Chinese aluminum industry: challenges and transformation

September 2013
For the last decade Chinese Al industry had extremely quick growth

For the past decade Chinese aluminium production and consumption experienced rapid growth due to urbanization and infrastructure development.

- Building and construction (B&C) and transport were the main consumption-driving sectors.
- Large part of capacity was commissioned and operated by private companies.

Demand for aluminium in China was mainly supplied by domestic production with aluminium producers used to “never ending” consumption growth.

Sources: Aladdiny, CRU, Antaike, UC RUSAL research
Changes in geography of Chinese aluminum smelting capacity during the last decade

- Chinese aluminium industry used to be fragmented already in 2002, with 5 mln.t of national capacity being installed at 38 small smelters
- Regional distribution of smelters had undergone some changes with share of central and western regions increasing and production at south-west growing with slower pace
- **Shandong** was the obvious leader of aluminium production growth and it will continue to be one of the key regions in aluminium industry
- Production in **Xinjiang** and **Inner Mongolia** also showed rapid increase
- In future share of north-western region will increase due to shut-downs in central region
- Combined share of production in Western provinces (North-west + south-west) in H1 2013 reached 52%

### Top 5 aluminium producing provinces 2002 vs H1 2013

<table>
<thead>
<tr>
<th>Province</th>
<th>2002</th>
<th>H1 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Henan</td>
<td>11</td>
<td>19</td>
</tr>
<tr>
<td>Guizhou</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>Qinghai</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Gansu</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>Ningxia</td>
<td>6</td>
<td>9</td>
</tr>
</tbody>
</table>

### H1 2013 vs 2002 production regional distribution in China

- **North-west region**: 35% → 41%
- **South-west region**: 26% → 11%
- **Central & east regions**: 33% → 41%

Capacity transfer to north-west regions is not that obvious due to continuous operations of loss-making smelters in central region

Source: Aladdiny, CRU, UC RUSAL research
**Primary aluminium production and capacity by main producers in China in 2012 – 2013F**

<table>
<thead>
<tr>
<th>Company</th>
<th>Production 2012, kt</th>
<th>As of total</th>
<th>Growth, kt</th>
<th>Growth, %</th>
<th>As of total</th>
<th>Installed capacity as of December 2012, kt</th>
<th>As of total</th>
<th>Installed capacity by the end of 2013, kt</th>
<th>As of total</th>
<th>Prospective projects 2013, kt(1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHALCO</td>
<td>4 225</td>
<td>19%</td>
<td>343</td>
<td>9%</td>
<td></td>
<td>4 355</td>
<td>16%</td>
<td>4 355</td>
<td>15%</td>
<td>-</td>
</tr>
<tr>
<td>CPI</td>
<td>2 623</td>
<td>12%</td>
<td>676</td>
<td>35%</td>
<td></td>
<td>2 646</td>
<td>10%</td>
<td>2 836</td>
<td>9%</td>
<td>+190</td>
</tr>
<tr>
<td>Xinfa Group</td>
<td>1 829</td>
<td>8%</td>
<td>402</td>
<td>28%</td>
<td></td>
<td>2 320</td>
<td>9%</td>
<td>2 870</td>
<td>10%</td>
<td>+550</td>
</tr>
<tr>
<td>Hongqiao Group</td>
<td>1 802</td>
<td>8%</td>
<td>613</td>
<td>52%</td>
<td></td>
<td>2 100</td>
<td>8%</td>
<td>3 100</td>
<td>10%</td>
<td>+1 000</td>
</tr>
<tr>
<td>East Hope</td>
<td>942</td>
<td>4%</td>
<td>372</td>
<td>65%</td>
<td></td>
<td>1 330</td>
<td>5%</td>
<td>1 680</td>
<td>6%</td>
<td>+350</td>
</tr>
<tr>
<td>Yichuan</td>
<td>845</td>
<td>4%</td>
<td>122</td>
<td>17%</td>
<td></td>
<td>880</td>
<td>3%</td>
<td>880</td>
<td>3%</td>
<td>-</td>
</tr>
<tr>
<td>Nanshan Group</td>
<td>810</td>
<td>4%</td>
<td>73</td>
<td>10%</td>
<td></td>
<td>840</td>
<td>3%</td>
<td>840</td>
<td>3%</td>
<td>-</td>
</tr>
<tr>
<td>Yulian Energy (Vimetco)</td>
<td>695</td>
<td>3%</td>
<td>-58</td>
<td>-8%</td>
<td></td>
<td>830</td>
<td>3%</td>
<td>830</td>
<td>3%</td>
<td>-</td>
</tr>
<tr>
<td>Shenhuo Group</td>
<td>649</td>
<td>3%</td>
<td>-141</td>
<td>-18%</td>
<td></td>
<td>1 030</td>
<td>4%</td>
<td>1 290</td>
<td>4%</td>
<td>+260</td>
</tr>
<tr>
<td>Jiuquan Iron&amp;Steel Group</td>
<td>644</td>
<td>3%</td>
<td>381</td>
<td>2.5x</td>
<td></td>
<td>840</td>
<td>3%</td>
<td>1 290</td>
<td>4%</td>
<td>+450</td>
</tr>
<tr>
<td><strong>Top-10 total</strong></td>
<td>15 064</td>
<td>66%</td>
<td>2 815</td>
<td>23%</td>
<td></td>
<td>17 171</td>
<td>63%</td>
<td>19 971</td>
<td>61%</td>
<td>2 800</td>
</tr>
<tr>
<td><strong>China total</strong></td>
<td>22 729</td>
<td></td>
<td>3 195</td>
<td>16%</td>
<td></td>
<td>27 111</td>
<td></td>
<td>32 861</td>
<td></td>
<td>5 750</td>
</tr>
</tbody>
</table>

