

**BAKER & O'BRIEN**  
I N C O R P O R A T E D

**AVERAGE U.S. MARGINS INCREASE AS MORE REFINERIES BENEFIT FROM PRICE-DISCOUNTED DOMESTIC CRUDE OILS**

**Resolving the Mid-Continent Crude Oil Surplus: Will Rail Transport Still Be Relevant in 2015?**  
*Houston, October 26, 2012*

Baker & O'Brien, Inc.'s third quarter 2012 release to *PRISM*<sup>1</sup> subscribers reflects stronger margins in PADDs 2 and 3 and reasonably stable margins elsewhere. The benefits of price-discounted domestic crude oils expanded out to more refineries in the mid-continent and the U.S. Gulf Coast (USGC). Compared to the previous quarter, average cash margins<sup>2</sup> rose more than \$2/Bbl. - and more than \$3/Bbl. in PADDs 2 and 3. PADDs 1 and 5 showed large margin improvements over the same period last year.

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

	<u>12Q3 vs. 12Q2</u>	<u>12Q3 vs. 11Q3</u>
<b>PADD 1</b>	+0.92	+5.67
<b>PADD 2</b>	+3.06	+2.21
<b>PADD 3</b>	+3.03	+3.31
<b>PADD 4</b>	-0.76	-0.01
<b>PADD 5</b>	-0.89	+2.89
<b>U.S. Overall</b>	<b>+2.18</b>	<b>+3.24</b>

Although the benchmark light-heavy spread (LLS-Maya) declined by about \$2/Bbl. from the same period last year, this was still sufficient to provide coking refineries with modestly positive cash margins. More significantly, the average third quarter USGC LLS 6321 crack spread increased by over \$4/Bbl. from the same period last year. The September crack spread was even higher, reaching \$12.16/Bbl. These improvements reflect stronger Atlantic Basin refining fundamentals, as well as an increasing domestic crude oil price advantage. The LLS price averaged \$109.40/Bbl. - a discount of about \$0.20/Bbl.

to North Sea Brent. This was well below the LLS five-year average price of Brent + \$3/Bbl. Thus, many USGC refineries are now enjoying more than a \$3/Bbl. advantage over Atlantic Basin competitors processing crudes tied to the Brent price. The “envelope”

**Key Refining Margin Metrics, \$/Bbl.**

	<u>2012</u>	<u>2012</u>	<u>2011</u>	<u>2011</u>	<u>2010</u>
	<u>Sept</u>	<u>Q3</u>	<u>Q3</u>	<u>Annual</u>	<u>Annual</u>
WTI	94.45	<b>92.11</b>	89.70	95.05	79.39
LLS	112.99	<b>109.40</b>	112.61	112.33	82.83
LLS – Maya	12.39	<b>11.91</b>	14.02	13.66	12.59
USGC LLS 321*	16.73	<b>14.26</b>	9.65	6.15	8.21
USGC LLS 6321**	12.16	<b>10.21</b>	5.95	3.52	2.46
Chicago WTI 321***	39.87	<b>37.51</b>	34.54	25.55	10.11

\*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

of domestic refineries having access to cost-advantaged domestic crude oils continues to expand.

