AGENDA

• Key Themes
• Global Outlook
• US Crude Outlook
• US Nat Gas Outlook
• DI Play Assessments
KEY THEMES
KEY THEMES

- Macro themes supporting prices:
  - November sanctions against Iran (1.0-1.5 MMBbl/d)
  - Continued Venezuela declines.
  - Instability in Libya and Nigeria.

- Macro themes pressuring prices:
  - Continuing trade issues between the US, China and the EU.
  - Cancellation of Saudi Aramco’s IPO.
  - Expected higher production from OPEC and Russia (Venezuela’s quota shortfall).

- E&P’s living within cash flows, returning cash to shareholders, and reducing debt.
  - Recent price increases should prompt increases in 2H 2018 capital plans while battling service cost increases in the field.
  - Expect CAPEX in other basins as we await pipelines in Permian.
  - Permian Basin continues to undergo large-scale consolidation. The recent acquisitions by Concho, BP, & Diamondback are proof.
  - More consolidation will certainly take place as operators seek G&A, service cost, contiguous acreage, and operational efficiencies.

- US has great economics for both oil & gas directed shale drilling.
  - Highly economic parts exist in every major shale basin across the country (not only Permian).
  - Incremental volumes of oil, gas production moving forward will have to export.
GLOBAL OUTLOOK
IEA – WORLD ENERGY OUTLOOK

Growth in the Global Energy Mix from 2016-2040

Source: IEA 2017 World Energy Outlook, New Policies Scenario
IEA – WORLD ENERGY OUTLOOK

Key Takeaways

- Population expands from 7.4 billion today to more than 9 billion in 2040.
- Urbanization such that a city the size of Shanghai added to the world’s urban population every four months.
- Natural gas use rises by 45% to 2040
  - Limited room to expand in the power sector
  - Renewables capture two-thirds of global investment in power plants as they become the least-cost source of new generation.
  - Industrial demand becomes the largest area for growth for natural gas.
- A 630 bcm increase in US shale gas production over the 15 years from 2008 would comfortably exceed the highest sustained period of output growth by a single country in history.
  - By the mid-2020s, the United States become the world’s largest liquefied natural gas (LNG) exporter.
- 80% of the projected growth in gas demand takes place in developing economies, led by China, India and other countries in Asia
  - Helping to address widespread concerns over air quality.
Key Takeaways

- Liquefaction sites worldwide doubles by 2040
  - Additions coming from the United States and Australia, followed by Russia and Qatar.
- US offers destination flexibility, hub-based pricing and spot availability.
- This will allow the US to lead the change from indexed oil contracts to competitive pricing.
GLOBAL OIL SUPPLY/DEMAND

Start of persistent oversupply.

Peak oversupply.

Supply outages.

Start of production quotas.

Source: IEA MODS
LONG-TERM FORECAST: GLOBAL OIL SUPPLY/DEMAND

Source: DI ProdCast, IEA MODS, IEA OMR
POSSIBLE IMPACT OF IRANIAN SANCTIONS

After sanctions were lifted at the start of 2016, Iran was able to increase production ~1 MMBbl/d in a year.

During 2012-2015, under sanctions, Iranian production averaged 2,836 MBBbl/d.

If Iranian production goes back to average levels from prior to sanctions being lifted, there would be a 961 MBBbl/d drop from today’s levels.

There is a possibility that Iranian production will not decline as far as it did during the sanctions, especially if China & India continue to purchase Iranian crude.

Any trade tariffs would push these nations and others towards utilizing Iranian crude and my harm the prospects of US light crude in the area.

Source: IEA MODS
The situation & conditions on the ground in Venezuela has led to a steep, unexpected decline in the country’s production. Venezuelan production has dropped 790 MBbl/d from the peak since the quotas were instated to July.
During 2014, Libya was the catalyst that drove prices into a headfirst dive with unexpected increases in their production.

Throughout 2016, attacks on Nigerian infrastructure & Libyan port closures led to supply outages.

During 2017, as OPEC-12 cut production, the exempt Nigeria & Libya increased production > 600 MBbl/d, undermining the cuts.

Nigeria & Libya agreed to keep to maximum 2017 production levels in 2018. Outages have kept them below those levels by a collective 500 MBbl/d.

