U.S. Oil & NGL Fundamentals

-- Shale Liquids Moving From Excess to Exports --

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U.S. Liquids Undergoing a Shale Supply Shift

New Infrastructure Lowers Regional Differentials

But a Bottlenecked Border Drives U.S. Downstream Advantages

Product Exports Monetize Excess

U.S. Retools to Import Low, Export High

Questions and Answers
U.S. Liquids Shale Supply Shift
Shale liquids moving from excess to exports
U.S. Crude Oil Supply Shift - An unprecedented hockey stick pattern since 2010
The NGL Supply Shift - Lags crude due to processing plant construction timelines

Source: Stratas Advisors analysis, EIA data
U.S. liquids supply growth expectations
Supply gains continue as producers selling into an increasingly flush market

- We expect total 2017 liquids production to exceed 12 MMb/d in the U.S
- Light crude oil production is likely to exceed 9.8 MMb/d
- NGLs should average 3.9 MMb/d while lease condensate will likely exceed 1.1 MMb/d

Source: Stratas Advisors, North American Unconventional Oil (NAUO 2014)
Lower Differentials via New Infrastructure
Crude differentials narrowed

Double digit differentials eradicated as new infrastructure comes into service

Source: Stratas Advisors, Hart Energy Rextag, Bloomberg, 10/14/14

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Rapid U.S. crude infrastructure expansion

Crude by Rail matches quick ramp timelines of new shale plays

- We expect crude by rail (CBR) to remain a dynamic midstream contributor to the N. American logistics portfolio, although at higher costs due to new tanker specifications and rules related to testing/categorization/staffing.

- We see more developers building interconnected multi-modal terminals to transload pipelined barrels onto railcar for delivery to end-use refiners.

- We expect maturation of shale plays will lead to greater pipeline investment including integration with CBR operations. Price differentials will fall to transport tariffs at more perfect equilibrium.

### 5-Year Forward NAUO 2014 Forecast (thousand b/d)

<table>
<thead>
<tr>
<th>Type</th>
<th>Forecast</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rail loading – U.S.</td>
<td>4,695</td>
</tr>
<tr>
<td>Rail loading – W. Canada, unrisked</td>
<td>1,102</td>
</tr>
<tr>
<td>Rail loading – U.S. Bakken, unrisked</td>
<td>1,623</td>
</tr>
<tr>
<td>Rail loading – Niobrara, unrisked</td>
<td>1,159</td>
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<tr>
<td>Rail loading – Utica, unrisked</td>
<td>228</td>
</tr>
<tr>
<td>Rail loading – Permian/Panhandle, unrisked</td>
<td>937</td>
</tr>
<tr>
<td>Rail loading – Eagle Ford, unrisked</td>
<td>380</td>
</tr>
<tr>
<td>Rail loading – Cushing Area, unrisked</td>
<td>141</td>
</tr>
<tr>
<td>Rail loading – Woodford, unrisked</td>
<td>226</td>
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<tr>
<td>Rail offloading – PADD U.S.</td>
<td>6,657</td>
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<tr>
<td>Rail offloading – E. Canada</td>
<td>290</td>
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<tr>
<td>Rail offloading – PADD 1</td>
<td>1,494</td>
</tr>
<tr>
<td>Rail offloading – PADD 2</td>
<td>846</td>
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<tr>
<td>Rail offloading – PADD 3</td>
<td>2,589</td>
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<tr>
<td>Rail offloading – PADD 4</td>
<td>35</td>
</tr>
<tr>
<td>Rail offloading – PADD 5</td>
<td>1,693</td>
</tr>
</tbody>
</table>

Source: Stratas Advisors - North American Unconventional Oil (NAUO 2014)
Our NGL service models impacts of 600+ projects & plants

New NGL infrastructure remaking this market as has already happened for crude oil

Incremental C2 & C5+ Export Pipelines

- **Vantage**: 40 Mb/d (potential 60 Mb/d)
- **Cochin (Condensate)**: 50 Mb/d
- **Mariner West**: 50 Mb/d (80 Mb/d potential)
- **Mariner East 1**: 75 Mb/d
- **Utopia/Cochin East**: 50 Mb/d (75 Mb/d potential)
- **ATEX Express**: 190 Mb/d (285 Mb/d potential)

*Incremental capacity if expanded to full potential

Source: Stratas Advisors, 2014 U.S. NGL Service, Company Information

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Bottlenecked Border Drives Downstream Activity
U.S. expanding crude refineries & condensate splitters

Crude & condensate processing expansions can convert U.S. excess to exports

888,000 b/d of potential light processing capacity expansion concentrated in PADDs 2, 3 & 4

- PADD 4 - Crude, 53,000 b/d, 6%
- PADD 3 - Crude, 300,000 b/d, 34%
- Condensate Splitters, 400,000 b/d, 46%
- PADD 2 - Crude, 135,000 b/d, 15%
- PADD 3 - Condensate, 240,000 b/d, 27%
- PADD 2 - Condensate, 160,000 b/d, 18%

Source: Stratas Advisors, EIA, Company Information, Media Reports
Ownership of U.S. refineries to change


- Ownership changes should be anticipated for several key U.S. & Canadian refineries that represent a combined 1.7 million barrels per day of crude distillation capacity. This presents a material opportunity for the North American domestic oil production industry to capture market share from importers.

