Hidden forces-
China’s crude oil storage market prospect

Li Li
Research Director, ICIS
03/2017
Shining star in global bearish mood
Key drivers for appetite of the No.1 crude oil importing giant

- Hidden force: Teapot refineries
- Strategic Petroleum Reservation
- Emerging capacity
- Overview
Crude oil: how’s the appetite?

Bearish factors

- Sluggish demand
- Few capacity expansion

Bullish factors

- SPR
- Attractive prices
- New buyers

Arbitrage
1

Hidden force-
Teapot refineries
Where have the cargoes headed to?

Crude oil imports by Chinese provinces

- Shandong
- Zhejiang
- Guangdong
- Liaoning
- Fujian
- Heilongjiang
- Hebei
- Xinjiang
- Hainan
- Guangxi
- Tianjin
- Others

YTD: Year To Date

2014 2015 2016 YTD

Crude oil imports (in millions of metric tons)
What is teapot refineries?

CDU Capacity Distribution of Independent Refineries

<table>
<thead>
<tr>
<th>Region</th>
<th>CDU capacity</th>
<th>Share (%)</th>
<th>Refinery number</th>
<th>Average CDU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shandong</td>
<td>2,611</td>
<td>63.90%</td>
<td>66</td>
<td>40</td>
</tr>
<tr>
<td>Northeast China</td>
<td>334</td>
<td>8.20%</td>
<td>16</td>
<td>21</td>
</tr>
<tr>
<td>East China</td>
<td>287</td>
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<td>13</td>
<td>22</td>
</tr>
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<td>297</td>
<td>7.30%</td>
<td>19</td>
<td>16</td>
</tr>
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<td>15</td>
</tr>
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<td>220</td>
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<td>6</td>
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</tr>
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<td>72</td>
<td>1.80%</td>
<td>2</td>
<td>36</td>
</tr>
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<td>Central China</td>
<td>30</td>
<td>0.70%</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,088</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>139</strong></td>
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Source: ICIS

**Average CDU Capacity of Independent Refineries by Region (2015)**

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Source: ICIS
### Liberalization and new buyers

#### Independent Refiners Allowed to Refine Imported Crude by NDRC as of 15 August

<table>
<thead>
<tr>
<th>Refiner</th>
<th>Quota (m tonnes/year)</th>
<th>Non-state-operated category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baota Petrochemical Group</td>
<td>6.16</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Dongying Yatong Petrochemical</td>
<td>2.76</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Shandong Dongming Petrochemical</td>
<td>7.5</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Panjin Beifang Asphalt Fuel</td>
<td>7</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Shandong Kenli Petrochemical</td>
<td>2.52</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Shandong Lijin Petrochemical</td>
<td>3.5</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Shandong Wonfull Petrochemical</td>
<td>4.16</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Shandong Tianhong Chemical</td>
<td>4.40</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Shandong Shouguang Luqing Petrochemical</td>
<td>2.58</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Shandong Chambrook Petrochemical</td>
<td>3.31</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Sinochem Hongrun Petrochemical</td>
<td>5.3</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Shandong Qirun Chemical</td>
<td>2.2</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Shandong Haiyou Petrochemical</td>
<td>3.2</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Wudi Xinyue Chemical</td>
<td>2.4</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Hengyuan Petrochemical</td>
<td>3.5</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Shandong Qingyuan Group</td>
<td>4.04</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

#### Independent Refiners with Quotas Pending for NDRC Approval after Passing CPCIF Appraisal

<table>
<thead>
<tr>
<th>Refiner</th>
<th>Quota (m tonnes/year)</th>
<th>Non-state-operated category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yancheng Petroleum</td>
<td>3.60</td>
<td>No</td>
<td>9.84</td>
</tr>
<tr>
<td>Hebei Xinhai Chemical Group</td>
<td>3.72</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Shandong Shench Chemical</td>
<td>2.52</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

#### Independent Refiners Submitting Applications

<table>
<thead>
<tr>
<th>Refiner</th>
<th>Quota (m tonnes/year)</th>
<th>Non-state-operated category</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Henan Fengli Petrochemical</td>
<td>2.93</td>
<td>No</td>
<td>7.49</td>
</tr>
<tr>
<td>Shandong Jincheng Petrochemical</td>
<td>4.56</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Rizhao Landbridge Petrochemical</td>
<td>N/A</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Shandong Zhonghai Fine Chemical</td>
<td>N/A</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Shandong Wantong Petrochemical</td>
<td>N/A</td>
<td>No</td>
<td></td>
</tr>
</tbody>
</table>

#### Independent Refiners to Submit Applications

<table>
<thead>
<tr>
<th>Refiner</th>
<th>Quota (m tonnes/year)</th>
<th>Non-state-operated category</th>
<th>Total</th>
</tr>
</thead>
</table>
Over 80% fed by imported crude oil

Feedstock Mix of Shandong independent refiners (2016 VS 2015)