Source: IEA MODS
# OPEC: COMPLIANCE, SANCTIONS, & THE ADJUSTMENT

<table>
<thead>
<tr>
<th>Member</th>
<th>Quota (MBbl/d)</th>
<th>June 2018 (MBbl/d)</th>
<th>Compliance (MBbl/d)</th>
<th>Max. Prod. (MBbl/d)</th>
<th>Spare Cap. (MBbl/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saudi Arabia</td>
<td>10,058</td>
<td>10,460</td>
<td>-402</td>
<td>10,640 (Nov. 2016)</td>
<td>+180</td>
</tr>
<tr>
<td>Iraq</td>
<td>4,351</td>
<td>4,550</td>
<td>-199</td>
<td>4,680 (Dec. 2016)</td>
<td>+130</td>
</tr>
<tr>
<td>UAE</td>
<td>2,874</td>
<td>2,900</td>
<td>-26</td>
<td>3,180 (Dec. 2016)</td>
<td>+280</td>
</tr>
<tr>
<td>Kuwait</td>
<td>2,707</td>
<td>2,720</td>
<td>-13</td>
<td>2,940 (Aug. 2016)</td>
<td>+220</td>
</tr>
<tr>
<td>Venezuela</td>
<td>1,972</td>
<td>1,300</td>
<td>+672</td>
<td>2,610 (Jul. 2012)</td>
<td>+1,310</td>
</tr>
<tr>
<td>Angola</td>
<td>1,673</td>
<td>1,450</td>
<td>+223</td>
<td>1,850 (Aug. 2012)</td>
<td>+400</td>
</tr>
<tr>
<td>Algeria</td>
<td>1,039</td>
<td>1,050</td>
<td>-11</td>
<td>1,200 (Jan. 2012)</td>
<td>+150</td>
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<tr>
<td>Qatar</td>
<td>618</td>
<td>620</td>
<td>-2</td>
<td>750 (Sep. 2012)</td>
<td>+130</td>
</tr>
<tr>
<td>Ecuador</td>
<td>522</td>
<td>530</td>
<td>-8</td>
<td>560 (Sep. 2016)</td>
<td>+30</td>
</tr>
<tr>
<td>Gabon</td>
<td>193</td>
<td>200</td>
<td>-7</td>
<td>253 (Dec. 2012)</td>
<td>+53</td>
</tr>
<tr>
<td>Iran</td>
<td>3,797</td>
<td>3,790</td>
<td>+7</td>
<td>3,850 (Oct. 2016)</td>
<td>+60</td>
</tr>
<tr>
<td>Eq. Guinea</td>
<td>128</td>
<td>130</td>
<td>-2</td>
<td>272 (Jun. 2012)</td>
<td>+142</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>29,932</strong></td>
<td><strong>29,700</strong></td>
<td><strong>+232</strong></td>
<td><strong>32,785</strong></td>
<td><strong>+3,085 +982</strong></td>
</tr>
</tbody>
</table>

### Possible Impact of Iran Sanctions?

Avg. 2012-2015 Prod. 2,836 MBbl/d

If the “spare capacity” for all countries can come online & Iran goes back to average volumes during sanctions, OPEC-12 could reinstate 100% compliance with quotas.

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Source: IEA MODS

[Graph showing compliance percentages from 1/17 to 6/18 with notes on possible impact of Iran sanctions.]
US ON TRACK TO BECOME LARGEST PRODUCER OF CRUDE OIL

- Compliance with quotas Nov 2016 OPEC meeting soars to 150%+
  - Unexpected severity of declines in Venezuela; Libya port issues; Potential Iranian sanctions
- June 2018 OPEC meeting agreed to adjust production back to 100% compliance starting in July 2018.
- 700-750 MBbl/d of production back into the global market.
- Saudi Arabia and Russia
- Delays the US in reaching the top spot, but doesn’t stop it (robust economics, especially at $65+/Bbl
US OIL BREAKEVENS

WTI Breakeven ($/Bbl) @ 12.5% MARR & $2.75/MMBtu HH

Source: DI ProdCast
US RIG COUNT: TROUGH TO PEAK

- **Trough – May 4th, 2016**
  - 433 Active Rigs
- **Peak – July 17th, 2018**
  - 1,191 Active Rigs