- Changes in light crude refinery ownership will likely trigger changes in light crude supply relationships. Crude supply changes will likely be seen at the Come-by-Chance & Citgo Lemont refineries if sale transactions close. As new rail, pipeline & marine logistics relieve regional bottlenecks & as supply ramps inland & offshore, we expect crude-on-crude competition between U.S. & Canadian grades.

- Crude slate changes will likely be most notable at light oil refineries that gain access to crude options from multiple light tight oil plays or upgraders. If & when new owners take over PdVSA’s shares in the 4 heavy high-acid crude refineries listed below, they could seek new flexibility & access to run a higher slate of discounted Canadian heavy crude oil. In 2013, these 4 refineries imported 366 Mb/d of Venezuelan heavy crude oil, which was 52% of U.S. heavy Venezuelan imports.

<table>
<thead>
<tr>
<th>Refinery</th>
<th>Old Owner</th>
<th>New Owner</th>
<th>Crude Displacement Opportunity</th>
<th>Crude Distillation Design Capacity, Mb/d</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Come-by-Chance Refinery</td>
<td>Harvest Operations Corp.</td>
<td>SilverRange Financial</td>
<td>Offshore light.</td>
<td>115</td>
<td>Operational</td>
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<tr>
<td>2  Lemont Refinery</td>
<td>CITGO Petroleum (PdVSA)</td>
<td>To be determined</td>
<td>Canadian light crude oil</td>
<td>167</td>
<td>Operational</td>
</tr>
<tr>
<td>3  Corpus Christi Refinery</td>
<td>CITGO Petroleum (PdVSA)</td>
<td>To be determined</td>
<td>Venezuelan crude</td>
<td>165</td>
<td>Operational</td>
</tr>
<tr>
<td>4  Sweeny Refinery</td>
<td>JV of Phillips 66 / PdVSA</td>
<td>To be determined</td>
<td>Venezuelan crude</td>
<td>168</td>
<td>Operational</td>
</tr>
<tr>
<td>5  Lake Charles Refinery</td>
<td>CITGO Petroleum (PdVSA)</td>
<td>To be determined</td>
<td>Venezuelan crude</td>
<td>425</td>
<td>Operational</td>
</tr>
<tr>
<td>6  Chalmette Refinery</td>
<td>JV of Exxon Mobil / PdVSA</td>
<td>To be determined</td>
<td>Venezuelan crude</td>
<td>192</td>
<td>Operational</td>
</tr>
<tr>
<td>8  Torrance Refinery</td>
<td>ExxonMobil Corp.</td>
<td>To be determined</td>
<td>Diverse domestic slate.</td>
<td>150</td>
<td>Operational</td>
</tr>
</tbody>
</table>
U.S. petchem industry expands on advantaged liquids

Cost-advantaged U.S. shale gas & NGL = low cost fuel & feed for chemical makers

Source: Stratas Advisors – 2014 U.S. NGL Service
And now, lease condensate export infrastructure too

What are the requirements & potentials for field condensate exports?

Schematic of a Condensate Stabilizer
- Three marketable streams from one hard to handle field stream -

- Marketable rich sales gas is compressed & injected into high pressure gas pipeline. Predominantly C1, but also contains small fractions of C2 to C4.
- Marketable Y-Grade NGL mix to pipeline. Contains C2 to C4.
- Marketable Stabilized Condensates or C5+. Outlet volume is approximately 70% of inlet volumes. Can be moved by liquid pipeline, rail tanker car or tanker trucks.

High pressure bullet tanks for raw field condensate

Stripper Column: Gas-fired hot oil heater provides heat for condensate distillation. Gas is purchased. Reboilers transfer heat without fluid inter-mixing. Electric drive pumps keep fluids in motion. Plant can be powered by distributed generation or by purchased electricity.

Stabilizer Column

Atmospheric storage tanks for stabilized condensate

Source: Stratas Advisors - 2014 U.S. NGL Service, Company Information
U.S. Product Exports Monetize Excess
U.S. demand swamped by shale supply shift

Cascade of light crude to U.S. refineries meets stagnant fuel demand

- Gasoline demand drops 100 Mb/d lower by 2017 when accelerated declines begin
- Demand for middle distillates (including jet fuel) to increase slightly
- We expect combined total U.S. fuel demand to begin structurally declining post-2015

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U.S. refiners rely on imported heavy crude supplies

U.S. 2013 heavy crude imports (3,758 Mbbl/d total) nearly flat with 2012

- Demand for heavy crude is nearly light-crude inelastic. The U.S. imported essentially the same volume of heavy crude oil in 2013 as compared to 2012 (3,758 MMbbl/d versus 3,763 MMbbl/d, respectively).

