

BAKER & O'BRIEN

I N C O R P O R A T E D

Q1 2017: U.S. REFINING MARGINS SHOW MODEST IMPROVEMENT

Special Topic: Despite Subdued Margins, U.S. Refiners Set Throughput Record

Houston, June 6, 2017

Baker & O'Brien, Inc.'s 17Q1 release to PRISM¹ subscribers reflects a modest gain in U.S. refining margins, compared to the prior quarter, driven by increasing crack spreads. As the

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

	17Q1 vs. 16Q4	17Q1 vs. 16Q1
PADD 1	-0.38	2.68
PADD 2	1.39	0.92
PADD 3	1.03	2.59
PADD 4	4.55	3.97
PADD 5	1.78	1.26
U.S. Overall	1.28	2.11

adjacent table shows, the average refining margin in four of the five PADDs showed an increase in successive quarters, with PADD 4 refineries showing the greatest improvement. This improvement in refining margins was generally consistent with the improvement in the crack spreads reflecting a greater increase in product prices despite an increase in crude costs compared to the

previous quarter.

Comparing Q1 results with a year ago, higher margins were primarily attributable to stronger gasoline and distillate margins. Other factors included higher sweet crude oil discounts relative to Brent and lower costs associated with renewable fuels compliance.

Taking a look at the major indicators of refinery profitability in the table below, the U.S. Gulf Coast (USGC) LLS 321 crack spread was up almost a \$1/Bbl. compared to the previous quarter. This trend in the quarter-to-quarter crack spread improvement was also apparent in the Chicago WTI 321 crack spread as it increased by a similar amount. The major driver in this improvement was the robust increase in

Key Refining Margin Metrics, \$/Bbl.

	2017 <u>March</u>	2017 <u>Q1</u>	2016 <u>Q4</u>	2016 <u>Annual</u>	2015 <u>Annual</u>
WTI	49.79	51.84	49.20	43.24	48.68
LLS	51.53	53.51	50.57	44.92	52.33
Brent	51.74	53.79	49.48	43.72	52.40
LLS – Maya	8.49	8.21	7.67	8.50	8.27
USGC LLS 321*	12.34	11.98	11.13	10.66	14.70
USGC LLS 6321**	8.92	8.66	7.76	6.60	10.15
Chicago WTI 321***	13.75	12.30	11.41	14.26	21.06

product prices, which was especially true for gasoline.

Refiners continued to maximize gasoline production during the quarter as inventory levels declined, and product inventories moved to within their five-year range.

Gasoline demand continues to remain strong coupled

with increasing domestic sweet crude oil production, which could signal continued strength in refining margins for future quarters.

* 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

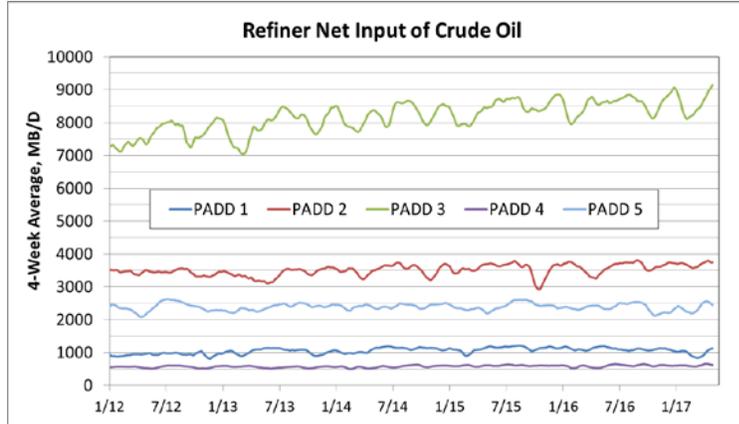
*** WTI deemed conversion to 33% conventional 87R gasoline, 33% RBOB and 33% ULSD

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.

USGC coking refineries saw a slight improvement in margins as the LLS/Maya crude oil price differential widened slightly.