Trough to Peak:
+758 Active Rigs

Source: DI Rig Analytics
EFFICIENCY GAINS

- Realized through longer laterals, optimized completions, and the shift to industrial-style exploitation of shale plays.
- Gains will continue to offset impact from increasing service costs

![Crude Oil Production Graph](image-url)

- **Crude Oil Production (Bbl/d)**
- **Permian**
- **Months on Production**
- **2011**
- **2012**
- **2013**
- **2014**
- **2015**
- **2016**
- **2017**
- **2018**

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### US DUC COUNT: BUILDING QUICKLY

<table>
<thead>
<tr>
<th>Region</th>
<th>DUC Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delaware</td>
<td>514</td>
</tr>
<tr>
<td>Midland</td>
<td>401</td>
</tr>
<tr>
<td>Appalachian</td>
<td>324</td>
</tr>
<tr>
<td>Williston</td>
<td>249</td>
</tr>
<tr>
<td>Gulf Coast</td>
<td>224</td>
</tr>
<tr>
<td>Anadarko</td>
<td>125</td>
</tr>
<tr>
<td>DJ</td>
<td>98</td>
</tr>
<tr>
<td>PRB</td>
<td>58</td>
</tr>
<tr>
<td>Mid-con</td>
<td>55</td>
</tr>
<tr>
<td>East Texas</td>
<td>31</td>
</tr>
<tr>
<td>Other</td>
<td>25</td>
</tr>
<tr>
<td>Piceance</td>
<td>13</td>
</tr>
<tr>
<td>San Juan</td>
<td>9</td>
</tr>
<tr>
<td>Fort Worth</td>
<td>6</td>
</tr>
<tr>
<td>North Park</td>
<td>3</td>
</tr>
<tr>
<td>Arkoma</td>
<td>2</td>
</tr>
</tbody>
</table>

*Only shows wells that were drilled before February 2018 but still remain uncompleted.*

Source: DI Rig Analytics
PERMIAN: OIL PRODUCTION VS. TAKEAWAY

Source: DI ProdCast, DI Market Intelligence
US PRODUCTION: GROWTH IN LIGHT CRUDE OILS

Crude Oil Production (MMBbl/d)

0-25°API  25-35°API  35-42°API  42-50°API  50+°API

Source: DI ProdCast
US CONFIGURED FOR HEAVIER CRUDES

Valero – Corpus Christi Example

Even Slate
- 50+°API Benchmark
- 200 MMBbl/d
- 14% Coking Capacity
- 11% Coking as % of Distillation (RHS)

Ultra Light Slate
- 50+°API Benchmark
- 200 MMBbl/d
- 4% Coking Capacity
- 4% Coking as % of Distillation (RHS)

- Gasoline: 81
- H. GO: 67
- Distillate: 40
- LPG: 2

- Gasoline: 96
- H. GO: 67
- Distillate: 24
- LPG: 3

- Even Slate: 9.92 MM$ Gate Value - 9.20 MM$ Feedstock Cost = 720 M$ Profit
- Ultra Light Slate: 9.69 MM$ Gate Value – 9.20 MM$ Feedstock Cost = 490 M$ Profit

Refinery would require $3.45/Bbl discount for every additional condensate barrel to make themselves whole again.

Source: EIA, OGJ, DI
US OIL EXPORTS: WEEKLY VOLUMES

Crude Oil Exports (MBbl/d)

Exports
Production

Source: EIA
US OIL EXPORTS: DESTINATIONS

Crude Oil Exports (MBbl/d)

Rest of World  Canada  China  Netherlands  Korea  Italy  UK

Source: EIA
US PRODUCTION: EXPORTS KEY

<table>
<thead>
<tr>
<th>Year</th>
<th>Production Growth (vs. Avg. 2017)</th>
<th>Avg. Exports</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>1.37</td>
<td></td>
</tr>
<tr>
<td>2020</td>
<td>3.67</td>
<td>3.36</td>
</tr>
<tr>
<td>2025</td>
<td>5.39</td>
<td>4.84</td>
</tr>
</tbody>
</table>

