BAKER & O'BRIEN
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Q2 2016: U.S. REFINING MARGINS SHOW MODEST IMPROVEMENT

Baker & O'Brien, Inc.'s 16Q2 release to *PRISM*[1] subscribers reflects a modest gain in U.S. refining margins, compared to the prior quarter, driven by increasing crack spreads. As the table below shows, the average refining margin in four of the five PADDs showed an increase in successive quarters, with refineries in PADDs 2 and 4 showing the greatest improvement. Despite higher market crack spreads, refining cash margins only showed a modest improvement compared to the prior quarter primarily due to rising crude oil and feedstock costs and lower secondary product margins.

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

	16Q2 vs. 16Q1	16Q2 vs. 15Q2
PADD 1	0.96	-0.21
PADD 2	2.47	-4.23
PADD 3	0.25	-5.92
PADD 4	3.06	-8.27
PADD 5	-0.07	-6.58
U.S. Overall	**0.84**	**-5.37**

Comparing Q2 results with a year ago, overall U.S. refining margins were significantly lower in 2016. The decline is primarily attributable to weaker gasoline and distillate margins. Other factors include narrower sweet crude oil discounts relative to the Brent benchmark and higher costs to meet biofuel blending obligations (primarily for the purchase of RINs).

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 over $2/Bbl. compared to the previous quarter. This trend in the quarter-to-quarter crack spread improvement was much more apparent in the Chicago WTI 321 crack spread, which increased over $8/Bbl. The major driver in this improvement was the sharp increase in product prices which was especially true for gasoline. Refiners continued to maximize gasoline production during the quarter as inventory levels increased. Gasoline demand continues to remain strong, but inventory levels remain high which could signal weaker gasoline crack spreads in future quarters.

Key Refining Margin Metrics, $/Bbl.

	2016 June	2016 Q2	2016 Q1	2015 Annual	2014 Annual
WTI	48.73	**45.50**	33.33	48.68	93.10
LLS	50.58	**47.35**	35.19	52.33	96.74
Brent	48.34	**45.58**	33.92	52.40	98.91
LLS – Maya	8.22	**9.59**	9.10	8.27	11.01
USGC LLS 321*	11.60	**11.28**	8.95	14.70	12.12
USGC LLS 6321**	6.92	**6.40**	4.95	10.15	8.05
Chicago WTI 321***	20.20	**18.83**	10.08	21.06	19.05

** 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*

USGC refineries saw a slight improvement in coking margins as the LLS/Maya crude oil price differential increased approximately $0.50/Bbl. between the two quarters.

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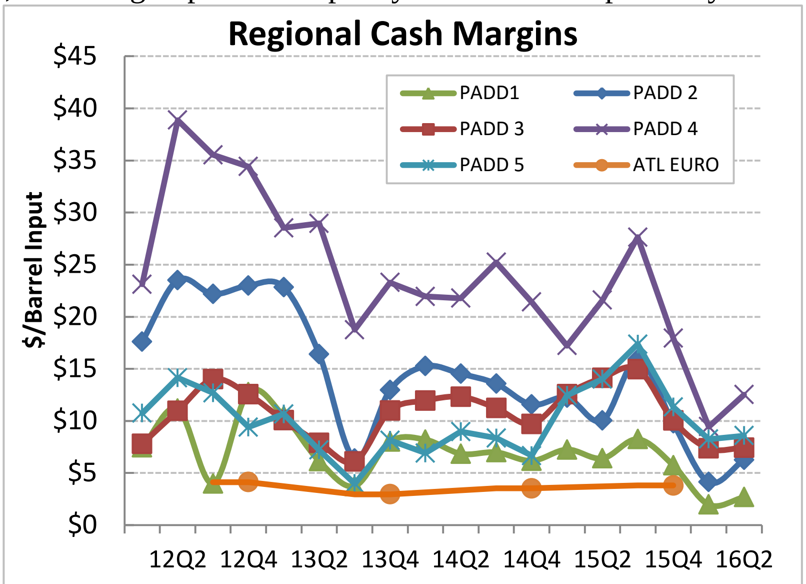
[1] *PRISM*™ is Baker & O'Brien's refinery modeling and database system that includes operational and economic performance details for refineries in the U.S., Canada, Europe, and Asia. *PRISM* is a trademark of Baker & O'Brien, Inc.

