Analysis and Forecast of China Ethylene Oxide (EO) Industry, 2013

(Sample)

Huidian Research

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5. Supply and Demand of China Ethylene Oxide Market

5.1 Production Capacity of Ethylene Oxide

5.1.1 Nationwide Production Capacity

At present, manufacturers can adjust the production proportion of ethylene oxide (EO) and ethylene glycol so as to achieve optimal economic benefit by adopting cooperative production devices for producing ethylene oxide and ethylene glycol. Subjecting to ethylene oxide’s characteristics and the restrictions of storage and transportation, so products must sell out timely with little inventory. The yield and sales volume basically keep a good balance. As of the end of 2012, there were about 26 enterprises producing ethylene oxide, with total production capacity of 2100kt/a, the actual annual output was 1410kt. Direct import and export are difficult due to safety factor. The production capacity of EO from 2012 to 2013 and distribution are exhibited in the following chart:

Tab. 4 Production Capacity of Ethylene Oxide, 2012-2013 (Unit:kt)

<table>
<thead>
<tr>
<th>Enterprises</th>
<th>Capacity, 2012</th>
<th>Outut, 2012</th>
<th>Capacity, 2013</th>
<th>Production Place</th>
<th>Corporate Property</th>
<th>Source of Technique</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinopec Shanghai</td>
<td>136</td>
<td>152.4</td>
<td>286</td>
<td>Shanghai</td>
<td>Sinopec SD</td>
<td></td>
</tr>
<tr>
<td>Jiaxing Sanjiang</td>
<td>280</td>
<td>203</td>
<td>280</td>
<td>Zhejiang</td>
<td>Privately Operated SD</td>
<td></td>
</tr>
<tr>
<td>ZRCC</td>
<td>100</td>
<td>118</td>
<td>200</td>
<td>Zhejiang</td>
<td>Sinopec SD</td>
<td></td>
</tr>
<tr>
<td>Quanyan Petrochemical</td>
<td>60</td>
<td>30</td>
<td>60</td>
<td>Zhejiang</td>
<td>Joint Venture</td>
<td></td>
</tr>
<tr>
<td>Ningbo Akzo Nobel</td>
<td>75</td>
<td>70</td>
<td>75</td>
<td>Zhejiang</td>
<td>Foreign Investment</td>
<td></td>
</tr>
<tr>
<td>Ningbo Heyuan</td>
<td>50</td>
<td>50</td>
<td>Zhejiang</td>
<td>Privately Operated</td>
<td>SHELL</td>
<td></td>
</tr>
<tr>
<td>YPC</td>
<td>100</td>
<td>94</td>
<td>186</td>
<td>Jiangsu</td>
<td>Sinopec SD</td>
<td></td>
</tr>
<tr>
<td>Nanjing Dena Petrochemical</td>
<td>60</td>
<td>50</td>
<td>120</td>
<td>Jiangsu</td>
<td>Foreign Investment SD</td>
<td></td>
</tr>
<tr>
<td>Yangzi BASF SE</td>
<td>150</td>
<td>0</td>
<td>150</td>
<td>Jiangsu</td>
<td>Joint Venture BASF</td>
<td></td>
</tr>
<tr>
<td>Anhui Fengyuan Biochemistry</td>
<td>20</td>
<td>15</td>
<td>20</td>
<td>Anhui</td>
<td>Privately Operated Ethanol Method</td>
<td></td>
</tr>
<tr>
<td>Total (East China)</td>
<td><strong>1031</strong></td>
<td><strong>732.4</strong></td>
<td><strong>1427</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liaoning North</td>
<td>150</td>
<td>120</td>
<td>150</td>
<td>Liaoning</td>
<td>CNGC SD</td>
<td></td>
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<tr>
<td>Fushun Petrochemical</td>
<td>40</td>
<td>40</td>
<td>100</td>
<td>Liaoning</td>
<td>CNPC SHELL</td>
<td></td>
</tr>
<tr>
<td>Liaoyang Chemical Fiber</td>
<td>100</td>
<td>100</td>
<td>200</td>
<td>Liaoning</td>
<td>CNPC UCC</td>
<td></td>
</tr>
<tr>
<td>Liaoning Huajing</td>
<td>180</td>
<td>180</td>
<td></td>
<td>Liaoning</td>
<td>CNGC SD</td>
<td></td>
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<tr>
<td>Jilin Petrochemical</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>Jilin</td>
<td>CNPC SD</td>
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</table>

(Sample) Analysis and Forecast of China Ethylene Oxide (EO) Industry, 2013
Judging from the above data, ethylene oxide enterprises mainly concentrated on Jiangsu, Shanghai, Beijing, Jilin and so on, displaying the imbalanced situation --- more enterprises in the north and less in the south, more in the east and less in the west.

