Latest Data and the Fate of Crude by Rail

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GENSCAPE

Brief Overview
Genscape: How do they do it?

Genscape uses thermal and visual imagery to measure storage volumes.

Genscape provides measured data on pipeline flows.

Genscape monitors activity at refineries to detect shutdowns, upsets, and flaring.

Genscape Vesseltracker monitors vessel movements around the globe.
### Monitoring Stats – North America

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil Storage</td>
<td>371mn bbls, weekly ~1900 tanks/week</td>
</tr>
<tr>
<td>Crude Oil Pipeline</td>
<td>12.5 mn bpd, 2x/hr, 50 pipelines</td>
</tr>
<tr>
<td>Crude by Rail</td>
<td>2 mn bpd loading, daily 1.7 mn bpd unloading, daily</td>
</tr>
<tr>
<td>Refineries</td>
<td>13.6 mn bpd, 12x/hr (80% US) 470+ units</td>
</tr>
<tr>
<td>Product Tanks (Gasoline, Jet, Diesel, Ethanol)</td>
<td>65mn bbls, weekly ~660 tanks</td>
</tr>
<tr>
<td>NGL Processing</td>
<td>59 units, 12x/hr</td>
</tr>
<tr>
<td>NGL Pipeline</td>
<td>2 mn bpd, 2x/hr</td>
</tr>
</tbody>
</table>
## Monitoring Stats – Europe

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crude Oil Storage</td>
<td>100mn bbls, weekly ~200 tanks/week</td>
</tr>
<tr>
<td>Crude Oil Pipeline</td>
<td>Forties Supply Chain Transalpine System</td>
</tr>
<tr>
<td>Refineries</td>
<td>5.1 mn bpd, 12x/hr 120+ units</td>
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<tr>
<td></td>
<td>- Belgium</td>
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<td>- Czech Republic</td>
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<td>- England</td>
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<td></td>
<td>- Netherlands</td>
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<tr>
<td></td>
<td>- Scotland</td>
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<tr>
<td></td>
<td>- Spain</td>
</tr>
<tr>
<td>Product Tanks</td>
<td>16.5mn MT, weekly ~1,270 tanks</td>
</tr>
<tr>
<td>(Gasoil, Gasoline, Jet)</td>
<td></td>
</tr>
</tbody>
</table>
Cushing – A History
Cushing, OK
Genscape vs EIA Storage Methodology

Monthly Cushing Stocks Change Comparison

- EIA Change
- Genscape Change
• Added ~4.92mn bbls capacity since April 2015

• Highest utilization and storage level on May 13, 2016:
  • 80.64%, 70.945mn bbls
Cushing Connected Pipeline Capacity Changes

Genscape Monitoring
Total: 92%
Outgoing: 86%
Incoming: 96%
Cushing Connected Pipeline Utilization

Incoming Utilization | Outgoing Utilization

Mar-16 | Apr-16 | May-16 | Jun-16 | Jul-16 | Aug-16 | Sep-16
Beyond Cushing – Come on down!
• Genscape monitors ~55% PADD 3 Capacity

• LOOP = 67-69mn bbls capacity
PADD 3 storage capacity grew 530,000 barrels per week H1 2016 and 525,000 barrels per week H2 2015
More than 11mn bbls of additional tank capacity within the next year
US Storage

**Capacity Utilization**
*Sept. 30, 2016*

- **PADD 1**: 68.11%
- **PADD 2**: 66.68%
- **PADD 3**: 62.89%
- **PADD 4**: 63.61%
- **PADD 5**: 63.83%
- **US**: 61.14%

**Available Capacity**
*Adjusted for pipeline fill, assumes 80% utilization limit*
*Sept. 30, 2016*

- **PADD 1**: 51.5452
- **PADD 2**: 23.184
- **PADD 3**: 3.8428
- **PADD 4**: 4.485
- **PADD 5**: 0%
- **US**: 89.9932

- **EIA Utilization Sept 30**: 68.11%
- **Genscape Utilization Sept 9**: 61.14%
Fires and Floods OH MY!
Canadian Wildfire Impact

- Reduced Western Canadian production compounded with planned maintenance
- Reduced outgoing pipeline flows: Keystone, Enbridge Mainline
- Reduced Western Canadian stocks
- Increased USGC to Eastern Canada waterborne movements
- Increased Capline pipeline flow
- Elevated WTI Price
Production Declines

Western Canada Heavy and SCO Production (mn bpd)
Reduced Outgoing Pipeline Volumes and Draw from Storage

- **Keystone**
- **Mainline**

- **Alberta Heartland**
- **Edmonton**
- **Hardisty**

Graphs showing pipeline volumes and draw from storage from January 2016 to September 2016.
USGC to the Rescue!

**USGC to Eastern Canada Waterborne Loadings**

- **2015**
- **2016**

**PADD 3 to PADD 2 Pipeline Flows**

- **2016**
- **2015**
WTI Impact

- **16-Feb-16, $29.04**
  - Preliminary Freeze Talks

- **17-Mar-16, $40.20**
  - Meeting rescheduled

- **18-Apr-16, $39.78**
  - OPEC Fails to reach agreement

- **2-Aug-16, $39.51**
  - WTI falls below $40/bbl

- **5-Aug-16, $41.80**
  - OPEC Production freeze talks rekindled

- **8-Jun-16, $51.23**
  - 11-month WTI high

- **8.2, 8.4, 8.6, 8.8, 9.0, 9.2, 9.4**

- **$-**

- **$10.00**

- **$20.00**

- **$30.00**

- **$40.00**

- **$50.00**

- **$60.00**

- **EIA Crude Oil Production Domestic Production mn bpd**

- **NYMEX Light Sweet Crude Oil (WTI) Futures Electronic (Front Month) $/bbl**
Louisiana Flooding
Louisiana Flooding – August 2016

Baton Rouge Total Motor Gasoline Rack Liftings (bpd)

PADD3 Total Gasoline Rack Liftings (bpd)

17, 1,046,473
Houston

34, 1,051,823
Louisiana

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Re refinery impact

Exxon – Baton Rouge 110,000 bpd CDU
St. James Rail

St. James Rail Unloadings (bpd)
The Fate of Rail
The Nail in the Coffin

### Major Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>In-Service Date</th>
<th>Capacity (bpd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keystone XL Bakkenlink</td>
<td>Uncertain</td>
<td>100,000</td>
</tr>
<tr>
<td>Dakota Access (DAPL)</td>
<td>Q4 2016</td>
<td>470,000</td>
</tr>
<tr>
<td>Upland Pipeline</td>
<td>2020</td>
<td>300,000</td>
</tr>
<tr>
<td>Davis Refinery</td>
<td>2018</td>
<td>55,000</td>
</tr>
</tbody>
</table>

### Graph Details

- **Production (MT/ND)**
- **With Rail (Estimate)**
- **Pipeline/Local Refinery Capacity**
West Coast is the Best Coast?

Tesoro - Anacortes
Happy Halloween!
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