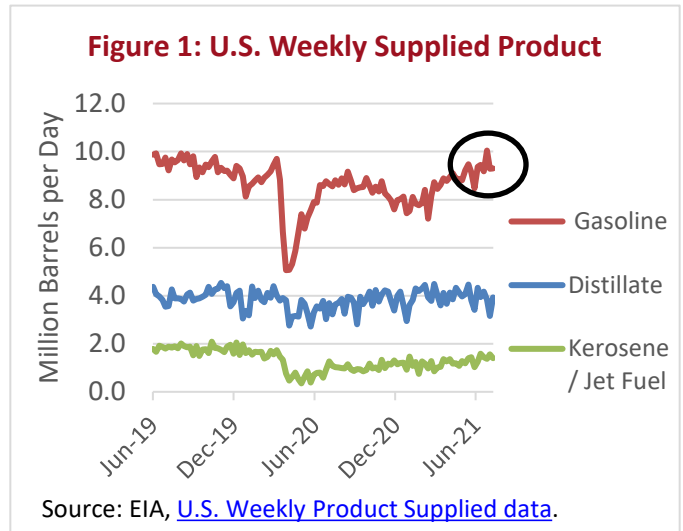
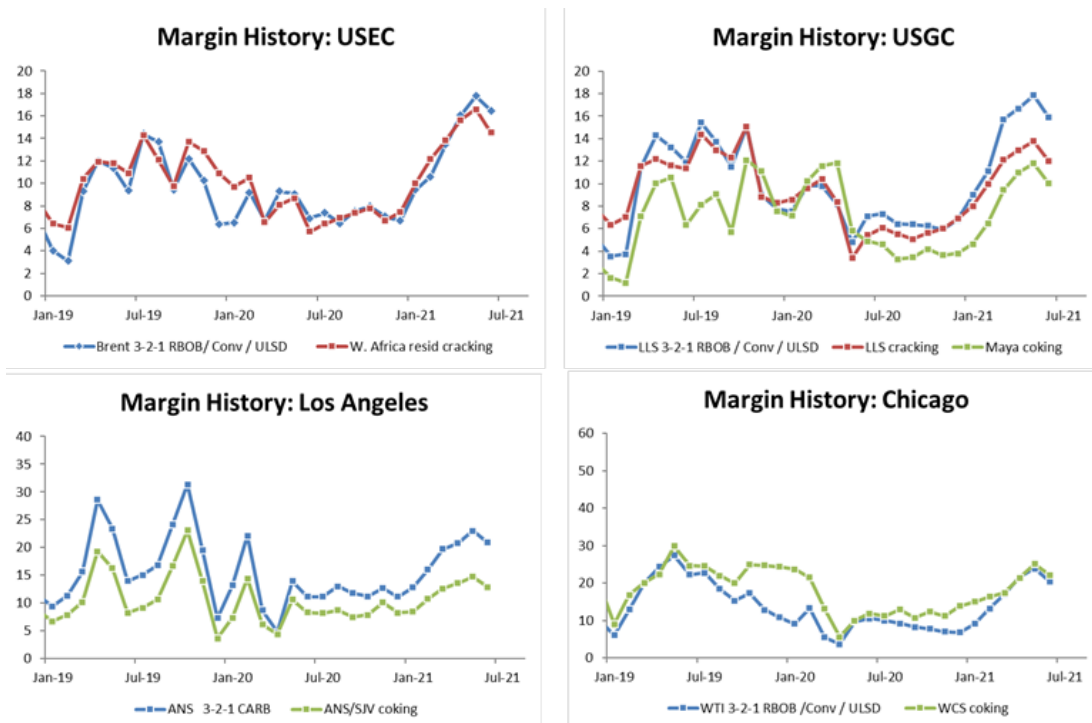
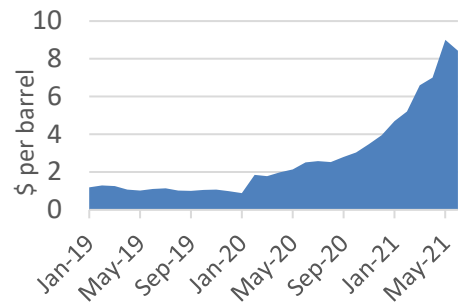


Figure 2: U.S. Refinery Billboard- Refinery Gross Margins (\$/Bbl.)



The average year-to-date gross margin improvement for the 3-2-1 product cracks in the charts above is \$8.5/Bbl. While this looks encouraging for refiners, it does not account for the costs of RFS obligations. As shown in RIN costs per barrel of gasoline and diesel associated with these obligations began to climb at the start of 2020 and spiked sharply in 2021, offsetting some of the margin improvement (Figure 3). From January 2021 to June 2021, RIN costs have surged by \$3.7 per product barrel supplied. As a result, the \$8.5/Bbl. gain in the 3-2-1 product cracks so far this year is cut to \$4.7 when RINs costs are factored in.

Figure 3: RIN Costs per Barrel of U.S. Gasoline and Diesel Supplied



Source: EIA, OPIS, Platts.

This is reflected in our reported increase in cash margins of \$4.5/Bbl. from Q4 2020 to Q2 2021. The *PRISM* analysis shows that, on a per barrel of feed basis, U.S. refiners benefited from average gross margin improvements of \$7.7/Bbl. but faced increased RFS-related obligation costs of \$3.2/Bbl. Increased natural gas prices also played a significant but smaller roll in dampening the impact of gross margin improvement on refiner's bottom lines.

One underlying cause for the surge in RINs is that the agricultural feedstocks used to produce renewable fuels are currently in high demand globally as livestock feed. For example, the two main feedstocks for U.S. biofuels production are corn for bioethanol and soybean oil for biodiesel and renewable diesel. The EIA reports that *"since December 31, 2020, U.S. corn prices have increased by 42% while U.S. soybean oil prices have increased by 55%. Both prices have reached their highest levels in more than eight years, driven in large part by increased [livestock feed] demand from China and concerns around future domestic supply."*

While the recent recovery in road transportation fuel demand is welcome news for refiners, the rising RIN costs associated with RFS compliance will be of concern. Our analysis shows that cash margins for U.S. refiners have only improved modestly despite increases in demand, utilization, and the widely quoted gross margin crack spreads. Given the continued roll out of programs to encourage the replacement of "fossil" transportation fuels with renewable carbon sources, higher RFS (and similar programs) costs could be a new normal for U.S. refiners making the familiar crack spreads less reliable indicators of refinery profitability.

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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.

About U.S. Refinery Billboard

The **U.S. Refinery Billboard**, jointly published with RBN Energy, provides a one-of-a-kind weekly update on the U.S. refining industry including key market insights on refinery activity, individual refinery performance, product markets, and economics. The comprehensive report includes regional crude and refined product price spreads, crude oil netbacks, refinery-specific indicative margins leveraging Baker & O'Brien's *PRISM* refinery modeling system, and highlights of weekly news of importance to the sector.

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