The Growth Analysis of China Copper Smelting Industry

Lu Ganping
General Manager
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- Future production and composition of refined copper in China
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The impact of legislation and government reforms on capacity and investment

1. The status quo of China copper smelting industry

- Smelting and refining capacity has increased significantly since 2007

  - According to statistics from Antaike, in 2014, China's refined capacity reached 9.87 million tons, which is 1.31 times larger than in 2007. And the average annual growth rate since 2007 has been 12.8%.

![Smelting and refining capacity (10kt)](chart)

Source: Antaike, Jinrui Futures
The impact of legislation and government reforms on capacity and investment

1. The status quo of China copper smelting industry

- Investment in fixed asset of china copper smelting industry has increased year by year.
- However, the debt ratio of overall smelting enterprises is quite high and their profitability remains at a relatively low level.

![Graph showing fixed asset investment and debt ratio](source: Wind, Jinrui Futures)
The impact of legislation and government reforms on capacity and investment

1. The status quo of China copper smelting industry

- Pollution in China copper smelters is still serious and pollutant emission regulation needs to be strengthened.

Sulfur dioxide emissions from Non-ferrous metal industry (10 kt, %)

Overall energy consumption from smelting industry (10kg standard coal /t, %)

Source: Wind, Jinrui Futures
The impact of legislation and government reforms on capacity and investment

1. The status quo of China copper smelting industry

- Soaring capacity
- Pollution issues
- Rapid investment growth
2. Government legislation & Reform

- copper smelting industry standard
  Aimed at lifting market entry threshold and reducing energy consumption.
  ✓ This regulation requires:
    1) For new construction and renovation of copper smelters, which use copper concentrate and secondary copper resources, their smelting capacity has to be 100,000 tons / year and above;
    2) For new construction of primary copper smelters, their overall energy consumption of smelting process has to be 180 kg of standard coal / ton and below.

- "Twelfth Five Year Plan" of Nonferrous Metals Industry
  Industrial transformation and upgrading plan (2011-2015)
  Aimed at promoting industrial restructuring and upgrading.

- Waste electronic products recycling regulations
  "Twelfth Five Year Plan" of Energy saving
  Sustainable economy development strategy
  Aimed at improving energy utilization efficiency and develop sustainable economy.
2. Government legislation & Reform

<table>
<thead>
<tr>
<th>Energy reform</th>
<th>SOE reform</th>
<th>Tax reform</th>
<th>Finance reform</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reform oil, gas, electric and new energy industry</td>
<td>Introduce social capital</td>
<td>Improve fixed assets conversion</td>
<td>Stock issuance registration system</td>
</tr>
<tr>
<td>Strengthen market pricing mechanism and enhance resource utilization efficiency</td>
<td>Improve capital structure</td>
<td>BT to VAT</td>
<td>Liberalize interest rate control</td>
</tr>
<tr>
<td></td>
<td>Limit salary of senior management</td>
<td></td>
<td>Implement a neutral monetary policy</td>
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<td></td>
<td>Promote technical innovation</td>
<td></td>
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<tr>
<td></td>
<td>Encourage corporate restructuring and mergers</td>
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</tbody>
</table>
3. The impact of government legislation and reforms on capacity and investment

- Raised the industry entry threshold and eliminated obsoleted capacity.

In 2010, the total obsoleted capacity was 24,7400 tons. In 2014, this number reached 70,8600 tons, 2 times more than in 2010.

The total number of obsoleted capacity (10 kt)

Source: Wind, Jinrui Futures
3. The impact of government legislation and reforms on capacity and investment

- Suppressed the growth rate of investment in fixed asset and resulted in the decline of growth rate of new capacity.
- Decreased major energy consumption indicators and controlled pollutant emissions.

**New capacity growth (10 kt, %)**

- **Energy consumption indicators (kg of standard coal / t)**

Source: Wind, Jinrui Futures
Further enhanced industry concentration.

