U.S. Unconventional Crude Oil Fundamentals

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by
Greg Haas, Hart Energy, Manager of Research,
Integrated Oil & Gas Markets
Hart Energy Research, Houston, Texas
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An Interesting Week ...

- **Valero Energy** to build 90 kb/d crude topper, buy 2000 railcars– 1/8/13
- **Phillips 66** cuts 5-year, 50 kb/d Bakken to NJ Crude By Rail Deal - 1/8/13
- **Cenovus** Doubling Oil Sands Rail Deliveries – 1/9/13
- **Enbridge & Enterprise Product Partners** Expects Startup of 250,000 b/d Seaway Expansion – 1/9/13
- **6 Midstream/Downstream Firms** Raise Equity in Capital Markets. The Window is Open!
- **Tesoro Corp.** Ceases Refining in Hawaii since no Access to Shale Oil or Shale Gas– 1/8/13.
- **Saudi Oil Output** Cut 5% in December 1/10/13
- **Venezuela** Postpones Inauguration 1/8/13
An Interesting Decade - Oil & Gas

10 Years of U.S. Spot Prices

Source: Hart Energy Research, Bloomberg data

Source: Hart Energy Institutional Research analysis of data by Bloomberg
An Interesting Decade - Rigs

10 Years of U.S. Rig Counts

Source: Hart Energy Institutional Research analysis of data by Baker Hughes
An Interesting Decade – Overlaid

10 Years of U.S. Rig Counts


Oil

Gas

Natural Gas

Source: Hart Energy Research, Bloomberg data.

NGL Natural Gas
0
400
800
1,200
1,600
2,000

$12.00/MMBtu
$8.00/MMBtu
$4.00/MMBtu
$0.00/MMBtu
Capping Off An Interesting Century ... Gas Production

Source: U.S. Energy Information Administration
Capping Off An Interesting Century ... Oil Production

U.S. Field Production of Crude Oil

Source: U.S. Energy Information Administration
New Technology Today - Upstream

Horizontal Drilling
Hydraulic Fracturing
And Now,
Pad Drilling

Image Credit: Chesapeake / Statoil.
New Technology Today - Midstream

Fusion Bond Epoxy (FBE)

Offers Enhanced Coating Protection

Source: Bridger Pipeline, LLC (True companies, Casper, WY).
New Technology Today – Midstream

Crude by Rail Offers Scalability, Flexibility, Coverability

Matched to Incremental Unconventional Production Gains

Image Courtesy of Rangeland Energy LLC
Hart Energy Research: Refining Unconventional Oil

- Annual, Regional Crude-Side View of U.S. Integrated Oil
- Independent Analysis of Capacities 2012 to 2016
- Crude Production, Pipelines, Rail, Storage & Refining
- Conceptual outlook for the pending Cushing Coast crude pileup

Print & PDF format with Excel data

Users to date:
- E&C/Vendors
- Refiners
- Midstream Strategists
- Traders
- Investors
- Upstream Producers
Integrated U.S. Analysis

Scope
Annual Crude Oil Balances for Next 5 Years
Analysis of U.S. as a whole and 5 PADD sub-regions

Source: Hart Energy Research, “Refining Unconventional Oil”
Differentials with a Distinction

Market is repricing amid misalignment of new oil supplies that are seeking access to legacy refiners

Source: Hart Energy Institutional Research, Bloomberg, 1/9/13
New Supply, Existing Demand

Nearly ¾ of US Refining Asset Base is on the Nation’s Coasts.
 ➤ That’s Not Where the Oil-Bearing Shale Plays Are

Source: Hart Energy Research, “Refining Unconventional Oil”
Midstream Supercycle

Reconfiguring Legacy Pipelines For Rising Crude Oil Flows

9.2 Million b/d of Announced Intra-Regional Deliverability Improvements

Most Aiming at Gulf Coast Where 50%+ of Nation’s Refining Fleet Operates
Midstream Supercycle

An Emerging Crude-by-Rail Industry

55 Announced Crude-by-Rail Terminals Coast to Coast

Incremental barrels of unconventional crude by rail will soon reach each of the major coastal refining PADD regions and across the Midcontinent.

Source: Hart Energy Research, Refining Unconventional Oil

Image Courtesy of Rangeland Energy LLC
Shale & Tight Oil Advantages

U.S. Refiners See Advantaged Crude Costs, Higher Margins

Lower Crude Costs Mean Higher Refinery Crack Spreads and Profits

Source: Hart Energy Research, Refining Unconventional Oil
Shale & Tight Gas Advantages

Shale Gas – Lower Fuel Costs for Energy-Intensive Refining

**Estimated Global Landed LNG Prices**
July 2012, US$/MMBtu

Source: FERC, Waterborne Energy, Hart Energy Research
*Refining Unconventional Oil*

- U.S. average refiner consumes 0.43 mmBTU Natural Gas per crude barrel
- U.S. Refiners currently have ~$6.45/bbl advantage over like Asian competitors
Advantage Drives Expansion (... and vice-versa ...)

U.S. Downstream Capital Expenditures Rotate Into Light Crude & Crude Logistics to Improve Margins.

Update 1/10/13: Must Add 90,000 b/d for Valero in PADD 3

Source: Hart Energy Institutional Research, “Refining Unconventional Oil”
U.S. Energy Independence?

Import Balance Must Consider Quality AND Quantity

† Light shale oil cannot directly replace heavy oil ‡

2011
4,424,849 b/d

2012
4,003,200 b/d

OPEC Light, 964 kb/d

OPEC Heavy, 1,223 kb/d

OPEC Intermediate, 2,238 kb/d

Source: Hart Energy Institutional Research analysis of EIA Monthly Data

<table>
<thead>
<tr>
<th>YOY Import Gains (Jan to Oct periods)</th>
<th>kb/d</th>
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<tbody>
<tr>
<td>ALGERIA</td>
<td>-66.5</td>
</tr>
<tr>
<td>ANGOLA</td>
<td>-98.9</td>
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<tr>
<td>ECUADOR</td>
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<tr>
<td>IRAQ</td>
<td>3.1</td>
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<tr>
<td>KUWAIT</td>
<td>125.1</td>
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<tr>
<td>LIBYA</td>
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<tr>
<td>NIGERIA</td>
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<tr>
<td>QATAR</td>
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<tr>
<td>SAUDI ARABIA</td>
<td>200.2</td>
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<tr>
<td>UAE</td>
<td>-6.7</td>
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<tr>
<td>VENEZUELA</td>
<td>-190.8</td>
</tr>
<tr>
<td>OPEC Total</td>
<td>-421.7</td>
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</tbody>
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That’s 9.5% below 2011 OPEC Imports of 4.42 million b/d
Findings

Key Report Findings

• U.S. Unconventional Supply Growth
• Midstream Investment Supercycle
• Light Crude Refinery Expansion
• Advantage via Both Unconventional Gas & Oil
• Declining Imports, Gulf Coast Prices

Source: Hart Energy Institutional Research, Refining Unconventional Oil
U.S. CRUDE OIL FUNDAMENTALS

THANK YOU

Greg Haas
Manager of Research
Integrated Oil & Gas
Hart Energy Research
Houston, Texas USA

ghaas@hartenergy.com

713-260-5201