Argus Americas crude summit recap

New Orleans, 14 March 2019
More than 400 attended the 11th annual Argus Americas Crude Summit

Crude market and quality highlights
WTI Houston passes LLS as main USGC light marker
Bottlenecks hit inland diffs, WTI Houston aligns with Brent

ICE Brent and WTI Midland v WTI Houston, $/bl

- Permian WTI output rising @ 75k/bbl per month; no new lines
- Plains brings Sunrise expansion online
- Enterprise bringing on NGL conversion
Bottlenecks shift from pipelines to docks
WCS Houston now a core Gulf coast price assessment

<table>
<thead>
<tr>
<th>All-day weighted average assessments</th>
<th>$/bl</th>
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</thead>
<tbody>
<tr>
<td><strong>Diff to WTI</strong></td>
<td><strong>Diff to LLS</strong></td>
</tr>
<tr>
<td>LLS St James</td>
<td>+8.10</td>
</tr>
<tr>
<td>WTI Cushing</td>
<td>-8.10</td>
</tr>
<tr>
<td>WTI Midland</td>
<td>-0.54</td>
</tr>
<tr>
<td>WTI Houston</td>
<td>+5.46</td>
</tr>
<tr>
<td>Mars Clovelly</td>
<td>+7.10</td>
</tr>
<tr>
<td><strong>WCS Hardisty</strong></td>
<td>-10.00</td>
</tr>
<tr>
<td><strong>WCS Cushing</strong></td>
<td>-2.50</td>
</tr>
<tr>
<td><strong>WCS Houston</strong></td>
<td>+1.00</td>
</tr>
</tbody>
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- Only WCS Houston is a market-set price for heavies in the US Gulf coast
- More than 93,000 b/d of reported trade in Feb ‘19 trade month
New crude flowing to Cushing from Rockies and Permian

Source: EIA on 25 January 2019

Cushing stocks rising again with contango and more inbound lines

Source: Andy Lipow, Argus Americas Crude Summit, January 2019
WTL (West Texas Light) is emerging

- Could be up to 600,000 b/d of production today
- Plains announced that lighter than 44 API can no longer be shipped/sold as WTI
- Enterprise and Magellan already have segregations established for WTL
- Trades of WTL at Midland are being reported to Argus – normally at a diff to WTI Midland
  - Eg: WTL Midland = WTI Midland -1.30 (done 3-13-19)
WTI pipeline assessment at Houston now going global

- Argus WTI Houston physical index @ MEH now used in international deals:
  - JXTG in Japan
  - CPC in Taiwan
  - PMI in Mexico
  - Others?

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WTI links USGC with NWE and Asia-Pacific
WTI influencing European and Asian markets

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<thead>
<tr>
<th>Differential to Dubai swaps</th>
<th>Basis</th>
<th>$/bl</th>
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<tbody>
<tr>
<td>WTI Houston, Asian timestamp (Apr)</td>
<td>Apr</td>
<td>-2.54</td>
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<tr>
<td>WTI Midland, Asian timestamp (Apr)</td>
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<td>-9.42</td>
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<tr>
<td>LLS, Asian timestamp (Apr)</td>
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<tr>
<td>Mars, Asian timestamp (Apr)</td>
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</table>