**2012 vs 2013 Production by top 4 aluminium companies**

<table>
<thead>
<tr>
<th>Company</th>
<th>Production 2012</th>
<th>Production 2013E</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHALCO</td>
<td>4 225</td>
<td>4 206</td>
</tr>
<tr>
<td>CPI</td>
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<td>1 829</td>
<td>2 135</td>
</tr>
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<td>Hongqiao Group</td>
<td>1 802</td>
<td>2 450</td>
</tr>
</tbody>
</table>

**Source:** Aladdiny

**Note:** (1) All projects are approved by local Governments, but not by central NDRC.

Whereas largest state-owned companies cut production in line with central government’s directions, private companies ramp up production in low-cost regions, increasing their market share.

**Chinese aluminum industry has its leaders:**
Top 10 producers account for 63% of total installed capacity.
Chinese aluminium industry by the end of 2012: overproduction crisis and capacities ramp up

- The reasonable and far-reaching Government-stated policy on aluminium capacity relocation to the Western low cost provinces faced opposition on the part of local Eastern provinces’ governments, encouraging aluminium capacities roll-up and tending to support smelters in their regions
- Local provinces in central and southern parts of China used several ways to subsidize smelters:
  - Power tariff subsidizing
  - Allocation of subsidies for SOEs and public companies
  - Special policy supporting enterprises
  - Imposing obligations to provide subsidies at third party’s expenses

Chinese aluminium industry faces structural overproduction crisis that may be resolved only by combined efforts of central, local authorities and large producers

Notes: (1) Operating capacity growth in China in Jan – Jul 2013
Source: Aladdiny, UC RUSAL research
New aluminum industry model leads to higher transportation costs...

Despite cheaper power costs NW producers face higher transportation costs and imported bauxite cost:

- Bauxite is shipped ~ 4,200 km from Indonesia to Shandong ports
- Alumina is transported by rail ~ 3,500 km from Shandong to Xinjiang
- Aluminium is transported by rail ~ 4,200 km from Xinjiang to customers
- Xinjiang vs East China - additional transportation cost of 290USD/t

Developing Xinjiang as a smelting hub increases the overall distance of the bauxite-alumina-aluminium-market supply chain from 4,000 km to 11,000km, 2/3 of which is by rail transport.

Source: Aladdiny, UC RUSAL research
Scheduled termination of Indonesian bauxite exports in 2014 will increase pressure on China’s Al industry and push China to diversify its bauxite supply.

China has extractable bauxites reserves of 539 Mt (2012), sufficient for 6-7 years of current alumina production, while the inferred resource base is 16.3 billion tons.

Chinese bauxite is dominately diasporic, with high alumina content but low Al/Si ratio – expensive to process.

China is still one of the largest world bauxite importers and its bauxite self-sufficiency rate was equal to 62% in 2012.

