Refining Outlook
The calm before the storm

February 2017

Kurt Barrow, Vice President kurt.barrow@ihsmarkit.com

© 2017 IHS
Introduction

After a period of volatile oil prices and rapidly shifting product demand and crude supply, a globalization of refining is creating a period of increased competition, and further disruptions are on the horizon.
Lower pump prices strongly influenced light duty vehicle miles traveled in the US

- **Light Duty Vehicles**
  - Strong gasoline demand response to falling prices
  - VMT reflective of primarily discretionary driving
  - Automotive fleet efficiency, population and age trends will slow then reverse demand

- **Commercial**
  - Diesel demand responding to broad industrial and upstream activity

---

**Moving Average VMT and Gasoline Demand Year over Year Change**

- Jan-13: -2%
- Jul-13: -1%
- Jan-14: 0%
- Jul-14: 2%
- Jan-15: 3%
- Jul-15: 4%
- Jan-16: 2%
- Jul-16: 1%

Note: 2016 data through November
Source: IHS
© 2017 IHS

**Gasoline and Diesel Demand Year over Year Change**

- 2013/2012: 2%
- 2014/2013: 6%
- 2015/2014: 2%
- 2016/2015: -2%

Note: 2016 date through November
Source: IHS, EIA
© 2017 IHS
US refiners have benefited from export markets as well

• US is now the world’s largest refined products exporter

• Sustained diesel exports to Latin America; exports to Europe showing signs of decline

• Gasoline exports have risen to nearly as high of volumes

• PADD III export trade approaching 20% of production

Source: IHS, EIA © 2017 IHS
US refining margins stabilized in 2016
Crude exports reestablished a spread between sweet and sour crude oil refining

USGC Net cash margins

Source: IHS, Argus Media Limited. © 2017 IHS
PADD I refineries have shifted to more crude import diet reflecting a more competitive crude oil market.
A tale of two refining industries

- Two “mature” demand markets moving in very different directions
- US refining capacity has grown – in recent years and today is at an all-time high
  - Increased capacity for both heavy crude and tight oil
- In contrast, European refining capacity has steadily declined
- US refining outlook remains positive but further capacity additions are uncertain
- Europe expected to further shrink capacity – 1-2 million B/D in coming 5 years. But, fuel oil tightness and IMO changes may provide stays of execution

Refining capacity

<table>
<thead>
<tr>
<th>Quarter</th>
<th>US</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>4Q08</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4Q09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4Q10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4Q11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4Q12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4Q13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4Q14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4Q15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4Q16</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4Q17</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: IHS © 2017 IHS
Rationalization occurring mostly in a few OECD markets. Additional shuttering expected in Europe.

**Crude distillation capacity closures (cumulative)**

Note: CIS stands for The Commonwealth of Independent States

Source: IHS
European refining margins weakening due to high stocks and import competition

NW Europe Benchmark Refining Margins

Source: IHS © 2017 IHS
Globalization of refining means more competitive product markets: consider diesel/ULSD

- In Europe
  - ULSD prices have weakened as increasing Middle East and India imports have arrived – accounted for approximately 25% of imports in 2015 and rising
  - Russian exports remain, despite export tax changes

- In US
  - Weaker Europe price creating a “Flip-flop” with ULSD trading from Europe to the USEC
  - Also, long-haul deliveries from Middle East to USEC becoming economic
  - USGC arbitrage to Europe closed for ULSD (but not other grades)

- In Asia
  - Flows from Middle East/India colliding with China exports
A big question in the East is, “Will China grow product exports further?”

China Transportation Fuel Net Exports

Source: IHS © 2017 IHS
US policy uncertainties

• New administration stimulates demand short term, but…
  • Uncertain international reactions to trade or foreign policies and actions.
  • Longer-term, price and demand impacts uncertain:
    • Simulative: Weaker CAFE, climate action, oil alternatives.
    • Retarding: Rising debt, higher interest rates, lower trade.

• Border Adjustment Tax
  • Increases US crude and refined product prices
    • Benefits largely flow to US crude producer, creating a production response
    • Higher pump prices decrease demand modestly
  • Refining crude slate, imports/exports and margins would be largely unaffected in “unconstrained trade” markets
  • Most refiners probably benefit as lower tax bill more than offsets loss of demand

• More impactful are potential actions on RFS, gasoline octane and CAFE midterm review
Future of RFS a key question as Trump takes office

- RFS (Renewal Fuel Standard) has been impactful for US refining industry
- Cost of RFS through RIN program has become significant
- Large disparity among R&M companies
- Complicated, inter-industry policy with great uncertainty of outcome if reopened

Range of US refiner RIN profits or costs

Note: Companies modeled by IHS using SEC filings include Alon, BP, Chevron, CVR Energy, Delek, ExxonMobil, HollyFrontier, Marathon, NTI, PBF Energy, Phillips 66, Shell, Tesoro, Valero, and Western

Source: IHS

© 2017 IHS
Big storm on the horizon is the IMO bunker fuel changes in 2020

- Global ship bunker fuel sulfur reduction to 0.5% from 3.5%
- Accounts for 4% of product demand - but, most difficult to process
- Neither shipping and refining industries will be ready
- Fuel oil steeply discounted into power sector
- Expands light/heavy and sweet/sour price relationships
- By far, largest product change in a decade or more

Source: IHS © 2017 IHS