<table>
<thead>
<tr>
<th>Delivered northwest Europe assessments</th>
<th>Basis</th>
<th>Diff</th>
<th>Price</th>
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<tbody>
<tr>
<td>CPC Blend cif Rotterdam</td>
<td>Dated</td>
<td>+1.20</td>
<td></td>
</tr>
<tr>
<td>BTC Blend cif Rotterdam</td>
<td>Dated</td>
<td>+3.20</td>
<td></td>
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<tr>
<td>Saharan Blend cif Rotterdam</td>
<td>Dated</td>
<td>+1.20</td>
<td></td>
</tr>
<tr>
<td>Bonny Light cif Rotterdam</td>
<td>Dated</td>
<td>+3.55</td>
<td>+0.36</td>
</tr>
<tr>
<td>Qua Iboe cif Rotterdam</td>
<td>Dated</td>
<td>+3.35</td>
<td>+0.26</td>
</tr>
<tr>
<td>Escravos cif Rotterdam</td>
<td>Dated</td>
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<td>+0.36</td>
</tr>
<tr>
<td>WTI cif Rotterdam</td>
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<td>+0.55</td>
<td>63.87</td>
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<tr>
<td>US crude cfr China</td>
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<tr>
<td>Price</td>
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<tr>
<td>WTI Houston</td>
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<td>63.88</td>
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<tr>
<td>Mars</td>
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<td>65.31</td>
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<tr>
<td>WCS Houston</td>
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<td>59.74</td>
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Delivered prices: WTI, Mars and WCS at Ningbo

US Gulf coast price assessed by Argus

Argus proprietary freight price to Ningbo
US crude starting to replace Middle East grades in Asia

WTI Houston now lands cheaper than Murban in Asia

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US crude challenges Japan’s imports from Middle East

Asia-delivered WTI Houston diff to delivered Murban (five-day moving average)

> 0 Murban is more competitive
< 0 WTI Houston is more competitive

US crude of higher quality is now more competitive than most popular Middle Eastern grades for Japanese refiners
New North Sea Dated — a proposal

- Bonny Light, BTC Blend, Escravos, Qua Iboe, Saharan Blend and WTI cargoes traded on, or normalised to, a CIF Rotterdam basis, confirmed, reported and assessed.

- Assessed for delivery 12 days to one month ahead plus two days.

- Freight deduction Hound Point to Rotterdam, based on past five working days’ assessments and average API of delivered basket.

- This aligns the delivered market with the trading and pricing of FOB North Sea grades, Brent, Forties, Oseberg, Ekofisk and Troll.

- Quality adjustments at 60pc of difference between grade and lowest in basket (on FOB basis) two months previous to month of publication, for all grades in basket except Brent, Forties, Saharan Blend and WTI.
Why North Sea needs more transparency

Average monthly deal count underlying benchmark in 4Q 2018

- Argus WTI Midland: 446 deals
- Dubai Partials: 375 deals
- ASCI: 190 deals
- Argus WTI Houston: 190 deals
- Argus Mars: 139 deals
- North Sea Forwards: 108 deals
- Argus LLS: 81 deals
- Argus ESPO: 20 deals
- Dubai Physical: 13 deals
- BFOET Physical: 9 deals
- Urals NW Europe: 0 deals

*Forties crude most often sets benchmark; but Forties often goes to Asia, N Sea Brent price pulled up because Forties is in short supply, but there’s lots of other light sweet crude in the area
The proposed benchmark’s performance

North Sea Dated and New North Sea Dated, $/bl

New North Sea Dated

North Sea Dated
2018 – Bakken and WTI get new pipelines to the coast
US crude exports surge

US crude exports, mn b/d

- Canada
- Asia-Pacific
- Europe
- Other Americas
- Other

— EIA, Census Bureau
Volume on futures averages about 1/3 of Argus swaps

Daily volume on financial contracts at Houston

- **CME swap on Argus WTI Houston (HTT)**
- **CME Permian WTI Futures at Enterprise (HCL)**
- **ICE Permian WTI Futures at MEH (HOU)**
Industry hedges on Argus WTI Houston-settled swaps

Open interest for CME swap on Argus WTI Houston (in lots of 1,000 bl)

02-Apr-18 02-May-18 02-Jun-18 02-Jul-18 02-Aug-18 02-Sep-18 02-Oct-18 02-Nov-18 02-Dec-18 02-Jan-19 02-Feb-19

- Total WTI Houston on CME (HTT)
- WTI futures at Houston Enterprise (HCL) on CME
- WTI futures at Houston MEH on ICE (HOU)