Asian Demand Dynamics & Changing Crude Imports

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Asia Pacific Demand: China, India and the Rest

- Asian demand forecast rises by 5.5 mmb/d between 2012-2020
- China (3.9 mmb/d) and India (1.0 mmb/d) make up about 90% of all growth
Asia Pacific - “Firm” Additions to 2020

**China:** 4.5 mmb/d between now and 2020? Potential for overbuild?

**Pakistan:** PARCO project 250 kb/d by 2016

**India:** Paradeep 300 kb/d, designed for Middle East sour but no supply deal. 2013/14

**Vietnam:** Nghi Son 2018/19

**Malaysia:** 300 kb/d (Iraq crude) for ‘RAPID’ 2016/17
China's refining capacity expansion:

- **In 2012**
  - Added some 880 kb/d of capacity in 2012.

- **Between the start of 2013 and the end of 2020**:
  - About 4.5 mmb/d of net new refining capacity is expected to be added by 2020 (nearly 500 kb/d in 2013)
  - Another 4.0 mmb/d of capacity has been proposed by various players, but these are tenuous.

- **By 2015**, China's capacity for handling sour crudes is expected to increase to 5.5 mmb/d.
Background: Characteristics of Chinese Refining

❖ Large refining capacity at 12.7 mmb/d (Jan 2013)
  ▪ Around 70% in coastal regions,
  ▪ Comprehensive pipeline infrastructure

❖ While traditionally geared to heavy sweet crudes, new-build are mainly for medium/heavy sour crude

❖ Huge conversion capacity, 48% of CDU capacity
  ▪ twice Japan’s average, and almost at US level
  ▪ 1.6 mmb/d coking, 4.7 mmb/d FCC/HC

❖ Low reforming, poor octane (partly due to high cracking ratio)
Potential Crude Displacement: Asian Closures

**Australia:**
- Ran 20% ME crude in 2012 (150 kb/d)
- Clyde shut ‘12 (70 kb/d)
- Kurnell due 2014 (125)
- Another 100-200 likely

**Japan:**
- METI requires closures of 1.2 mmb/d by 2014
- Crude slate is 90% Middle East med/sour

**Taiwan:**
- Government pressure to close Kaohsiung in 2015 (200 kb/d, with 70% ME grades)

**Philippines:**
- Shell could close Tabangao (200 kb/d; 50 kb/d MidEast)

**China:**
- NDRC requires ‘teapot’ closures of 850 kb/d, but limited crude impact

**South Korea:**
- Possible reduction

**Total backout of MidEast crude: 1.2 mmb/d?**
How much additional Crude is needed?

- Asia already net imports 17 mmb/d crude
- Changes on refining side:
  - Additions of nearly 8 mmb/d capacity less closures of around 2mmb/d
  - Net increase in crude runs of 5 mmb/d?
- Asian crude output roughly flat 2012-2020
  \[ \Rightarrow 5 \text{ mmb/d increase in crude imports required by 2020} \]
Global Closures – Rebalancing the Industry

PHASE I: 2008-2012
• Widespread cuts, but Europe bears the brunt (40%)

PHASE II: 2013-2016
• OECD Asia biggest share: Japan government plan, Australia + Philippines...
• Europe closures shift to Med

PHASE III: 2017-2020:
• Emphasis on N America: steep demand decline, loss of cheap crude plus diminishing LatAm exports

Source: FGE World Refining Outlook
The Unbalanced Crude Supply/Demand World: 2012-2017

- Major shift in crude trade patterns evident in mid-term
- This is driven by steep rise in US liquids output combined with expected refinery closures
- Diminishes incremental role of Middle East
Crude Quality Lightens to 2015, then Static to 2020

Incremental Crude Production by Quality (mmb/d)

- Light Sweet
- Med-Sweet
- Light Sour
- Med-Sour
- Heavy-Sour

2009-2011

2011-2015

2016-20

Lt-Sr
Lt-Swt
Med-Swt
Med-Sr
Hvy-Swt
Hvy-Sr
Increasing Refining Complexity

Global refinery complexity

Capacity of upgrading units vs crude distillation

Global refinery yield

- Major increase in complexity underway.... …...therefore big swing in yields
- But slows post-2015… …so yields more stable

Source: FGE World Refining Outlook
Incremental Chinese Crude Demand is Med/Heavy Sour

- Although older Chinese refineries were designed for heavy sweet crudes
- New coastal refineries are designed for medium/heavy sour crudes
- Some incremental demand for extra-light/condensate for high naphtha yield

**Crude imports to China (mmb/d)**

- **Sour medium/heavy**
  - 66% of imports in 2012 (vs 60% in 2008)
  - Up 1.4 mmb/d vs 2008

- **Heavy Sweet**
  - Peaked in 2010 (1.1 mmb/d)
  - Now back flat with 2008

- **Condensate and light crude: +400 kb/d**
  - Petchem integration requires higher naphtha yield
  - Four main refineries have separate extra-light crude trains)
  - Incremental destination for WAF backed out of US
Chinese state companies’ overseas equity crude availability outside the Mid East could double to 3 mmb/d by 2020.
Key Drivers for Shifting Crude Oil Trade Patterns-2020

North America: rising Canadian and US output means 4.5 mmb/d less imports required vs 2011
  - Africa backed out
  - LatAm backed out
  - Middle East backed out

FSU: 1 mmb/d diverted from Europe to Asia (ESPO expansion plus seaborne Caspian)

Asian closures free up 1.5 mmb/d for China/India, mostly from Middle East

Latin America & Africa: output rises but new refineries mean exports fall

Middle East: no incremental requirement (Iraq offset by Saudi’s swing role and new refining)

Total: 5 mmb/d diverted from West to East
Thank You