Source: DI Market Intelligence
US NAT GAS OUTLOOK
Dry Gas Production Forecast

US Dry Gas Production

Δ Dec to Dec (Bcf/d) →
Δ YoY (Bcf/d) →

2016-17
+7.30
+2.20
2017-18
+5.48
+7.67
2018-19
+2.00
+3.70
2019-20
+1.96
+2.15
2020-21
+1.92
+2.08
2021-22
+2.27
+2.43
2022-23
+2.08
+2.21

Year | WTI ($/Bbl) | HH ($/MMBtu)
-----|------------|------------
2019 | $60        | $2.60      
2020 | $60        | $2.60      
2021+| $60        | $2.65-$2.80

Source: DI ProdCast
Gas Breakevens Under $3.00/MMBtu

Gas Breakevens at $60 WTI

HH Breakevens ($/MMBtu) @ $60/Bbl

WTI & 12.5% MARR

Negative = Associated Gas

Other
Anadarko
Eagle Ford
Haynesville
Marcellus/Utica
Permian
DJ
Ft Worth
Williston

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NORTHEAST: GAS PRODUCTION VS. TAKEAWAY

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Pipeline</th>
<th>Capacity (Bcf/d)</th>
<th>Status</th>
<th>In Service</th>
<th>Source</th>
<th>Destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leach Xpress</td>
<td>Columbia Gas (TCO)</td>
<td>1.50</td>
<td>In Service</td>
<td>1/1/2018</td>
<td>OH, PA-West</td>
<td>Leach, OH</td>
</tr>
<tr>
<td>Rover Phase II</td>
<td>Energy Transfer (ET)</td>
<td>1.15</td>
<td>In Service</td>
<td>6/1/2018</td>
<td>MW</td>
<td>Canada</td>
</tr>
<tr>
<td>Atlantic Sunrise Phase 1B</td>
<td>Transco</td>
<td>0.45</td>
<td>Under Construction</td>
<td>7/1/2018</td>
<td>PA-North</td>
<td>NJ/MD</td>
</tr>
<tr>
<td>Atlantic Sunrise Phase 2</td>
<td>Transco</td>
<td>0.50</td>
<td>Under Construction</td>
<td>7/1/2018</td>
<td>PA-North</td>
<td>AL</td>
</tr>
<tr>
<td>Atlantic Sunrise Phase 3</td>
<td>Transco</td>
<td>0.35</td>
<td>Under Construction</td>
<td>9/1/2018</td>
<td>PA-North</td>
<td>AL</td>
</tr>
<tr>
<td>Nexus Gas Transmission</td>
<td>Nexus</td>
<td>1.50</td>
<td>Under Construction</td>
<td>9/1/2018</td>
<td>OH</td>
<td>Canada</td>
</tr>
<tr>
<td>Gulf Xpress</td>
<td>Columbia Gulf (CGT)</td>
<td>0.88</td>
<td>Under Construction</td>
<td>11/1/2018</td>
<td>WV</td>
<td>LA</td>
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<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>6.33</strong></td>
<td></td>
<td></td>
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Source: DI ProdCast, DI Market Intelligence
PERMIAN: TAKEAWAY VS. GAS PRODUCTION

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Developer</th>
<th>Capacity (Bcf/d)</th>
<th>Status</th>
<th>In Service</th>
<th>Destination</th>
<th>Interconnects/Shippers</th>
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<tbody>
<tr>
<td>Pecos Trail</td>
<td>Namerico, Cresta Fund I</td>
<td>1.85</td>
<td>Announced</td>
<td>3Q’19</td>
<td>Agua Dulce</td>
<td>Valley Crossing, NET Mexico, Corpus Christi LNG</td>
</tr>
<tr>
<td>Permian to Katy (P2K)</td>
<td>Sempra, Boardwalk</td>
<td>2.00</td>
<td>Negotiating Agreements</td>
<td>Mar-2020</td>
<td>Katy/HSC</td>
<td>Sempra G&amp;P Mktg (250), Other (200)</td>
</tr>
<tr>
<td>Bluebonnet</td>
<td>Bluebonnet Market Express</td>
<td>2.00</td>
<td>Announced</td>
<td>Nov-2020</td>
<td>Katy</td>
<td>Transco</td>
</tr>
<tr>
<td>Whistler Pipeline</td>
<td>NextEra, Targa, WhiteWater, MarkWest</td>
<td>2.00</td>
<td>Announced</td>
<td>Nov-2020</td>
<td>Agua Dulce</td>
<td>Agua Blanca</td>
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<tr>
<td>Permian Highway</td>
<td>KM, EagleClaw, Apache</td>
<td>2.00</td>
<td>Announced</td>
<td>Dec-2020</td>
<td>Gulf Coast/Mexico</td>
<td></td>
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<tr>
<td>Permian Global Access</td>
<td>Tellurian</td>
<td>2.00</td>
<td>Announced</td>
<td>2022</td>
<td>LA Gulf Coast</td>
<td>Driftwood LNG</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>13.83</strong></td>
<td></td>
<td></td>
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</tbody>
</table>