5.2 Demand for Ethylene Oxide

5.2.1 Domestic Demand

As for EO downstream industries in 2012, ethylene glycol accounted for 49% of market shares, non-ionic surface active agent 20%, water reducing agent 11%,

<table>
<thead>
<tr>
<th>Total(Northeast China)</th>
<th>570</th>
<th>360</th>
<th>730</th>
<th>Guangdong</th>
<th>Sinopec</th>
<th>SHELL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sinopec Maoming</td>
<td>100</td>
<td>95</td>
<td>120</td>
<td>Guangdong</td>
<td>Sinopec</td>
<td>SHELL</td>
</tr>
<tr>
<td>CNOOC</td>
<td>60</td>
<td>60</td>
<td>60</td>
<td>Guangdong</td>
<td>Joint Venture</td>
<td>SHELL</td>
</tr>
<tr>
<td>Total(South China)</td>
<td>160</td>
<td>155</td>
<td>180</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shandong Chenlong Group</td>
<td>50</td>
<td>30</td>
<td>50</td>
<td>Shandong</td>
<td>Privately Operated</td>
<td>SD</td>
</tr>
<tr>
<td>Shandong Yuhuang Chemical</td>
<td>60</td>
<td>60</td>
<td>Shandong</td>
<td>Privately Operated</td>
<td>Ethanol Method</td>
<td></td>
</tr>
<tr>
<td>Yanshan Petrochemical</td>
<td>30</td>
<td>21.6</td>
<td>30</td>
<td>Beijing</td>
<td>Sinopec</td>
<td>SD</td>
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<tr>
<td>Beijing Eastern Petrochemical</td>
<td>40</td>
<td>32</td>
<td>40</td>
<td>Beijing</td>
<td>Sinopec</td>
<td>SD</td>
</tr>
<tr>
<td>TPCC</td>
<td>40</td>
<td>29</td>
<td>40</td>
<td>Tianjing</td>
<td>Sinopec</td>
<td>DOW</td>
</tr>
<tr>
<td>SINOPEC SABIC TianJin Petrochemical Company Limited,</td>
<td>50</td>
<td>52</td>
<td>50</td>
<td>Tianjing</td>
<td>Sinopec</td>
<td>DOW</td>
</tr>
<tr>
<td>Total(North China)</td>
<td>210</td>
<td>164.3</td>
<td>270</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wuhan Ethylene Project</td>
<td></td>
<td>150</td>
<td>Hubei</td>
<td>Sinopec</td>
<td>SD</td>
<td></td>
</tr>
<tr>
<td>Hubei Yongan Pharmacy</td>
<td>20</td>
<td>0</td>
<td>20</td>
<td>Hubei</td>
<td>Privately Operated</td>
<td>Ethanol Method</td>
</tr>
<tr>
<td>Shangqiu Zhongya Chemical Co.,Lt.</td>
<td>60</td>
<td>0</td>
<td>60</td>
<td>Henan</td>
<td>State-owned Asset</td>
<td>SD</td>
</tr>
<tr>
<td>Total(Central China)</td>
<td>80</td>
<td>0</td>
<td>230</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pengzhou Ethylene Project</td>
<td>100</td>
<td>100</td>
<td>Sichuan</td>
<td>CNPC</td>
<td>SHELL</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2151</td>
<td>1412</td>
<td>2937</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Huidian Research
polyether 7%, ethanolamine 8%, glycol ether 3%, choline and others accounted for about 2% of market shares.

Consumption characteristics of ethylene oxide in China:
1) the production volume of ethylene glycol is far higher than that in Japan and America, while the demand for high value-added EO downstream products are strong, because there is no abundant supply in China, so it mainly depends on import;
2) as for varieties, there are more than 5000 varieties of EO downstream products while only about 300 varieties in China. China just starts to research and develop EO varieties in the sphere of medicine, spice, dyestuff, coating and special chemical fiber oil;
3) ethylene oxide is short of supply in the long run, objectively, which restrict the development of downstream industry. Currently, the scale of most ethanolamine devices are 40～80kt/a in foreign countries, but in China the scale of most devices are less than 20kt/a. At the same time, there are many weaknesses such as backward technology process, low quality, high cost, weak competitiveness and insufficient supply in China.

According to incomplete statistics, it predicts that the demand for ethylene oxide (exclude the volume for producing ethylene glycol) will be about 1730kt in 2013. APEG TPEG HPEG, mainly used in railroad, rail transit, nuclear power station and commercial concrete etc., will be the leading factor in EO downstream industry. In the 12th Five-Year Plan, the length of railroad lines in services in China reaches about 120 thousand km. At present, it plans to invest CNY 1320 billion in building about 20,000 km railway lines. For example, Beijing-Shanghai Express railway is 1300 Km long, which using 240kt of polycarboxylate superplasticizer. Considering the 37 cities approved for building urban railway system and the large-scale construction projects such as Tianwan Nuclear Power Plant, these projects will consume a large amount of polycarboxylate superplasticizer, so it will need a huge amount of APEG TPEG HPEG from the downstream market. Comparing with 2012, it estimates that market demand will increase over 20%, and in the future the demand growth for 2a EO will exceed over non-ionic surface active agent (predicting that demand growth of non-ionic surface active agent will be 10%). As for other downstream industries, such as, ethanolamine, glycol ether, PU, polyether, choline chloride, medical intermediate, dyestuff, rubber industries also will usher substantial consumption increment.
These downstream enterprises which need EO are mainly concentrated in Jiangsu, Shandong, Shanghai, Hubei, Zhejiang, Guangdong, Liaoning, Shaanxi, Beijing and Tianjin etc., of which Guangdong, Shandong, Hubei, Zhejiang and Shaanxi etc. mainly depend on transporting EO products from the north of China to the south as well as buying EO products from the east to the west, namely, safety and transportation cost restrict the development of downstream enterprises.