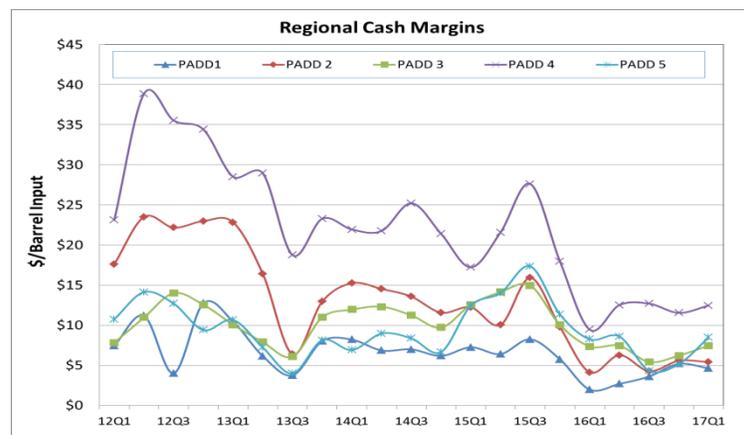
Special Topic: Despite Subdued Margins, U.S. Refiners Set Throughput Record

In the Special Topic of our Q2 2016 *PRISM* Press Release, we questioned how long refining margins could remain at their five-year lows before we saw “economic” run cuts, particularly by PADD 1 refineries. Reductions did occur, but PADD 3 saw the most significant cuts, which appear to be a result of planned maintenance outages traditionally seen in the 4th and 1st quarters. PADDs 1 and 2 have “held serve”, sustaining record throughput levels and keeping product supply high (figure at left).²

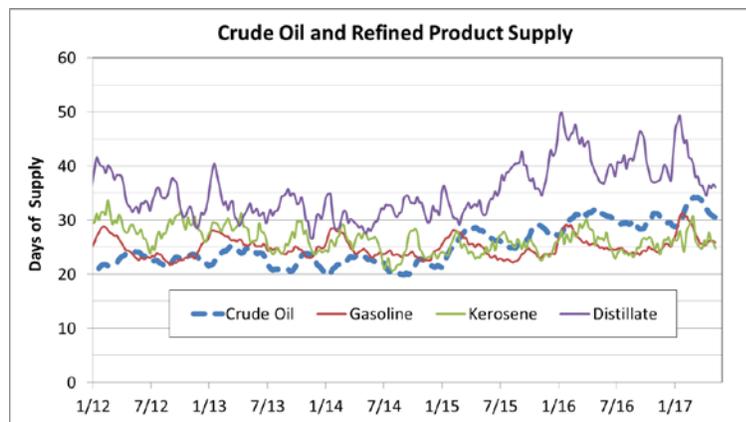


Cash margins increased modestly over the past year, but remain near

the low end of the five-year range (figure at right)³. With maintenance pit-stops complete, refiners have stomped on the accelerator, setting an all-time throughput record in April, at over 17.2 million barrels per day (B/D). What gives?



While strong domestic demand helped absorb most of the finished product, export markets have been crucial to the refined product balance. PADD 3 is clearly the main source of throughput increases over the past year, due to new capacity additions and high utilization. PADD 3 refiners have cheap access to PADD 1 and PADD 2 product markets via pipeline, and coastal access for exports to key Latin and South American terminals. In fact, PADD 3 refiners exported over 22% of their gasoline and distillate products in 2016. As a result, the domestic refined product balance remained stable over the past year despite record output from refiners (figure at left)⁴.



Absent supply shocks (i.e.,

² Sourced from U.S. EIA

³ Baker & O’Brien *PRISM*

⁴ EIA

unexpected, large capacity outages) or unexpected surges in product demand, there's little reason to think the recent margin uptick will become a sustained upswing, especially if PADD 1 and

PADD 2 refiners can maintain current output levels. Marginal refiners have come through the trough but are not out the woods; they continue to be highly vulnerable to both domestic and global changes to refined product demand.

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 focuses primarily on the downstream industry and 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 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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