

# REFINING INDUSTRY IN FOCUS

Baker & O'Brien, Inc.

www.bakerobrien.com

Q4 2021

## Q4 2021: U.S. Refining Margins Holding Steady

Houston, February 16, 2022

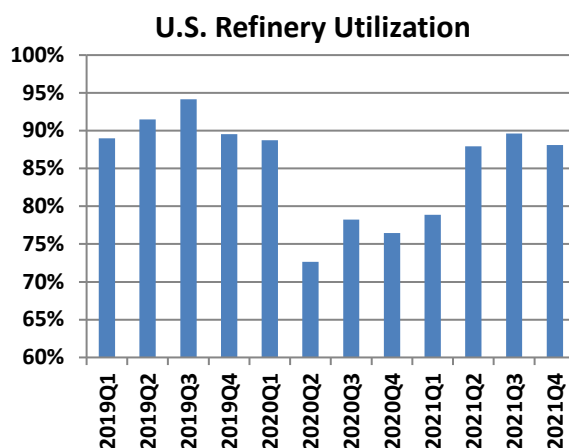
Baker & O'Brien, Inc.'s 2021 Q4 *PRISM*<sup>™</sup> update shows that in 2021, Q4 refinery margins held steady following a period of recovery over the first three quarters of 2021. Average U.S. refining cash margins for the quarter were relatively robust at \$6.62/Bbl., nearly \$8/Bbl. above the negative margins seen a year ago.

Increased demand, coupled with modest declines in refinery utilization, supported Q4 margins. Total product demand edged up by 1% over the quarter and included an 8% increase in U.S. gasoline consumption compared to a year ago. As we reported in the Baker & O'Brien/RBN Energy **U.S. Refinery Billboard** weekly newsletter, refinery utilization declined 1.7% over the quarter.

Refining fundamentals are substantially stronger than one year ago. Refinery utilization is 15% higher and aggregate U.S. refined product demand is 11.5% higher, mainly driven by gasoline and jet fuel recoveries.

Other Key Refining Margin Metrics were mixed from Q3 to Q4, as shown in the following table. Product crack spreads fell in most key markets but remained relatively strong in Q4. The light-heavy crude oil price spread (WTI -WCS) continued to strengthen, supporting margins of coking refineries that process heavy sour crude oil.

<i>PRISM Cash Margins (\$/Bbl.)</i>		
	2021 Q4 vs. 2021 Q3	2021 Q4 vs. 2020 Q4
<b>PADD 1</b>	1.87	8.22
<b>PADD 2</b>	-1.00	6.78
<b>PADD 3</b>	1.04	8.09
<b>PADD 4</b>	-0.01	6.92
<b>PADD 5</b>	2.39	8.44
<b>U.S. Overall</b>	<b>0.44</b>	<b>7.80</b>



<i>Key Refining Margin Metrics, \$/Bbl.</i>							
	Q-to-Q Comparison		Quarters			Full Year	
	2021: Q4 vs Q3	Q4: 2021 vs. 2020	2021 Q4	2021 Q3	2020 Q4	2021	2020
<i>PRISM Cash Refinery Margins (\$/Bbl.)</i>							
PADD 1	1.87	8.22	8.48	6.60	0.26	5.95	-0.20
PADD 2	-1.00	6.78	5.78	6.78	-1.00	5.66	0.19
PADD 3	1.04	8.09	6.33	5.29	-1.77	4.13	-0.16
PADD 4	-0.01	6.92	7.67	7.67	0.75	6.49	2.08
PADD 5	2.39	8.44	8.14	5.75	-0.30	5.25	0.54
Total U.S.	0.44	7.80	6.62	6.18	-1.19	4.91	0.11
<i>Feedstocks Indicators (\$/Bbl.)</i>							
Brent	6.44	35.90	79.67	73.23	43.78	70.51	41.50
Brent - WTI	-0.36	1.01	2.49	2.85	1.49	2.75	2.20
Brent - LLS	-0.56	1.35	1.37	1.93	0.03	1.23	0.30
WTI – WCS USGC	2.07	5.95	7.30	5.23	1.35	4.57	3.71
<i>Product Crack Margin Indicators (\$/Bbl.)</i>							
PADD 1 - NYH Brent 3-2-1	-0.32	10.05	17.29	17.61	7.24	15.66	7.44
PADD 2 - Chicago WTI 3-2-1	-5.52	9.01	16.32	21.84	7.30	18.16	8.36
PADD 3 - USGC LLS 3-2-1	-1.60	10.71	17.16	18.77	6.45	16.09	7.09
PADD 5 - CA ANS 321	0.48	10.88	22.55	22.07	11.67	20.55	12.04
<i>U.S. Utilization and Demand Indicators (% change)</i>							
Refinery Utilization %	-1.7%	15.2%	88.1%	89.6%	76.5%	86.2%	79.0%
Total Product Demand, MB/D	1.1%	11.5%	18,385	18,181	16,495	17,703	16,613
Gasoline Demand, MB/D	8.0%	12.6%	8,607	7,968	7,643	7,934	7,305
Jet Fuel Demand, MB/D	-0.2%	34.6%	1,416	1,418	1,052	1,326	1,094
Diesel Demand, MB/D	-1.4%	2.3%	4,632	4,697	4,528	4,639	4,740