Table of Contents

1. Overview of Ethylene Oxide
   1.1 Ethylene Oxide Profile
   1.2 Preparation and Application of Ethylene Oxide

2. Environment Analysis of China Ethylene Oxide Industry
   2.1 Economic Development Environment
   2.2 Related Policy

3. Production Technology of China Ethylene Oxide Industry
   3.1 Technological Development Status
   3.2 Production Technology Improvement
   3.2.1 Application Technology of New Chlorine Inhibitor
   3.2.2 Recycling Ethylene Technology
   3.2.3 Prevent Isomerization of Reaction Gas
   3.2.4 Large-Scale and New Type Reactor
   3.2.5 Catalyst Loading Technology
   3.3 Progress of Equipment Manufacture and Competitive Advantages of Biological Method
3.4 Economically Compare Ethylene Method with Ethanol Method for Producing Ethylene Oxide

4. Ethylene Oxide Downstream Industry in China
4.1 Main Downstream Products of Ethylene Oxide
4.1.1 Ethylene Glycol
4.1.2 Ethanolamine
4.1.3 Polyether
4.1.4 Compounds of Glycol Ether
4.1.5 Morpholine
4.1.6 Nitriding Choline
4.1.7 Ethephon
4.1.8 THEIC
4.1.9 Ethylene Cellulose
4.2 Development Status of China Ethylene Oxide Downstream Industry
4.2.1 Capacity and Output are Insufficient, Downstream Products Depend on Import
4.2.2 Unbalanced Distribution of Upstream and Downstream Production Areas, Logistics Transportation Restricts Downstream Development
4.2.3 Unreasonable Downstream Product Structure, Weak R&D Ability of Product Process

5. Supply and Demand of China Ethylene Oxide Market
5.1 Production Capacity of Ethylene Oxide
5.1.1 Nationwide Production Capacity
5.1.2 Ethylene Oxide Capacity in Shandong
5.2 Demand for Ethylene Oxide
5.2.1 Domestic Demand
5.2.2 Demand in Shandong
5.3 Market Condition
5.3.1 Market Condition, 2012
5.3.2 Market Status at Domestic Four Major Regions, 2013

6. Imports and Exports of China’s Ethylene Oxide
6.1 Imports
6.2 Exports
6.3 Import Source and Export Destination Countries

7.1 Ethylene Oxide Industry Scale in China
7.1.1 Enterprise Scale
7.1.2 Staff Scale
7.1.3 Asset Scale
7.2 Production and Sales of Ethylene Oxide Industry in China
7.2.1 Production Value
7.2.2 Sales Revenue  
7.3 Financial Capacity of China Ethylene Oxide Industry  
7.3.1 Profitability and Forecast  
7.3.2 Debt Paying Ability and Forecast  
7.3.3 Investment Income  

8. Key Enterprises of China Ethylene Oxide Industry  
8.1 China Sanjiang Fine Chemicals Company Limited  
8.1.1 Company Profile  
8.1.2 Business Performance  
8.1.3 Company Strength  
8.2 Sinopec Shanghai Petrochemical Company Limited  
8.2.1 Company Profile  
8.2.2 Business Performance  
8.2.3 Company Strength  
8.3 Sinopec Zhenhai Refining & Chemical Company  
8.3.1 Company Profile  
8.3.2 Business Performance  
8.3.3 Company Strength  
8.4 Sinopec Yangzi Petrochemical Company Ltd  
8.4.1 Company Profile  
8.4.2 Business Performance  
8.4.3 Company Strength  
8.5 Dena (Nanjing) Petrochemical Company Ltd  
8.5.1 Company Profile  
8.5.2 Business Performance  
8.5.3 Company Strength  

9. Development Suggestion and Risk of Ethylene Oxide Industry  
9.1 Suggestion  
9.1.1 Reasonable Planning Layout, Scientifically Promote Ethylene Oxide Industry and Downstream Products  
9.1.2 Strengthen R&D, Appropriately Expand Application Areas of Ethylene Oxide Products  
9.1.3 Speed up Introduction, Realize Domestication of Key Technologies  
9.2 Risks