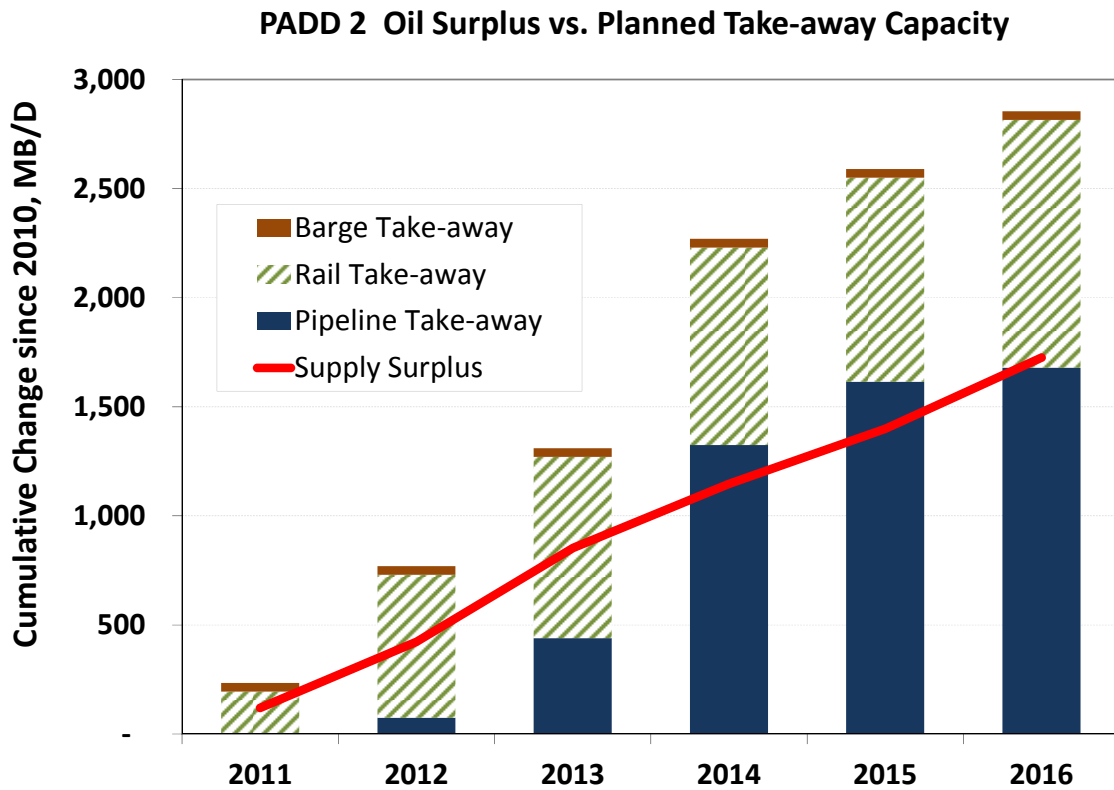
Mid-continent crude oils continue to trade at a significant discount to coastal grades, as rapid expansion of tight oil production has outstripped the ability of the transportation infrastructure to

<sup>1</sup> *PRISM*<sup>TM</sup> 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.

<sup>2</sup> Net Cash Margin (Refinery EBITA), \$/Bbl. of input.

move it to the large refining centers (the “take-away” capacity). A significant volume of mid-continent crude oil is now moving by rail, and new pipeline and rail projects have been announced to increase take-away capacity. Baker & O’Brien has recently completed several crude oil supply/demand/pricing studies, and in this quarter update we take a closer look at the likely future PADD 2 crude oil balance based on these announcements.

The following chart depicts one potential scenario. The red line shows the cumulative change in the PADD 2 crude oil surplus (domestic crude oil production + imports from Canada less PADD 2 crude runs) compared to the cumulative change in take-away capacity (the bars) based on the announced projects.



As illustrated above, rail transportation is essential in moving the domestic mid-continent crude oil surplus through 2013. However, assuming all the announced projects proceed, pipeline take-away capacity alone may be adequate to carry the incremental barrels by as early as 2014 (reflecting the Seaway Pipeline reversal at full capacity, and completion of the Keystone XL southern leg and Seaway expansion projects). Obviously, this scenario could change significantly if crude oil production expands beyond the current forecast (which a number of analysts are now projecting) and/or some of the “announced” take-away projects do not proceed or are delayed in implementation. In such a case, the surplus might continue to exceed the pipeline take-away capacity. Assuming the indicated scenario does transpire, it suggests that the new - and more expensive - rail facilities may become underutilized. However, there are a number of factors that might mitigate this and support continued outbound rail flows.

- **LLS/Brent price differential.** Increasing flows of light, sweet crude oils into the USGC (e.g., from the Eagle Ford, the Permian, and other easily accessible areas) could cause an even steeper decline in LLS price vs. Brent to the point that traditional volumes of

medium sour crude oil imports begin to be backed out. While all-in rail freight rates out of North Dakota and Canada to the East and West Coasts may exceed pipeline tariffs to the USGC, crude oil price premiums on the East and West Coasts could help in offsetting the higher rail freight costs. Thus, price relationships on the East and/or West Coasts might be such that an economic incentive exists for rail shipments to these areas, even though pipelines to the USGC are not running at full capacity.

- **Marginal economics.** When optimizing refinery feed slate and operating rates, marginal economics tend to drive decisions. Refiners have invested, to varying degrees (either directly, or indirectly via term contracts), in infrastructure (pipeline, rail cars, rail car loading/unloading facilities). These up-front investments (“sunk money”) typically do not factor into short-term optimization decisions. As such, some refiners may be in a position in which marginal rail costs are below marginal pipeline costs.
- **Flexibility.** Rail transportation offers some flexibility not afforded by pipelines. For example, it can provide multi-refinery companies with options to optimize crude oil sourcing and processing which a single destination pipeline may not offer.

Continued production growth in several crude oil basins in the U.S. is expected to improve the global competitiveness of an increasing number of domestic refineries. However, the ability to ramp up take-away capacity to deal with what is expected to be an ongoing mid-continent crude oil surplus will be an important factor in which refineries benefit the most from the changing market dynamics.

#### 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 and 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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