China’s decarbonisation and impact on the aluminium market

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Decarbonisation target and reality in China

Chinese policies will drive the aluminium industry to reduce carbon footprint

Carbon reduction pathways of the Chinese aluminium industry and impact

Conclusion
Top GHG emitters

Data source: UN Environment Programme
Carbon emission reduction in China is not an easy job

Chinese electricity generation by power source

Output of main industrial products

Data source: China Electricity Council, NBS, SMM
Structure of presentation

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Supply-side reform has put a cap on aluminium smelting capacity in China, which builds a solid foundation for aluminium industry to achieve the carbon emission peak before 2030.

Coal-fired power meets around 80% of the electricity demand in aluminium smelting industry in China, the remaining power is from hydro and renewable energy.

Coal-power-aluminium development model can not be adopted any more in China. The government will strictly control the new coal-fired power station project.
Chinese ETS will include the aluminium smelting industry

- China’s nation-wide ETS for the coal/gas-fired power industry will start trading carbon emission in the second of this year.
- The captive coal-fired power generators of smelters/refineries are included by this ETS.
- Other energy-intensity industries could be-covered soon, including aluminium smelting.
- The benchmark methodology is the potential measure for aluminium smelting industry, similar as the power industry.

<table>
<thead>
<tr>
<th>Category</th>
<th>Category details</th>
<th>Electricity Benchmark (t CO2/MWh)</th>
<th>Heat Benchmark (t CO2/GJ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Common coal-fired plants over 300 MW</td>
<td>0.877</td>
<td>0.126</td>
</tr>
<tr>
<td>II</td>
<td>Common coal-fired plants below 300 MW</td>
<td>0.979</td>
<td>0.126</td>
</tr>
<tr>
<td>III</td>
<td>Other plants that burn coal gangue or coal water slurry</td>
<td>1.146</td>
<td>0.126</td>
</tr>
<tr>
<td>IV</td>
<td>Gas-fired power plants</td>
<td>0.392</td>
<td>0.059</td>
</tr>
</tbody>
</table>

Data source: tanpaifang.com, SMM
Over the last 15 years, China’s “dual controls” – of energy intensity and total energy consumption – have reduced the energy consumption.

Inner Mongolia has not achieved the dual control target last year. The local government has taken extreme measure to reduce the energy consumption by shutting down energy-intensive industries, including smelters.

Normally the Chinese government will take efforts to achieve the established targets. New policies could be issued:
- Coal-fired power project?
- Import/export tax and VAT rebates?
- Al scrap import regulation?

Data source: China National Bureau of Statistics, adjusted based on constant 2005 prices
Aluminium product exporters show more interest in green metal

- In Dec 2019, the JV between Xiamen Xiashun and Yunnan aluminium came on stream, which supply aluminium slab from hydro power to Xiamen Xiashun.

- In Jan 2021, Mingtai Aluminium partners with UC Rusal to produce low-carbon products. And also Mingtai Aluminium will increase the recycling capacity to 680kt from current 300kt in order to reduce its' carbon footprint.

- Lots of downstream producers in China have achieved the ASI certification, for example, Xianmen Xiashun, Chalco Ruimin, Shandong Nanshan, Luoyang Wanji, Jiangsu Dingsheng, Tianjin Zhongwang, Yunnan Yongshu, Shanghai Shenhoo…

Data source: China Customs, SMM
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Chinese aluminium smelters are chasing green energy sources

- Aluminium smelters shift from coal-fired power to hydro power by relocation, for example China Hongqiao(2.03mt), Shenhuo Group(900kt), Qiya Group(350kt), Zhongfu(500kt)

- Renewable energy rich provinces encourage aluminium smelters to use more wind/solar power, like Gansu and Qinghai

- Potential shift from captive power stations to power purchase agreements (PPA) with the grid in order to reduce carbon footprint

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<table>
<thead>
<tr>
<th>Province</th>
<th>Current Capacity (kt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shandong</td>
<td>8,740</td>
</tr>
<tr>
<td>Inner Mongolia</td>
<td>6,270</td>
</tr>
<tr>
<td>Xinjiang</td>
<td>6,180</td>
</tr>
<tr>
<td>Henan</td>
<td>2,150</td>
</tr>
<tr>
<td>Yunnan</td>
<td>4,560</td>
</tr>
<tr>
<td>Sichuan</td>
<td>1,155</td>
</tr>
</tbody>
</table>
Recycling is becoming an important factor to reduce GHG emissions.

Current aluminium scrap import regulation is only designed for scrap as casting products raw materials.

More scrap recycling projects are under construction, which can meet metal demand and reduce carbon emission at the same time.

Imported aluminium scrap is expected to remain growth.

<table>
<thead>
<tr>
<th>Company</th>
<th>Capacity (k ton)</th>
<th>Investment (Million RMB)</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binzhou Sigma</td>
<td>300</td>
<td>450</td>
<td>3104 and 6063 Alloy</td>
</tr>
<tr>
<td>Gongyi Sigma</td>
<td>200</td>
<td>200</td>
<td>3104 Alloy</td>
</tr>
<tr>
<td>Shandong Hongchuang</td>
<td>200</td>
<td>159</td>
<td>1xxx, 3xxx and 8xxx Alloy</td>
</tr>
<tr>
<td>Shandong Hongchuang</td>
<td>200</td>
<td>159</td>
<td>1xxx, 3xxx and 8xxx Alloy</td>
</tr>
<tr>
<td>Henan Mingtai</td>
<td>105</td>
<td>171</td>
<td>Alloy slab</td>
</tr>
<tr>
<td>Henan Mingtai</td>
<td>210</td>
<td>150</td>
<td>Alloy slab</td>
</tr>
<tr>
<td>Henan Mingtai</td>
<td>360</td>
<td>371</td>
<td>3xxx and 6xxx slab</td>
</tr>
<tr>
<td>Guangxi Pinglv</td>
<td>800</td>
<td>1488</td>
<td>Ingot and billet</td>
</tr>
</tbody>
</table>

Data source: China Customs, SMM
Overseas investment is a potential solution for Al demand

- Indonesia Huaqing Aluminum is a joint venture between Huafon Group and Tsingshan Holding Group. The project is located in Tsingshan Industrial Park on Sulawesi Island, Indonesia.

- China Hongqiao has an alumina refinery in West Kalimantan. Shandong Nanshan refinery project is under construction in Bintan Island. They have potential to add smelting capacity.

- Huge investment in overseas infrastructure projects by Chinese companies, including minerals and hydro power, might lead to aluminium smelter projects in the future.
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Key takeaways

- Although the carbon emission reduction targets are not easy to achieve for China, the Chinese aluminium smelting industry should be able to accomplish the carbon peak before 2030, which can be secured by the consistent government policies.

- The policies and clients’ requirement will continue pushing the producers to reduce their carbon footprint. More new policies could be issued during the next 10 years to encourage carbon emission reduction. We can not rule out the possibility of the Chinese government changing the import/export tax and VAT rebates on aluminium products in the future, similar to what they have done for steel products.

- The impact of the decarbonisation in the Chinese aluminium industry will be great, not only in China, but also around the world. The global market balance will be significantly affected, including primary and scrap. The aluminium products trading flows could be reshaped again.
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