Source: DI ProdCast, DI Market Intelligence
Gas Flaring in North Dakota

ICO-24665 gas capture regulation implemented

88% gas capture (Nov. 2018)

Source: www.nd.gov, DI
North Dakota Processing Plant Capacity

North Dakota Natural Gas Processing Capacity

Source: www.nd.gov

Bcf/d


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Permian: Gas Flaring Trends

Recent growth in Permian Flared gas ratios

Permian Gas Production and %Flared

Source: TXRRRC
LONG-TERM NG FORECAST: US SUPPLY/DEMAND

US Gas Supply/Demand (Bcf/d)

2018: 22.6
2019: 22.3
2020: 22.3
2021: 22.6
2022: 22.7
2023: 22.8

Source: DI ProdCast, DI Market Intelligence
## LONG-TERM FORECAST: EXPORTS TO MEXICO

<table>
<thead>
<tr>
<th>Project Name</th>
<th>Operator</th>
<th>Status</th>
<th>In-Service Date</th>
<th>Capacity (Bcf/d)</th>
<th>Basin</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nueva Era Pipeline</td>
<td>Howard Mexico</td>
<td>Under Construction</td>
<td>10/1/2018</td>
<td>0.50</td>
<td>Eagle Ford</td>
<td>Pushed back start date from 2017.</td>
</tr>
<tr>
<td>South Texas Expansion Project (STEP)</td>
<td>Enbridge</td>
<td>Under Construction</td>
<td>10/1/2018</td>
<td>0.40</td>
<td>Eagle Ford (US project)</td>
<td>Initially expected to come online in May 2017.</td>
</tr>
<tr>
<td>Sur de Texas-Tuxpan Pipeline</td>
<td>CFE</td>
<td>Announced</td>
<td>1/1/2019</td>
<td>2.60</td>
<td>MX from Eagle Ford</td>
<td>Initially expected to come online in June 2018.</td>
</tr>
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<table>
<thead>
<tr>
<th>Historical (YTD2018)</th>
<th>Forecast</th>
<th>MX - Low Case</th>
<th>MX - Base Case</th>
<th>MX - High Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.9</td>
<td>3.7</td>
<td>4.2</td>
<td>4.3</td>
<td>4.3</td>
</tr>
<tr>
<td>4.7</td>
<td>4.8</td>
<td>4.9</td>
<td>5.0</td>
<td></td>
</tr>
</tbody>
</table>

Source: SENER, DI Market Intelligence
LONG-TERM FORECAST: LNG EXPORTS

- Historical (YTD2018) - Forecast

<table>
<thead>
<tr>
<th>LNG Terminal</th>
<th>Operator/Owner</th>
<th>Location</th>
<th>Capacity (Bcf/d)</th>
<th>Expected In-Service Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corpus Christi - Train 1</td>
<td>Cheniere</td>
<td>Corpus Christi, TX</td>
<td>1.07</td>
<td>Late 2018</td>
</tr>
<tr>
<td>Elba Island</td>
<td>Southern LNG</td>
<td>Elba Island, GA</td>
<td>0.35</td>
<td>Early 2019</td>
</tr>
<tr>
<td>Corpus Christi - Train 2</td>
<td>Cheniere</td>
<td>Corpus Christi, TX</td>
<td>1.07</td>
<td>2H 2019</td>
</tr>
<tr>
<td>Freeport - Train 1</td>
<td>Freeport LNG Development</td>
<td>Freeport, TX</td>
<td>0.70</td>
<td>3Q2019</td>
</tr>
<tr>
<td>Sabine Pass - Train 5</td>
<td>Cheniere</td>
<td>Sabine, LA</td>
<td>0.60</td>
<td>3Q2019</td>
</tr>
<tr>
<td>Cameron</td>
<td>Sempra</td>
<td>Hackberry, LA</td>
<td>2.10</td>
<td>2019</td>
</tr>
<tr>
<td>Freeport - Train 2</td>
<td>Freeport LNG Development</td>
<td>Freeport, TX</td>
<td>0.70</td>
<td>1Q2020</td>
</tr>
<tr>
<td>Freeport - Train 3</td>
<td>Freeport LNG Development</td>
<td>Freeport, TX</td>
<td>0.70</td>
<td>2Q2020</td>
</tr>
</tbody>
</table>