- According to statistics of Nonferrous Metals Association, the refined copper output of the top five enterprises in 2013 reached 4.08 million tons, accounting for 60 percent of the national total.

The market share of major companies in 2000

- Jiangxi Copper
- Tongling Nonferrous Metals
- Jinchuan
- Yunnan Copper
- Daye Nonferrous
- Others

The market share of major companies in 2013

- Jiangxi Copper
- Tongling Nonferrous Metals
- Jinchuan
- Yunnan Copper
- Daye Nonferrous
- Others

Source: China Nonferrous Metals Association, Jinrui Futures
The impact of legislation and government reforms on capacity and investment

3. The impact of government legislation and reforms on capacity and investment

- Chinese smelters have also made some efforts in guaranteeing the supply of raw materials. Furthermore, some domestic industry leaders expand their business overseas.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>July.2008</td>
<td>Xinxin Mining acquired Inner Mongolia Copper</td>
</tr>
<tr>
<td>Oct.2008</td>
<td>Aluminum Corporation of China held Yunnan Copper</td>
</tr>
<tr>
<td>Sep.2009</td>
<td>China Nonferrous Metal Mining Group Co., Ltd. acquired Shandong Obote Copper and Aluminum Co.</td>
</tr>
<tr>
<td>Dec.2009</td>
<td>China Minmetals held Hunan Nonferrous</td>
</tr>
</tbody>
</table>

Oversea:
- Aug.2007, China Aluminum acquired 91% shares of Canada Peru Copper
- Apr.2014, China Minmetals acquired Babangsi copper for $5.85 billion
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The demand of refined copper in China

Future production and composition of refined copper in China

The impact of energy, sulfuric acid and cost of labor on the profit margin
The demand of refined copper in China

1. China and ex-China refined copper supply and demand balance - China shortage, foreign surplus

China needs to import refined copper from abroad to meet domestic demand

Source: Wood Mackenzie, ICSG, Jinrui Futures
2. Can China domestic consumption be satisfied?

- Domestic production + Import
- The amount of copper needed to import is determined by the domestic deficit and the surplus from rest of world
- The supply can roughly meet the domestic demand

Refined copper balance of China (kt)

Source: ICSG, Antaike, Jinrui Futures
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Future production and composition of refined copper in China

1. China smelting capacity is expected to increase 800 thousand tons in 2015

<table>
<thead>
<tr>
<th>Company</th>
<th>Increased Capacity/kt</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dongying Fangyuan</td>
<td>200</td>
</tr>
<tr>
<td>Hengbang Copper</td>
<td>150</td>
</tr>
<tr>
<td>Baiyin Nonferrous</td>
<td>150</td>
</tr>
<tr>
<td>China National Gold Sanmenxia</td>
<td>200</td>
</tr>
<tr>
<td>Xinhui Copper</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>800</strong></td>
</tr>
</tbody>
</table>

According to our conversation with several major domestic smelters:

The capacity is expected to increase 800 thousand tons in 2015.

Source: SMM, Jinrui Futures
Future production and composition of refined copper in China

2. The composition of copper production in China

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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary Copper</td>
<td>186</td>
<td>186</td>
<td>180</td>
<td>179</td>
<td>178</td>
<td>177</td>
</tr>
<tr>
<td>(10kt)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary Copper</td>
<td>393</td>
<td>471</td>
<td>510</td>
<td>560</td>
<td>632</td>
<td>703</td>
</tr>
<tr>
<td>(10kt)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total (10kt)</td>
<td>579</td>
<td>657</td>
<td>690</td>
<td>740</td>
<td>810</td>
<td>880</td>
</tr>
<tr>
<td>Proportion of Secondary Copper</td>
<td>32.13%</td>
<td>28.31%</td>
<td>26.09%</td>
<td>24.19%</td>
<td>21.98%</td>
<td>20.11%</td>
</tr>
</tbody>
</table>

Source: Antaike, Jinrui Futures

Domestic refined copper production is consisted of secondary copper and primary copper.