- Fuel oil: 47% (2015), 81% (January-July 2016)
- Cutback bitumen: 5% (2015), 3% (January-July 2016)
- Other domestic crude: 4% (2015), 3% (January-July 2016)
- Government-allocated crude: 20% (2015), 10% (January-July 2016)
- Offshore crude: 4% (2015), 3% (January-July 2016)
- Imported crude: >95% (2015), >95% (January-July 2016)

Source: ICIS
## Performance in the crude purchase “campaign”

<table>
<thead>
<tr>
<th>Crude Imports of Independent Refiners</th>
<th>'000 tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Refiner</strong></td>
<td>Import Quota</td>
</tr>
<tr>
<td>Sinochem Hongrun</td>
<td>5,300</td>
</tr>
<tr>
<td>Dongming Petrochemical</td>
<td>7,500</td>
</tr>
<tr>
<td>Qirun Chemical</td>
<td>2,200</td>
</tr>
<tr>
<td>Shouguangluqing Petrochemical</td>
<td>2,580</td>
</tr>
<tr>
<td>Lijin Petrochemical</td>
<td>3,500</td>
</tr>
<tr>
<td>Wonfull Petrochemical</td>
<td>4,160</td>
</tr>
<tr>
<td>Yatong Petrochemical</td>
<td>2,760</td>
</tr>
<tr>
<td>Kenli Petrochemical</td>
<td>2,520</td>
</tr>
<tr>
<td>Chambroad Petrochemical</td>
<td>3,310</td>
</tr>
<tr>
<td>Baota Petrochemical</td>
<td>6,160</td>
</tr>
</tbody>
</table>

Note: *Includes crude imported under third-party processing trade*

Source: ICIS China
Burst in utilization

Oil majors’ and independent refiners’ operating rates in 2010-2015

Source: ICIS

Oil majors’ and independent refiners’ operating rates in 2015-2016

Source: ICIS

30%
35%
40%
45%
50%
55%
60%
65%
01-2015
01-2015
02-2015
03-2015
04-2015
04-2015
05-2015
06-2015
06-2015
07-2015
08-2015
08-2015
09-2015
10-2015
10-2015
11-2015
12-2015
12-2015

2015
2016

0%
20%
40%
60%
80%


Majors Independent refiners

www.icis.com
Logistic as a big bottleneck and ambitious investment plan

- Dongming: 180KBD, 10 mil t/y
- Huaxing: 170KBD, 20 mil t/y
- Hongrun: 74KBD, 20 mil t/y
- Zhenghe: 170KBD, 20 mil t/y
- Changyi: 160KBD, 13 mil t/y
- Linyi
- Zaozhuang
- Weifang
- Dongying
- Heze
- Jinan
- Zibo
- Dezhou
- Lianyungang
- Zhenjiang
- Tai'an
- Linyi
- Zibo
- Shenyang
Coastal inventory peaked

Crude inventory of independent refiners in Shandong

mil mt
2

Strategic reservation
Dynamic Target

End by 2020

90 days

At least 300 mil Bbls

Nearly 60 days

Start from 2006
Huge intake power but limited ownership
Emerging Capacity
Oversupplied refined products and expansion uncertainty

Refining Capacity Expansion in China (2011-2020E)

Source: ICIS
Future blueprint of China refining and storage industry

- **Caojing, Shanghai**: Caojing refining & chemical complex, 20m tonnes/year
- **Huizhou, Guangdong**: CNOOC’s Huizhou 2nd phase project, 10m tonnes/year
- **Lianyungang, Jiangsu**: Shenghong Petrochemical, 16m tonnes/year
- **Ningbo, Zhejiang**: ZRCC 2nd phase project, 15m tonnes/year
- **Changxing island, Dalian**: Hengli Petrochemical, 20m tonnes/year
- **Rizhao, Shandong**: Independents
- **Liaodongwan, Liaoning**: Panjin Petrochemical
- **Caofeidian, Hebei**: Qianhai Petrochemical, 15m tonnes/year
- **Gulei, Zhangzhou**: Gulei refining project, 16m tonnes/year
- **Huizhou, Guangdong**: CNOOC’s Huizhou 2nd phase project, 10m tonnes/year
- **Sinopec’s Maoming-Zhanjiang petrochemical base?**

Other locations mentioned:
- **Liaodongwan**: Liaoning
- **Panjin**: Petrochemical
- **Rizhao**: Shandong
- **Panjin Petrochemical**: Independents
- **Shenghong Petrochemical**: 16m tonnes/year
- **Hengli Petrochemical**: 20m tonnes/year
- **ZRCC 2nd phase project**: 15m tonnes/year
- **Gulei**: Petrochemical project, 16m tonnes/year
- **CNOOC’s Huizhou 2nd phase project**: 10m tonnes/year
Questions?

More question please contact
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+86 133-8009-5076 lili@icis-china.com

ICIS China Research team
• Refining industry
• Petrochemical industry (Olefin, aromatics)
• Feedstock (Naphtha, condensate, propane, natural gas, coal)
• Fuels (on-road, industrial)
• Logistics and supply chain management