Oil Market Dynamics and Impact on Base Oil Trends

Louise Burke
ILMA Management Forum
April 2016
Presentation overview

1. Oil Market factors
2. Impact on Base Oils
3. Outlook: review of the coming year
Does Crude Oil and Gasoline Demand matter?

- Geopolitical issues
  - OPEC
  - Iran
  - Russia
- Fundamental issues
  - Demand - US/IEA/OECD/Asia
  - Supply - Inventory levels/Production
Why does Crude Oil this matter?

- **Weekly Inventory levels**
  - US crude stocks increased by 9.4mn bl to 532.5mn bl last week amid a sharp rise in imports and lower production, marking a sixth consecutive week of builds, according to the Energy Information Administration (EIA).

- **Weekly Crude Production**
  - US crude production dropped by 30,000 b/d to about 9mn b/d. Output in the lower 48 states dropped by 20,000 b/d while production in Alaska slid by 10,000 b/d.

- **Weekly Crude Imports**
  - Imports increased by 691,000 b/d to about 8.4mn b/d. Over the last four weeks, crude imports averaged about 8.1mn b/d, or 11.6pc higher than the same period last year, the EIA said.

- **Refiner Processing rate**
  - US refiners processed about 15.8mn b/d in the week ended 18 March, down by 176,000 b/d from the previous week. Refineries operated at 88.4pc of capacity.
Between Jan 2010 and Jan 2016, oil price peaked in Q1 2012
Crude forecast to fall in the short-term before stabilizing at around $33/bl in 2017
Argus forecasts in line with EIA expectations

**2016 Apr to Dec Average ($/bl)**
- Argus Brent forecast - $33
- Argus LLS forecast - $35
- EIA Brent/WTI forecast - $35

**2017 Jan-Mar Average ($/bl)**
- Argus Brent forecast - $33
- Argus LLS forecast - $34
- EIA Brent/WTI forecast - $36

*EIA Short-Term Energy Outlook - March 2016*
*Argus Crude Outlook - March 2016*
US outright prices projected to be lowest in at least 7 years

<table>
<thead>
<tr>
<th>Annual Average ($/t)</th>
<th>US N100 fob</th>
<th>US N220 fob</th>
<th>US N600 fob</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>$916</td>
<td>$939</td>
<td>$1102</td>
</tr>
<tr>
<td>2011</td>
<td>$1,246</td>
<td>$1,281</td>
<td>$1,444</td>
</tr>
<tr>
<td>2012</td>
<td>$1,166</td>
<td>$1,187</td>
<td>$1,384</td>
</tr>
<tr>
<td>2013</td>
<td>$967</td>
<td>$1,007</td>
<td>$1,226</td>
</tr>
<tr>
<td>2014</td>
<td>$901</td>
<td>$909</td>
<td>$1,106</td>
</tr>
<tr>
<td>2015</td>
<td>$558</td>
<td>$560</td>
<td>$757</td>
</tr>
<tr>
<td>2016f</td>
<td>$407</td>
<td>$408</td>
<td>$678</td>
</tr>
</tbody>
</table>
Demand for Gasoline has increased due to lower crude prices and refined product prices

- Largest increase in gasoline demand in 5 years
- Increase in auto size/mileage
- Lighter crudes produce more gasoline
- Lighter crudes product more lighter base stock which impacts on availability of heavy grades
2015 regional gasoline cracks

- Gasoline cracks were the strongest for more than five years
- Also supporting naphtha, a product that looks structurally long
Why was gasoline so strong in 2015?

- Strongest growth in gasoline demand in over a decade
- Demand in OECD economies reacted positively to lower prices
- Strong demand and a refining sector that has invested heavily in maximising distillate yields resulted in a tight gasoline market in 2015
Link with other grades: US heavy-grade prices surge in 2H 2015

Motiva Grp II N100 ($/USG)  Argus domestic N100 ($/USG)  Motiva N600 ($/USG)  Argus domestic N600 ($/USG)

Light-heavy spread increases to widest in more than four years
US heavy-grade prices remain supported by ongoing structural supply-tightness
Key Factors that Impact on Base Oils prices

- Statistical Relationship with Historical Prices
- Latest Market Intelligence
- Monthly Base Oil Price Forecast
- Crude, Gasoil, Diesel, VGO and relevant Crack Spreads
- Seasonal Trends
- Short-Term Base Oil Supply Schedule
- Market Trends and Developments

Copyright © 2016 Argus Media Ltd. All rights reserved.
Base Oils Forecast – What is Important