Total Capacity Under Construction: 7.30

Source: DI ProdCast, DI Market Intelligence
SHELL – 2018 LNG OUTLOOK

Key Takeaways

- LNG trade increased from 100 million tonnes in 2000 to nearly 300 million tonnes in 2017.
- Rise in spot cargoes drives the need for robust and versatile trading solutions.
  - 1,100 LNG spot cargoes in 2017 is highest ever.
  - Exponential growth of JKM futures contracts in 2017.
Key Takeaways

- The growing requirements mismatch between buyers and suppliers could lead to a supply shortage developing in the mid-2020s.
  - Most suppliers still seek long-term LNG sales to secure financing.
  - LNG buyers increasingly want shorter, smaller and more flexible contracts to better compete in their own downstream markets.
  - The mismatch needs to be resolved to enable LNG project developers to make final investment decisions.
LNG PRICING

Forward Markets

- Henry Hub
- NBP
- JKM
- SLI
- 15% Brent

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LNG PRICING

Forward Markets

[Graph showing LNG pricing trends over time for various markets such as Henry Hub, NBP, JKM, SLI, and 15% Brent.]
DI PLAY ASSESSMENTS
DI PLAY ASSESSMENTS

DI Play Assessments

[Map showing various basins across the United States, including Williston Basin, Powder River Basin, DJ Basin, Ricean Basins, Mid-Continent, Central Basin Platform, Fort Worth Basin, Midland Basin, East Texas Basin, and Appalachian Basin.]
DI PLAY ASSESSMENTS

WHAT

DI Play Assessments provide a dynamic, extensive, project-ready foundation to create customized geological interpretations of reservoirs and play areas better and faster than ever before.

WHY

Avoid the opportunity costs of delaying action while waiting on answers. With DI Play Assessments, you benefit from extensive, out-of-the-box evaluations at a fraction of the cost, eliminating laborious overhead and radically boosting efficiency. The analytics-grade intelligence within DI Play Assessments is project-ready, so users get a running start and reduce the time wasted on data acquisition and cleanup processes by more than 90 percent.

HOW

The DI Geology Team cleans and QC’s well header data, directional surveys, and LAS logs (logs are normalized as necessary). The geologists handpick formation tops and create a structural framework for each basin. They then create geological property maps to give better insights into the plays and assign Landing Zones to wellbores to identify target formations. And, finally, the geologists perform advanced analyses of the data to identify trends and highlight areas of interest.
DI PLAY ASSESSMENTS

Geological Framework

LAS Logs
Workstation ready, normalized, and QC-ed logs

Formation Tops
Internally consistent tops picked by geologists

Maps
Get an understanding of basin-wide geology and rock properties with structure, isopach, and other geological maps

Production Data
Production volumes and EUR's are provided (allocated well-level production for Texas)

Completion Data
Includes proppant and treatment volumes and perforations

Quality Controlled Data
Provides a clean and ready data set, well header data, directional surveys, and logs are QC'd
DI PLAY ASSESSMENTS

Advanced Analysis

Landing Zones
Provides detailed landing information for horizontal wellbores including the landing zone/formation, percentage in zone, toe up or down, etc.