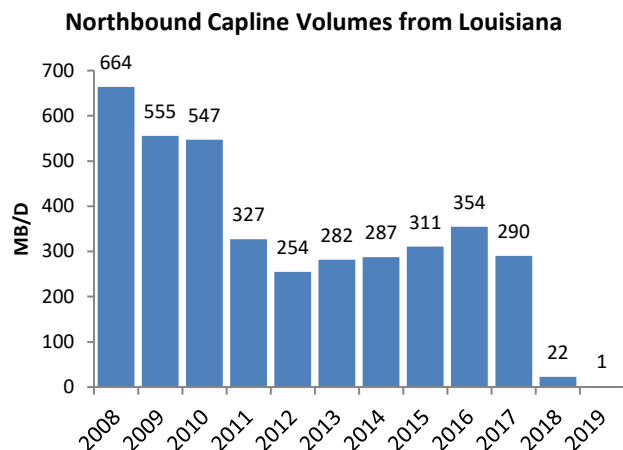
- 1) WTI – WCS USGC (WTI price at Magellan East Houston - Western Canadian Select [WCS] price at Nederland) is the price difference between a light sweet crude oil and a heavy sour crude oil and is an indicator of coking margin.
- 2) USGC LLS 321 deemed conversion to 33% CBOB gasoline, 33% RBOB gasoline, and 33% ULSD.
- 3) Chicago WTI 321 deemed conversion to 33% CBOB gasoline, 33% RBOB gasoline, and 33% ULSD.
- 4) NYH Brent 321 deemed conversion to 33% CBOB gasoline, 33% RBOB gasoline, and 33% ULSD.
- 5) CA ANS 321 deemed conversion to 67% CARBOB gasoline and 33% CARBOB diesel.

## Special Topic: Capline – Opening up a Houston Bypass for Southern Louisiana Refiners

The recent reversal of the U.S. Capline pipeline from Patoka, Illinois, to St. James, Louisiana, shines a light on the evolution of crude oil supply in North America. From the import-dependent, production-decline days of the mid-2000s to the supply-surplus period of today, the dynamics of crude oil production economics, delivered costs, and quality availability has shifted dramatically. The Capline reversal closed the door for moving coastal and waterborne-imported crude oils to the Central U.S. and opened a pathway that allows Bakken and Canadian crude oils to bypass Texas and reach Louisiana with fewer pipeline interchanges.



The 630 mile 40” Capline pipeline system was constructed in the late 1960s to transport crude oil from the U.S. Gulf Coast (USGC) to Midwest refineries. After U.S. oil demand outgrew domestic supply, the Capline system was connected to the VLCC-capable Louisiana Offshore Oil Port (LOOP), which enabled large flows of imported crudes into the North American heartlands. However, as shown in the adjacent chart, Capline flows slowed to a trickle as North American crude oil production increased and the pipeline system evolved. In 2019, Capline’s owners – Plains All American (54%), Marathon Petroleum (33%), and BP (13%) – signed off on a project to reverse its flow. Capline now moves Canadian-produced crude oils from Patoka (which arrive via various pipeline connections, such as Enbridge’s Southern Access and T.C. Energy’s Keystone) to St. James, Louisiana.



Interim operations of the reversed pipeline began December 18, 2021, and full operations commenced January 1, 2022, for both heavy and light crude oils. The map above shows that, before the reversal, the most cost-efficient route for Canadian crude oil deliveries to Louisiana was via pipelines connecting through the Houston/Port Arthur area; the alternatives

were a combination of rail or barge. The more direct Capline route is likely to become the main supply line for Canadian crude deliveries to Southern Louisiana, displacing some heavy crude imports. Additionally, it may evolve into a pathway for Canadian exports to global markets; however, as the pipeline reversal does not extend to the LOOP at this time, these are expected to be transported on smaller (Aframax class) oil tankers out of St. James, Louisiana, via the Mississippi River.

The reversed Capline capacity is currently 200 MB/D, but there is open space on the pipeline to accommodate additional demand as initial volumes are about 100 MB/D. In comparison, lower Mississippi River refineries processed almost 300 MB/D of heavy sour crude oil in 2019 (the last full year not impacted by COVID-19). Only a small portion of the heavy crudes was Canadian. Thus, there is room for more Canadian crude flows into these refineries.

Capline's reversal should be welcome news for USGC refiners. Over the decades, USGC refiners invested heavily to convert heavy sour Latin and South American crude oils into finished transportation products; however, that supply line is dwindling. Sanctions have impeded Venezuelan heavy crude oil imports since 2019, and Mexico (PEMEX) recently announced plans to curtail crude oil exports and increase domestic processing. If Mexico realizes its aspirations, USGC refiners would need to find alternatives for the Mexican heavy volumes. This scenario opens the door for more pipeline-delivered Canadian crude.

Capline's evolution illustrates the potential of existing oil supply infrastructure to adapt to evolving market conditions. As outlined in previous articles, we think this reversal was a long time coming.

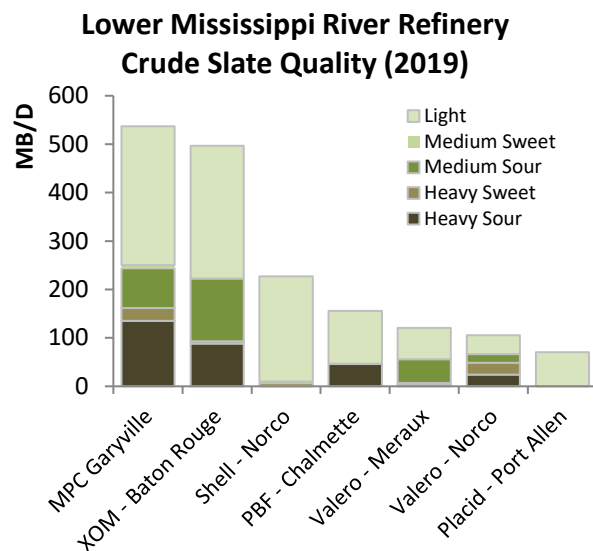
Contact:

Gary Devenish

(832) 358-1453

gary.devenish@bakerobrien.com

Or info@bakerobrien.com



## 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 analyses 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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