The raw material of secondary copper is scrap. However, scrap imports become less competitive for several reasons:

- the price spread between scrap and refined copper was tightened;
- industry structure is reforming and upgrading;
- the cost of labor is increasing;
- environment-friendly requirement becomes stricter;
3. The proportion of secondary copper is decreasing year by year

- The proportion of secondary copper is decreasing year by year.
- The estimated numbers from 2015 to 2017 are 24%, 22% and 20%, respectively.

Source: Antaike, Jinrui Futures
4. Whether domestic smelters have flexible choices in raw materials

- The process of secondary copper production:
  Feeding-melting-Oxidation-Reduction-Roast&Cast

- There are significant differences between smelting scrap and concentrate.

- If a scrap smelter is planning to renovate its facility for smelting concentrate, we believe that such plan will be limited by technique and capital and is infeasible.
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The demand situation of refined copper in China

Future production and composition of refined copper in China

The impact of energy, sulfuric acid and cost of labor on the profit margin
The impact of energy, sulfuric acid and cost of labor on the profit margin

1. Gross Profit and TC/RC of Chinese Smelters

Source: Wind, Jinrui Futures

Source: CRU, Jinrui Futures
The impact of energy, sulfuric acid and cost of labor on the profit margin

2. Cost of Chinese Smelters

**Reference range of smelting cost in 2013**

<table>
<thead>
<tr>
<th></th>
<th>¥/Tons</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smelting</td>
<td>1210-1680</td>
<td>Concentrate to Blister</td>
</tr>
<tr>
<td>Fire Refining</td>
<td>130-190</td>
<td>Blister to Anode</td>
</tr>
<tr>
<td>Electro-refining</td>
<td>450-630</td>
<td>Anode to Cathode</td>
</tr>
<tr>
<td>Sub Total</td>
<td>1790-2500</td>
<td></td>
</tr>
<tr>
<td>Sulfuric acid</td>
<td>110-200</td>
<td>Sulfuric acid by-product</td>
</tr>
<tr>
<td>Slag</td>
<td>100-140</td>
<td>Slag to Slag concentrate</td>
</tr>
</tbody>
</table>

Source: Wind, Jinrui Futures
3. The Unit Cost Composition of Refined Copper

Flash smelting-Blowing-Fire refining-Electro refining-Anode treatment-Gold and Silver electro refining-Sulfuric acid generation

**Cost Composition of Refined Copper (Exclude Raw Material)**
- Fabricating cost: 34%
- Electricity: 23%
- Fuel: 12%
- Water: 1%
- Others: 15%
- Cost of Labor: 5%
- Auxiliary material: 10%

**Cost Composition of sulfuric acid**
- Fabricating cost: 41%
- Electricity: 30%
- Others: 4%
- Cost of Labor: 4%
- Auxiliary material: 14%
- Fuel: 6%
- Water: 3%
The management cost remained at a relatively high growth rate in the past ten years.
The average wage in manufacturing industry also increased quickly.
5. Electricity Price Keep Growing

Chinese electricity price kept growing over the past years. The oil price had risen steadily from Jan, 2009 to Jun, 2014. Since then, however, the oil price was cut by more than 50% and hit five years low.

Source: Wind, Jinrui Futures
The impact of energy, sulfuric acid and cost of labor on the profit margin

6. Sulfuric Acid Price Remains at Lower Level

Sulfuric Acid Price (¥/t)

Source: Wind, Jinrui Futures
The impact of energy, sulfuric acid and cost of labor on the profit margin

• Conclusion:
  
  – Gross profit of Chinese smelters keep decreasing.
  
  – The decreasing TC/RC before 2008 lowered the gross profit of Chinese smelters.
  
  – Although TC/RC rebounded after 2008, gross profit of Chinese smelters did not improve, which is due to the higher cost, such as labor cost.
  
  – Also, the declining sulfuric acid price eroded the return of by-product.
  
  – The declining oil price since June 2014 is beneficial for smelters to lower the cost and improve the return.
Thank You!