Data Collection
- Temperature
- Mud Weights
- Total Organic Carbon (TOC)
- Vitrinite Reflectance (Ro)

Water Saturation
Petrophysical analyses were performed to determine water saturation; SWE and net pay maps are available

Risk Maps
Incorporates multiple geological parameters to identify and highlight sweet spots of a play

Predicted GOR
Multivariate statistics were used to predict GOR within the play fairway and out into exploratory regions of the play

Log Property Maps
Log properties averaged over target formations
POWDER RIVER BASIN PLAY ASSESSMENT

INITIAL RELEASE

- 3,275 LAS logs
- 359 Wellbore Trajectories
- 1,382 Picks including the Niobrara, Lance, Pierre, Mowry, Thermopolis, Morrison, Sundance, Cloverly, Chugwater, and Goose Egg formations
- 7 Structure and 3 Thickness maps, plus Deep Resistivity for the Niobrara formation

COMING IN OCTOBER 2018

- 4000 new picks
- 30 – 40 new maps (structure and gross thickness)
- New formations including: Parkman, Teapot, Sussex, Shannon, Frontier/Teckla, and others.
POWDER RIVER BASIN PLAY ASSESSMENT

SPEAKER

Patrick Rutty | Sr Product Manager, DI Transform

Drillinginfo presents our next webinar...

Powder River Basin: What You Need to Know

REGISTER NOW!

Wednesday, September 19th
- 1:00 pm MT
- 2:00 pm CST
- 3:00 pm ET
THANK YOU
APPENDIX
Start of 3 yrs. of Oversupply

Start of 7 mos. of Price Capitulation

False sense of hope from summer demand.

The low point following continued inventory builds.

Inventory worries continue. But OPEC extends quotas.

OPEC & Non-OPEC quotas agreed upon.

Supply outages & geopolitical tension continues, helping normalize inventories.

Supply outages continue. But OPEC extends quotas.

OPEC decides to increase production.

OPEC decides to increase production.

OPEC & Non-OPEC quotas agreed upon.

Supply outages.
GLOBAL OIL SUPPLY FORECAST

World Oil Supply (% change)

<table>
<thead>
<tr>
<th>Year</th>
<th>World (MMBbl/d)</th>
<th>OPEC (MMBbl/d)</th>
<th>US (MMBbl/d)</th>
<th>Brazil (MMBbl/d)</th>
<th>Canada (MMBbl/d)</th>
<th>Norway (MMBbl/d)</th>
<th>World (% change)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>12.31</td>
<td>0.26%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2.22%</td>
</tr>
<tr>
<td>2017</td>
<td>13.04</td>
<td>0.51%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.86%</td>
</tr>
<tr>
<td>2018</td>
<td>14.94</td>
<td>1.86%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.51%</td>
</tr>
<tr>
<td>2019</td>
<td>16.56</td>
<td>2.22%</td>
<td></td>
<td></td>
<td></td>
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<td>0.97%</td>
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<tr>
<td>2020</td>
<td>17.85</td>
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<td>0.66%</td>
</tr>
<tr>
<td>2021</td>
<td>18.60</td>
<td>0.66%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.16%</td>
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<tr>
<td>2022</td>
<td>19.22</td>
<td>-0.16%</td>
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<td></td>
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</tr>
<tr>
<td>2023</td>
<td>19.71</td>
<td>0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.51%</td>
</tr>
</tbody>
</table>

Source: DI ProdCast, IEA MODS, IEA OMR
GLOBAL OIL DEMAND FORECAST

World Oil Demand (% change) [RHS]

Source: IEA MODS, IEA OMR
EXPORTS - BASE CASE

Source: DI Market Intelligence
SHORT-TERM FORECAST: OECD INVENTORIES

OECD Stocks (MMBbl)

5-yr. Max/Min

Source: IEA MODS, DI Market Intelligence
PARADIGM SHIFT FROM SPECULATIVE RALLIES

Previously, price rallies were a function of speculation. Prices increased with more managed money long positions.

But since April, prices have sustained at steady to slightly increasing levels while speculative positions have played a lesser role.
KEY GAS BREAKEVEN THRESHOLDS

HH Breakeven ($/MMBtu) @ 12.5% MARR & $60/Bbl WTI

- Eagle Ford - Hawkville - Tier 1: $2.40
- Arkoma-Fayetteville - Tier 1: $2.42
- Anadarko - Granite Wash - Tier 1: $2.46
- Marcellus - PA-West - Tier 2: $2.62
- Utica - Dry Gas - Tier 2: $2.64
- Arkoma-Woodford - Tier 1: $2.84
- Ft. Worth - Barnett Dry - Tier 1: $2.91

Source: DI ProdCast