SPECIAL TOPIC: REFINING MARGINS HOVER NEAR FIVE-YEAR LOWS, BUT FOR HOW LONG?

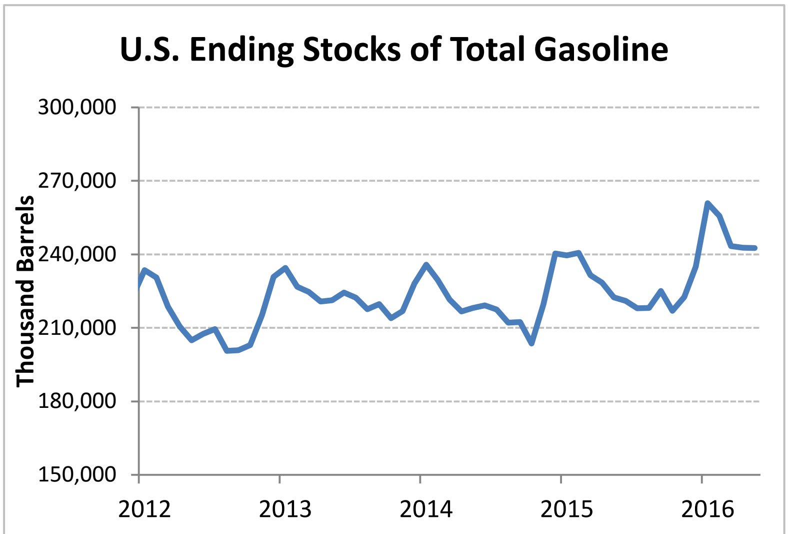
On the back of the cheap tight oil windfall, U.S. refiners have invested in "capacity creep" and are pushing their plants harder, achieving impressive capacity utilization. Propelled by strong gasoline cracks, U.S. refinery throughput rose to all-time highs in 2015, and the high utilization continued through the first half of 2016.



Source: PRISM

It appears that the hang-over may have set in. Despite robust seasonal gasoline demand growth, production outpaced consumption, leading to record gasoline inventories dragging down margins. Margins did increase in Q2, but the seasonal "bump" was disappointing compared to previous years, and they remain near seasonal five-year lows in most regions.

Many U.S. refiners are facing cost pressures and are more exposed to global competition. Following rail and pipeline infrastructure investment and lifting of the oil export ban, tight oil feedstock advantages have crumbled, RIN costs[2] have increased, and the Henry Hub natural gas price[3] is no longer the advantage it once was. In particular, East Coast refiners clearing their products through New York Harbor have borne the brunt of squeezed margins resulting from stiff competition with hard-pressed Atlantic European refiners. However, U.S. refiners remain competitive in export markets due to their strong asset base and freedom from RIN obligations. Refiners with export capabilities have found some shelter by supplying premium products to South America. For those with access, the West Coast remains the traditional safe-haven.



Source: EIA

Although operators appear to agree that run cuts are inevitable, few have publicly announced "economic" rate reductions for Q3, apparently anticipating that planned maintenance across the industry will bring inventories back down to sustainable levels. Barring that, or some other

[2] Average RINs cost for 2016 are US$3.40 per barrel of gasoline or diesel.
[3] EU – Henry Hub Natural Gas prices 2014, $5.68/MMBtu; 2015, $4.64/MMBtu; 2016 1H $2.40/MMBtu. EIA and World Bank.

rebalancing of supply and demand, margins could remain in this trough while Atlantic Basin refiners battle it out.

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.

Contact: Gary Devenish
(832) 358-1453
gary.devenish@bakerobrien.com