- Crude Oil price outlook
- Price trend analysis with reference to seasonality patterns and fundamentals
- Intra-grade spreads
- Intra-group spreads
- Gasoil/diesel spreads
- Maintenance and shutdown table
Base oil prices in 2016: Bearish and bullish factors

Bearish factors in 1H 2016

- Sliding crude prices
- Clearing of stockpile built up ahead of several plant closures
- Removal of Iranian sanctions

Bullish factors in 2H 2016
Base Oil prices in 2016:
Bearish and bullish factors

Bearish factors in 1H 2016:
- Sliding crude prices
- Clearing of stockpile built up ahead of several plant closures
- Removal of Iranian sanctions

Bullish factors in 2H 2016:
- Supply tightness caused by completion of the closure of base oil plants
- Slight recovery in crude prices
- Delayed switch to Group II supplies to support demand for Group I base oils
Supply Fundamentals – European closures

- **Shell Pernis**, 370,000 t/yr
  - 4Q 2015 & 1H 2016

- **Colas**, 335,000 t/yr
  - April 2015

- **ExxonMobil**, 645,000 t/yr
  - From 4Q 2015

- **Total Gonfreville**, 250,000 t/yr
  - 4Q 2015

- **Samir**, 125,000 t/yr
  - From 3Q 2015

- **Sapref**, 170,000 t/yr
  - 2Q-3Q 2015

- **KPC Europoort**, 235,000 t/yr
  - January 2016

- **Lukoil Nizhniy Novgorod**, 290,000 t/yr
  - April 2015

- **Lukoil Perm**, 460,000 t/yr
  - 1Q 2015

- **Rosneft Angarsk**, 250,000 t/yr
  - 2Q 2015

- **Gazpromneft Omsk**, 240,000 t/yr
  - 1Q-2Q 2015

- **Gazpromneft/Rosneft Yaroslavl**, 350,000 t/yr
  - 1Q 2015

- **Gazpromneft/Rosneft Yaroslavl**, 350,000 t/yr
  - 1Q 2015

- **MOL**, 150,000 t/yr
  - From 3Q 2015

- **ENI**, 645,000 t/yr
  - 1Q-2Q 2015

- **Gazpromneft Omsk**, 240,000 t/yr
  - 1Q-2Q 2015
Refinery maintenance in 3Q 2015-1Q 2016 absorb surplus supplies
Global 2015 maintenance peaks in Asia in Q2-Q3

- Japan: (Cosmo) 350,000 t/yr – Q2 2015
- Japan: (JX Nippon) 400,000 t/yr (Q2-Q3 2015)
- Japan: (Idemitsu) 305,000 t/yr (Q2 2015)
- Japan: (Cosmo) 350,000 t/yr (Q2 2015)
- Japan: (JX Nippon) 400,000 t/yr (Q2-Q3 2015)
- Japan: (Idemitsu) 305,000 t/yr (Q2 2015)
- S. Korea: (SK Lubricants) 2.45mn t/yr – Q1-Q2 2015
- S. Korea: (S-Oil) 1.42mn t/yr – Q2 2015
- S. Korea: (S-Oil) 1.42mn t/yr – Q2 2015
- S. Korea: (S-Oil) 660,000 t/yr – Q3 2015
- Taiwan: (FPCC) 520,000 t/yr – Q1-Q2 2015
- India: (HPCL) 480,000 t/yr – Q2 2015
- China: (PetroChina Karamay) 400,000 t/yr – Q2-Q3 2015
- China: (Hainan Handi) 300,000 t/yr – Q2-Q3 2015
- China: (Sinopec Jingmen) 300,000 t/yr – Q3-Q4 2015
- China: (PetroChina Karamay) 400,000 t/yr – Q2-Q3 2015
US Group II prices projected to hold in a relatively narrow range over next 12 months
US light-grades price strength expected to be range-bound. US heavy-grade price strength projected to fall from record high last year but still high compared to historical levels.
US Group III prices continue to face pressure, reflecting existing inherent price strength and rise in production capacity
US Group III prices expected to continue to face pressure, reflecting existing inherent price strength and rise in production capacity.
## Bright stock price then and now

<table>
<thead>
<tr>
<th></th>
<th>Asia bright stock ($/t)</th>
<th>Europe bright stock ($/t)</th>
<th>US bright stock ($/t)</th>
<th>LLS ($/bl)</th>
<th>Brent ($/bl)</th>
<th>Dubai ($/bl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 2010</td>
<td>$895</td>
<td>$895</td>
<td>$904</td>
<td>$80</td>
<td>$77</td>
<td>$77</td>
</tr>
<tr>
<td>Jan 2016</td>
<td>$889</td>
<td>$896</td>
<td>$927</td>
<td>$33</td>
<td>$31</td>
<td>$27</td>
</tr>
</tbody>
</table>
Bright stock price strength expected to surge in 2016

Price strength ratio = base oil price / crude price

Argus Base Oils Outlook - January 2016
Base oil prices holding relatively steady since August 2015 despite falling crude prices.
How sticky have base oil prices been?