- A review of the regional data shows little surprise. Easy access & refinery coker project completions & operations drove PADD 2 imports upward at a 16% growth rate. Despite the rush of light crude to the U.S. Gulf Coast refining region, the demand for heavy crude oil by the region’s refineries held above 2 million barrels in 2013 (2.025 Mb/d of heavy crude imports in 2013 versus 2.146 Mb/d in 2012).

- Heavy crude oil imports into PADD 5, however, showed a small & temporary increase in 2013 over 2012 rates. On the West Coast, the 2013 heavy import rate of 324 Mbbl/d beat the 2012 rates by 3%. PADD 5 refiners gave back that gain & more this year in 2014 to date. The available data through May data shows PADD 5 heavy crude imports sank 18% to 266 MMbbl/d in a period when imports as a whole of heavy crude into the U.S. as a whole sank 4.5% below the 2013 full year numbers.

Source: Stratas Advisors, EIA
U.S. shale can still displace light & intermediate supply

We see running room to back out overall U.S. supplies of offshore imports

- Based on our models for future crude oil production, midstream deliverability and refinery utilization, we expect U.S. imported crude oil volumes to decline.
- Logistics must be available to clear any overhang and to distribute crude across the continent so that U.S. crude prices avoid significant decline.
- U.S. producers can also expect Eastern Canadian refineries to seek more U.S. discounted crude to back out costlier offshore imports of light oil.

U.S. Imports of Crude Oil
(Thousand b/d)

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<tbody>
<tr>
<td>Volume</td>
<td>7,636</td>
<td>6,921</td>
<td>6,273</td>
<td>6,130</td>
<td>5,659</td>
<td>5,369</td>
</tr>
</tbody>
</table>

Source: Stratas Advisors: North American Unconventional Oil (NAUO 2014)
How low can U.S. intermediate crude imports go?

U.S. 2013 intermediate crude imports (2,935 Mbbl/d total)

- Better availability of U.S. light crudes can be blended with Canadian heavy crudes to form blended intermediates. Imports of intermediate crudes into U.S. refineries took a sizable hit in 2013, declining 10% to 2.935 Mb/d from 3.243 Mb/d in 2012.

- Over 2013, the largest drop of intermediate crude oil imports was seen in PADD 3 (-231 Mb/d) followed by declines in PADD 1 (-58 Mb/d)

- 2013 imports of intermediate crude into the remaining three regions held relatively firm, with combined 2013 imports dropping just 18 Mb/d from the combined 2012 levels.

- We anticipate further declines in offshore intermediate imports as more U.S. light production comes to market & as multimodal logistics improve from Canada (via new pipeline, rail & marine tankers options).

Source: Stratas Advisors, EIA
U.S. Retools to Import Low, Export High
U.S. now a net exporter of refined products

Since 2010, shale supply gains have established U.S. as fuel export superpower

Source: Stratas Advisors, EIA
NGL export infrastructure getting put to work

We expect cost-advantaged U.S. NGL to supply global markets

• Of the 600+ infrastructure projects we have included in our models, we see all purity product exports occurring via pipeline, rail and marine terminals now operating or under construction.

• Feeding those export facilities are pipelines, storage facilities, tank farms, ship builders, tanker car makers, fractionation plant operators, de-ethanizer developers, and more.

Source: Stratas Advisors - 2014 U.S. NGL Service, Company Information
U.S. now a net exporter of purity NGLs

Since 2010, shale supply gains have established U.S. as NGL export superpower

Source: Stratas Advisors, EIA
U.S. still a deep net importer of crude oil

But crude supply shift has enabled lower import reliance and higher product exports

Source: Stratas Advisors, EIA
Combined net liquids imports versus demand

Meeting U.S. liquids demand requires less and less net imports

Source: Stratas Advisors, EIA
U.S. not energy independent but more energy secure

The 20% threshold in view

**EIA’s Oct 7 2014 STEO shows 19.4% in Dec. ’14 and 15.1% in Dec. ’15.**

"The Deutch Mark" – John Deutch’s 20% import target as an acceptable goal for U.S. energy security
Petroleum import cost forecast this decade cut over $1.3 trillion

“The future ain’t what it used to be.” - Yogi Berra

Net Crude Oil & Petroleum Products Import Expenditures now seen $1.3 trillion lower in 2014 vs. 2009 Annual Energy Outlook

In 2009 AEO, 10 year sum was seen at $3.83 trillion. AEO 2014 now sees as $2.46 trillion.

Source: Stratas Advisors, EIA
Questions & Answers

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