Downstream Opportunities in Kurdistan

November 13, 2011

CWC Kurdistan-Iraq Oil and Gas 2011

Erbil, Kurdistan

Presentation by Ben Montalbano
Washington, DC
About EPRINC

• Energy Policy Research Foundation Inc. (EPRINC), formerly the Petroleum Industry Research Foundation Inc. (PIRINC)

• Founded in NY in 1944
  – Moved to Washington from NYC in Feb 2007
  – EPRINC brings policy analysis and industry economics to bear on current energy issues
Takeaways

- Iraq needs several hundred thousand barrels per day of new capacity for internal consumption
- However, existing expansion plans may overcompensate
- Lack of regional export markets and refined product transport infrastructure
- Exports from KRG could be politically complicated
The Problem: Iraq’s Refined Product Disposition

<table>
<thead>
<tr>
<th>Consumption</th>
<th>(000 b/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>115</td>
</tr>
<tr>
<td>Kerosene</td>
<td>52</td>
</tr>
<tr>
<td>Distillate</td>
<td>110</td>
</tr>
<tr>
<td>Resid</td>
<td>133</td>
</tr>
<tr>
<td>Other</td>
<td>155</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>565</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supply</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td>72</td>
</tr>
<tr>
<td>Kerosene</td>
<td>52</td>
</tr>
<tr>
<td>Distillate</td>
<td>102</td>
</tr>
<tr>
<td>Resid</td>
<td>247</td>
</tr>
<tr>
<td>Other</td>
<td>41</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>514</strong></td>
</tr>
</tbody>
</table>

Source: OPEC Data
## Current Capacity – Kurdistan and Iraq

<table>
<thead>
<tr>
<th></th>
<th>Capacity (000 b/d)</th>
<th>Nelson Complexity Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kurdistan</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Daurah</td>
<td>140</td>
<td>6.8</td>
</tr>
<tr>
<td>Basra</td>
<td>140</td>
<td>3.8</td>
</tr>
<tr>
<td>Baiji I and II</td>
<td>320</td>
<td>5.9</td>
</tr>
<tr>
<td>Others (incl. teapots)</td>
<td>120-140</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>~780-800</td>
<td></td>
</tr>
</tbody>
</table>

Source: MEES, OGJ, Iraq Oil Report
Industry Needs Upgrading, Expansion to Meet Domestic Demand

• Several large, simple refineries with many small topping plants
  – The worldwide trend (China/Asia in particular) has been to retire “teapot” refineries, eliminate resid

• Refineries throughput at ~75% of capacity
  – Although capacity is effectively lower as nearly ½ of production is residual fuel oil.

• Iraq imports ~40 kbd of gasoline (1/3 of demand) and some other light products
KRG Projects Initiate Iraqi Downstream Modernization

• 20,000 b/d topping plants built in Erbil (Kalak) and Suleimaniya (Bazyan) in mid-2000’s.
  – Kalak received a 20,000 b/d upgrade during the past year, focusing on gasoline production

• Kalak produced Iraq’s first unleaded gasoline

<table>
<thead>
<tr>
<th>Kalak Upgrade</th>
<th>(000 b/d)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Naptha Hydrotreater</td>
<td>9</td>
</tr>
<tr>
<td>Reformer</td>
<td>6</td>
</tr>
<tr>
<td>Isomerization unit</td>
<td>2.5</td>
</tr>
</tbody>
</table>
Further Refinery Upgrades in the Works

- Kalak and Bazyan to receive additional gasoline-centric upgrades by end-2012:
  - Kalak – 60,000 b/d
  - Bazyan – 34,000 b/d

- New 60,000 b/d Taqtaq refinery in planning phase
- Combined give KRG ~154,000 b/d of capacity, excluding teapots and Taqtaq, by end-2012.
### Additional Upgrades Planned Throughout Iraq

<table>
<thead>
<tr>
<th>City</th>
<th>Planned Capacity</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karbala</td>
<td>140-200</td>
<td>Contract let to Saipam engineering.</td>
</tr>
<tr>
<td>Kirkuk</td>
<td>150</td>
<td>Design and Engineering</td>
</tr>
<tr>
<td>Missan</td>
<td>150</td>
<td>Design and Engineering</td>
</tr>
<tr>
<td>Nassiriyah</td>
<td>300</td>
<td>Design and Engineering</td>
</tr>
<tr>
<td>Ninevah</td>
<td>150</td>
<td>Design and Engineering</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>900-960</strong></td>
<td></td>
</tr>
<tr>
<td>Basra Rehabilitation, Crackers at Others</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Nearly 2 mm b/d of capacity by 2020?

- Expect rationalization of teapot refineries
  - Elimination of 100,000-200,000 b/d of underperforming capacity – will become uneconomic when faced with competition
- Don’t count on all projects to be built
  - Construction of all 5 projects announced by central government seem unlikely
    - $30 billion+ investment
  - But Karbala and the Basra upgrade are probable as a starting point, perhaps Nassiriyah as well.
Where does this leave supply?

• Given KRG upgrades and Karbala/Basra projects, Iraq should be able to meet current internal demand
  – And provide higher quality gasoline in the process
  – While reducing resid output

• Upgrades and new construction should continue in order to improve the value and quality of the product slate
Opportunities Remain in Kurdistan

• Replacement of inefficient teapots with complex capacity – improving the value of the product slate
• Meeting demand growth
• Export of refined product
Iraqi Consumption in Perspective – Room to Grow

Annual Consumption Per Capita

- Iraq
- Iran
- Saudi Arabia
- Kuwait

Barrels
Risks Remain

- Political acceptance of refined product exports out of the KRG?
  - How will Baghdad react to increased exports?
  - Will such exports fall (and remain) outside the purview of the crude oil export deal?
  - Outcry from teapots
Potential for Regional Competition

• Saudi Arabia planning 1.2 mm b/d of capacity
  – But also hope to curb demand – could lead to exports
• Turkey broke ground on 200,000 b/d refinery in October
  – $4.5-5 billion cost, plan some exports
• IEA sees Middle East distillation capacity increasing 2.3 mm b/d 2010 – 2016
  – Making it the second largest growth center after China
• Capacity in the region becoming more complex, efficient
Export Infrastructure
What’s going on in the U.S.?

Changing Crude Supplies and Lack of Infrastructure Creating Distortions
U.S. Cracking Margins

$\text{$/barrel}$

- Midwest WTI
- USGC LLS
- USAC Bonny Light
- USWC ANS
U.S. Crude Oil by Source

Source: EPRINC rendition from Enbridge. Enbridge used EIA and NED data and Enbridge Estimates (with some averages).
Pipelines In and Out of Cushing

Source: Info. From CME Group and Purvin and Gertz Study
The WTI-Brent Spread
The Result: Atlantic Coast Refiners Being Put Out of Business