<table>
<thead>
<tr>
<th></th>
<th>Jan 2010 - Jan 2012</th>
<th>Jan 2012 - Jan 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLS (USD/bl)</td>
<td>+38%</td>
<td>-70%</td>
</tr>
<tr>
<td>Brent (USD/bl)</td>
<td>+45%</td>
<td>-72%</td>
</tr>
<tr>
<td>Dubai (USD/bl)</td>
<td>+43%</td>
<td>-76%</td>
</tr>
<tr>
<td>Base oil price ($/t)</td>
<td>???</td>
<td>???</td>
</tr>
</tbody>
</table>
Asia, US base oil prices outpace crude from Jan 2010 to Jan 2012

<table>
<thead>
<tr>
<th></th>
<th>LLS +38%</th>
<th>Brent +45%</th>
<th>Dubai +43%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>US SN 150   US SN 500</td>
<td>US BS</td>
<td>US N100</td>
</tr>
<tr>
<td></td>
<td>+50%</td>
<td>+27%</td>
<td>+30%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Europe</td>
<td>Europe SN 150</td>
<td>Europe SN 500</td>
<td>Europe BS</td>
</tr>
<tr>
<td></td>
<td>Europe BS</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>+36%</td>
<td>+31%</td>
<td>+33%</td>
</tr>
<tr>
<td>Asia</td>
<td>Asia SN 150</td>
<td>Asia SN 500</td>
<td>Asia BS</td>
</tr>
<tr>
<td></td>
<td>+54%</td>
<td>+44%</td>
<td>+49%</td>
</tr>
</tbody>
</table>
Europe, US, Asia base oil prices lag crude-drop from Jan 2012 to Jan 2016

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>-58%</td>
<td>-41%</td>
<td>-21%</td>
<td>-63%</td>
<td>-63%</td>
<td>-42%</td>
<td>-51%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Brent -72%</th>
<th>Europe SN 150</th>
<th>Europe SN 500</th>
<th>Europe BS</th>
<th>Europe 4cst fca</th>
</tr>
</thead>
<tbody>
<tr>
<td>-49%</td>
<td>-40%</td>
<td>-25%</td>
<td>-50%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dubai -76%</th>
<th>Asia SN 150</th>
<th>Asia SN 500</th>
<th>Asia BS</th>
<th>Asia N150</th>
<th>Asia N500</th>
<th>Asia 4cst NEA cfr</th>
<th>Asia 4cst India cfr</th>
<th>Asia 4cst UAE ex-tank</th>
</tr>
</thead>
<tbody>
<tr>
<td>-62%</td>
<td>-60%</td>
<td>-33%</td>
<td>-64%</td>
<td>-58%</td>
<td>-45%</td>
<td>-49%</td>
<td>-50%</td>
<td></td>
</tr>
</tbody>
</table>
Argus Base Oils Outlook

• Monthly publication with monthly forecast of key base oil prices spanning 12 months into the future

• Key benefits
  • Facilitates short-term planning/budgeting
  • Provides third-party reference price to measure against internal price targets
  • Reduces exposure to spot price volatility

• Content overview
  • Full price outlook table
  • Regional price forecast analysis and commentary
    • Analytical framework
    • Price trend analysis with reference to seasonality patterns and fundamentals
    • Intra-grade spreads
    • Intra-group spreads
    • Gasoil/diesel spreads
  • Maintenance and shutdown table
Argus Base Oils: Managing spot and future price risk

• Argus Base Oils - spot market prices, news and analysis
  - www.argusmedia.com/baseoils

• Argus Base Oils Outlook - short-term price forecast covering the next 12 months
  - http://www.argusmedia.com/Oil-Products/Argus-Base-Oils-Outlook/

• Argus Consulting - long term forecasts, market analysis
  - http://www.argusmedia.com/Consulting/
• Any questions?