Macro View of Oil Markets & Market Disruptors

Dale Bradford
VP Worldwide Drilling & Services
Murphy Exploration & Production Company
Ten Countries Produce 69% of World Oil

• Vast Majority of Oil from Top Ten Producers

• The Remaining 185 Countries Produce the Balance...

<table>
<thead>
<tr>
<th>Country</th>
<th>Million barrels per day</th>
<th>Share of world total</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>14.85</td>
<td>15%</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>12.39</td>
<td>13%</td>
</tr>
<tr>
<td>Russia</td>
<td>11.24</td>
<td>12%</td>
</tr>
<tr>
<td>China</td>
<td>4.87</td>
<td>5%</td>
</tr>
<tr>
<td>Canada</td>
<td>4.59</td>
<td>5%</td>
</tr>
<tr>
<td>Iraq</td>
<td>4.45</td>
<td>5%</td>
</tr>
<tr>
<td>Iran</td>
<td>4.21</td>
<td>4%</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>3.77</td>
<td>4%</td>
</tr>
<tr>
<td>Brazil</td>
<td>3.24</td>
<td>3%</td>
</tr>
<tr>
<td>Kuwait</td>
<td>3.07</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Total top 10</strong></td>
<td><strong>66.68</strong></td>
<td><strong>69%</strong></td>
</tr>
<tr>
<td><strong>World total</strong></td>
<td><strong>97.23</strong></td>
<td></td>
</tr>
</tbody>
</table>

Source: EIA
Four of the Top Six Consumers Are Net Importers

Source: EIA
Tight Global Balance of Supply & Demand

- Balance within 2%
- Volatility of Oil Prices is Caused by Low Responsiveness of Supply and Demand to Price Changes in the Short Term
- Only OPEC has Spare Capacity – Less in Recent Years
- Market Sensitive to Disruptions

Source: EIA

Source: Short-Term Energy Outlook, January 2018
Uncertainty About Future Supply Drives Market

• Global Commercial Inventories are ~3 Billion Barrels...What are We Worried About?

• Unplanned Production Outages

• Destabilizing Events – Conflict, Severe Weather, Political, Economy

• Disruptive Technology – Renewables, Electric Cars, Vehicle Efficiency, etc.

57 X

4Q 2017 Daily NYMEX Futures Trading to Physical Trading Ratio
Impact of Production Outages or Restoration

• Unplanned Production Outages 2015-2017 Averaged 2.6 Mb/d

• End of Iran Sanctions Jan 2016 Reduced Outages by ~0.75 Mb/d

• Jan 2018 Outages at 3-yr low of ~1.5 Mb/d
Impact of Renewables

- Current Annual U.S. Renewable Supply 10 QBTU, Growing to 15 QBTU by 2040
- Equivalent to 4.9 Mb/d today and 7.3 Mb/d in 2040

Source: EIA
Impact of the Electric Car

• “An average passenger car is expected to achieve almost 50 miles per US gallon in 2035, compared with less than 30 MPG in 2015 - a faster rate of efficiency improvement than in the past.”

• “The growth of electric cars also mitigates the growth in oil demand, but the effect is much smaller: the 100 million increase in electric cars reduces oil demand growth by 1.2 Mb/d. By comparison, this is around a 10th of the impact of the gains in vehicle efficiency.”

Source: BP 2017 Energy Outlook
Macro View of Oil Markets & Market Disruptors

• Imbalance Between Oil “Haves” and “Have Nots” Drives Geopolitical Tension

• Oil Supply and Demand Balance is Inelastic – Responds Slowly to Disruption, Resulting in Short Term Commodity Price Volatility

• High Volume of Futures Trading Relative to Physical Trading – The Market is Driven by “What Might Happen”

• Disruption Comes in Many Forms