Upstream to Downstream, Onshore to Offshore, We’re There.
World Oil Economics Quiz

- Worldwide Daily Oil Consumption
  - 2000=68 MBD, 2012=90 MBD, 2020= ???
- US Daily Oil Consumption
  - 20 MBD
- World’s Top 3 Oil Producers
  - Saudi (10.3), Russia (10.2), US (8.0 M)
- US Daily Oil Imports
- 12 MBD (Duh), US Imports expected to drop…
- Today’s NOV-7, 2012 Oil Price (Brent & NYMEX Light Sweet)
  - Brent: $106.82  NYMEX Light Sweet: $84.44
- Is Today’s Oil Price Long Term or Short Term?
- Who Knows!!
<table>
<thead>
<tr>
<th>Producers¹</th>
<th>Total oil production</th>
<th>Exporters²</th>
<th>Net oil exports</th>
<th>Consumers</th>
<th>Total oil consumption</th>
<th>Importers⁴</th>
<th>Net oil imports</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Mexico</td>
<td>3.71</td>
<td>5. UAE</td>
<td>2.52</td>
<td>5. Germany</td>
<td>2.63</td>
<td>5. South Korea</td>
<td>2.15</td>
</tr>
<tr>
<td>8. UAE</td>
<td>2.94</td>
<td>8. Nigeria</td>
<td>2.15</td>
<td>8. Brazil</td>
<td>2.12</td>
<td>8. Italy</td>
<td>1.56</td>
</tr>
<tr>
<td>10. Norway</td>
<td>2.79</td>
<td>10. Mexico</td>
<td>1.68</td>
<td>10. Saudi Arabia</td>
<td>2.07</td>
<td>10. Taiwan</td>
<td>0.94</td>
</tr>
</tbody>
</table>

¹ Measurement Systems

² Total oil exports

³ Net oil exports

⁴ Total oil consumption

⁵ Importers

⁶ Net oil imports
Cameron Sampling & Blending - 50 Years of Excellence
Plants in UK & USA

1961 True Cut – Cliff Mock – Jiskoot – Linco Systems

1970s Blending Metering

1980s Blending, Sampling, Metering Additives

1990s Sampling, Metering Additives, Mixing

2000s Blending, Sampling & Mixing Systems

2010 - Blending, Sampling & Mixing Systems

2012 Cameron Blending/Sampling Technology Center

Measurement Systems
Cameron Quality Systems

Blending

Why do companies Blend
- To upgrade or downgrade products to meet specifications
- To optimise commercial value
- To facilitate movement of oil

Where do companies Blend
- Terminals
- Pipelines
- Refineries
Why Blend Crude/Fuel Oils?

• To upgrade or downgrade a product
• To allow crude to meet benchmarks or transport specifications
• To allow access to market for poor quality un-transportable crude
• To meet sulphur specifications

Blending Methods:

**In Tank**
Storage costs (inventory and infrastructure), delay, inflexible batch sizing

**In Line**
No storage, flexible output in quality and volumes
The Blend Challenge

- To blend a lower value, lower grade crude oil with a higher value, higher grade crude oil to a target parameter (for example sulfur content).
- To dynamically blend on-line (no room for error)
- To provide a consistent specific blended product at the lowest cost
- To reduce the traditional give away (over-blend insurance)
The economic drivers for blending

Widening heavy/light crude and product price differentials
Traditional in-tank blending (100s of years)

- Meter volumes of each component into a tank
- Mechanically mix the tank
- Draw and analyse physical samples (TMB)
- Modify blend
- Remix
- Draw and analyse physical samples (TMB)
- Blend stored ready for use/dispatch
In tank blending also has a high operations cost

**Tank Blending**

<table>
<thead>
<tr>
<th>Fill 3 crude oils</th>
<th>Mix</th>
<th>Sample &amp; Analyse</th>
<th>Adjust Blend/mix</th>
<th>Load</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2+4+1 hours</td>
<td>6 hours</td>
<td>1 hour</td>
<td>6 hours</td>
<td>4 hours</td>
<td>24 hours</td>
</tr>
<tr>
<td>2+4+1 hours</td>
<td>6 hours</td>
<td>1 hour</td>
<td></td>
<td>4 hours</td>
<td>18 hours</td>
</tr>
</tbody>
</table>

**In-line Blending**

<table>
<thead>
<tr>
<th>Fill 3 crude oils</th>
<th>Mix</th>
<th>Sample &amp; Analyse</th>
<th>Adjust Blend</th>
<th>Load</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 hours simultaneous</td>
<td></td>
<td></td>
<td>During blending</td>
<td></td>
<td>6 hours</td>
</tr>
</tbody>
</table>

**BATCH BLENDING TIME REDUCED BY UP TO 75%**
Crude oil tanks are not homogenous/consistent quality

Even after in-tank mixing!
In-line Blending

- In-line Blending is the controlled continuous proportioning of a number of component streams to produce a final blended product of closely defined quality.
- Components measured, mixed, and controlled in real time.
In line Blending Systems

- Process Analysis
- Meter Technology
- Flow Control
- Blending Analysis
- Quality
- Raw Product(s) In
- Blended On-Spec Product Out

Slide 13
Quicker than in tank blending – but still has giveaway/error

**BLEND ‘GIVEAWAY’**

**Final blend**
Cameron’s Blending Value Proposition

**BLENDING Fixed Ratio**

*Feedstock 1 – Heavy, low value and poor/variable quality*

$\downarrow$

$\downarrow$

*Feedstock 2 – Heavy, low value and poor/variable quality*

$\downarrow$

$\downarrow$

*Feedstock 3 – Light, high value and high/variable quality*

$\downarrow$

$\downarrow$

**BLENDING Using Cameron Analyser(s) Trim Control**

“GIVE-AWAY”

- Target Blend
- Actual blend

“GIVE-AWAY”

- Error from blend recipe
- Actual blend
PDVSA Jose Blending Systems

8 KM Offshore

FLOW = 100 KBPH
PEMEX FPSO Blending System

Yuum Kak Naab
Sunoco Nederland Blending System

- 4 streams
- Blending to sulphur
- Caldon flow meters
- JetMix system
CPC Taiwan LNG Blender
Cameron Crude Oil Blending Systems

Blending solutions with a performance guarantee
Proven systems with a ROI (typically $2-$8 tonne)

HOW IT WORKS?

• Work with client to determine Business Goals
• Technical teams develop Product Specification(s)
• Cameron engineer/design Application Focused system
• Business Goals (typical)
  Enhanced profitability
  Improved flexibility/quality
  Reduced ‘give-away’
  Rapid return on investment
Thank You!

Questions?