Indonesia used to be a major supplier of bauxites to China.

Indonesian resource ban made Chinese companies concerned about stability of supply and they started global search for bauxites, competing with global players.

Source: China Non-ferrous Metals Association (CNI), Aladdiny, SMM, China Customs, UCR research.

... with heavy dependence on bauxite import from Indonesia and other countries.

Rapid growth of aluminium production led to deficit of domestic bauxites.

.. and significant increase in bauxite import especially from neighboring Indonesia.

.. which even after imposing export limitations remains the major bauxite supplier to China.
Economic model in China transforms towards domestic consumption and focuses on value-added industry and services

Policy evolution in 10th to 12th five-year plans (2001 – 2015)

With main focus on following:

- Achieving growth for the secondary industry at 51% of GDP growth
- Upgrading the industrial structure, and strengthening international competitiveness
- Kick-starting the operations of a larger number of infrastructure facilities
- Bringing the development disparity between regions under effective control, and raise levels of urbanization

- Share of service industry’s value added to GDP up from 40.3% in 2005 to 43.3% in 2010
- Share of employed in service industry up from 31.3% to 35.3% in 2010
- Share of research and development (R&D) spending out of total GDP up from 1.3% in 2005 to 2% in 2010
- Urbanization rate up from 43% in 2005 to 47% in 2010

- Rebalance economy away from exports and investments, towards consumption and efficient, value-added industry and services
- National GDP growth of ~7% p.a.
- To close the urban/rural divide, income gap and narrow regional development differences (Western Region Development Program)
- Greater environmental protection and improving energy efficiency

Sources: NDRC website, UC RUSAL research
China is coping with aluminum overcapacity through governmental regulations...

Policy timeline - 2013

MIIT: announced plans to bring about consolidation in a number of industrial sectors, including aluminium
Jan

State Reserve Bureau conducted 2nd round of aluminium purchase (300 kt)
Mar

NDRC, MIIT: impose restrictions on capacity expansions in industries facing severe overcapacity
May

MIIT: New standards to aluminium industry
Jul

MIIT: issues list of obsolete capacity to be closed. (260 kt of aluminium)
Jul

NEA issued a circular on regulation of PPA(1) direct transaction approval
Sept

Policy details

Measures to be implemented in aluminium industry – consolidation of the industry by 2015

- Ten largest producers will account for 90% of the Chinese aluminium market
- 3-5 Chinese vertically integrated aluminium players of a global scale will be formed
- Promotion and support of cross-regional, cross-industrial M&A deals (all forms of ownership)

The State Reserve Bureau conducted its 2nd round of a total of 400 kt aluminum ingot purchase, following the purchase of 100 kt in November 2012, via bid invitation in Beijing on March 15

- No approval of new capacity projects in the industries with overcapacity
- Stop illegal construction of new capacities in industries with overproduction (those to be launched should not be started, new capacities being constructed should be stopped)
- Local governments should be responsible for control over blind expansions in their regions

- Stricter energy consumption, emissions limits are set (compared with 2007 standards)
- New standards are applied to new projects and already operating smelters/refineries. Those not complying with standards are to be eliminated as outdated capacities or should be modernized
- To be regulated: location of aluminium industry enterprises (facilities located in regions with non-competitive conditions should be removed to regions with competitive ones); project scale and share of own resource supply (minimum amount is adjusted/set)

Smelters should stop production on indicated production lines by September and decommission equipment by December 2013.
But, in fact, all of the smelters on the list are located in Henan and were already shut down by the time of announcement

From Oct.2012 till May 2013 State Council issued a series of documents, delegating its authority to approve projects to local governments in many fields, including direct power purchase
Strict criteria are set for those applying to direct PPA conclusion, energy-intensive industries in Eastern regions are not allowed to conclude direct PPA; subsidizing via PPA is prohibited

Note: (1) PPA - power purchase agreement
Source: MIIT, NDRC websites, news releases, CNIA

In a move to combat the crisis, central government focused on aluminium industry restructuring, tightening energy-efficiency and ecology regulations and giving a support to modern companies
...trying to control domestic expansions and making Chinese companies implement “go out” strategy

The next step of the Central government being actively discussed now by MIIT and NDRC with aluminium smelters is program of support to overseas expansions of smelters instead of domestic ones:

• Chinese companies already started international cooperation projects in bauxites and alumina after limitations were imposed by Indonesian government on exporting unprocessed bauxites

• Apart from projects in Indonesia, Chinese companies started looking for Australia and projects in Atlantic region, with CPI announcing start of its bauxite & alumina project in Guinea in September 2013

Bauxite & alumina projects can soon be accompanied by massive go-out of primary aluminium projects, followed by governmental incentives (as an example, Chalco and UC RUSAL’s negotiations on smelter in Siberia)

Guinea:
- CPI (bauxite 12 mtpy - 2014; alumina plant - 2020)
- LAOS:
- Chalco, bauxite exploration
- SHANDONG HONGQIAO, aluminium plant 1 mtpy
- CHALCO, aluminium project (suspended)

Malaysia:
- Chalco, bauxite mine & alumina refinery 1 mtpy
- CHALCO, aluminium project (suspended)
- SHANDONG XINFA
- AUSTRALIA:
- SHANDONG XINFA
- RUSSIA:
- CHALCO, possible aluminium project with UC RUSAL

Implementation of alumina projects abroad will give companies necessary experience to further move aluminium projects overseas where more competitive conditions will be offered
Future of Chinese aluminum industry

### Primary aluminum consumption and capacity forecast

- **MIIT’15 production guidance is at odds with market realities and growth estimates**

<table>
<thead>
<tr>
<th>Year</th>
<th>Consumption</th>
<th>Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>22,720</td>
<td>22,546</td>
</tr>
<tr>
<td>2013E</td>
<td>24,720</td>
<td>25,000</td>
</tr>
<tr>
<td>2014E</td>
<td>28,545</td>
<td>26,700</td>
</tr>
<tr>
<td>2015E</td>
<td>28,900</td>
<td>28,722</td>
</tr>
</tbody>
</table>

**Notes:**
1. including import
2. UC RUSAL research

### Scenarios of capacity/market balance

<table>
<thead>
<tr>
<th></th>
<th>2013E</th>
<th>2015E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Consumption</strong></td>
<td>24,720(1)</td>
<td>24,000</td>
</tr>
<tr>
<td><strong>Production</strong></td>
<td>25,000</td>
<td>24,000</td>
</tr>
<tr>
<td><strong>Proficit (Deficit)</strong></td>
<td>280</td>
<td>-</td>
</tr>
</tbody>
</table>

**Notes:**
1. including import
2. UC RUSAL research

**Sources:** Sunlight Metal, MIIT

- Aluminium production and consumption targets set by NDRC and MIIT seem to be too low as China will be close to 24Mtpy level already in 2013
- Sunlight Metal agency expects primary aluminum consumption to grow to 28.7 Mtpy by 2015 and have deficit of 1.3 Mtpy presuming that central government will control capacity expansion and decommissioning of loss-making capacity in Central regions
- This supports CNIA estimation of 4-5 Mln.t of aluminium capacity in China to be closed to balance the market
- China continue to be heavily dependent of outsourced bauxite mainly from Indonesia and ban on ore export after 2014 represents a risk for the industry. As expected, China will import 68 mln tons of bauxite in 2013, or 47% of the total consumption

**All market forecasts show that China will unlikely become exporter of primary aluminium to the global market**
Conclusions

- Chinese aluminium industry had an unprecedented growth during the last decade, making producers grow accustomed to constant expansions, but the economy slowdown dictates new rules.

- Despite strong aluminum consumption in China the SHFE price has not recovered to pre-crisis level and large aluminum stocks remain due to overproduction in the industry.

- As Chinese aluminium sector is highly fragmented and producers do not want to resort to production cuts being afraid of losing market share, the Central government seems to be the only power able to deal with overproduction.

- Recent measures taken by the Government to tackle overcapacity in aluminum industry should improve the domestic balance and keep new capacity expansion in check.

- Additional curtailments of loss-making capacities in Central provinces and an appropriate cut of alumina capacity should maintain future growth and support prices.

- At the same time the Chinese aluminum industry continues to be heavily dependent on outsourced bauxite and needs to diversify its sources of supply. Chinese companies are seeking for opportunities to take part in overseas bauxite & alumina projects to secure bauxite shipments.

- Primary aluminium smelting will be the next overseas projects Chinese company will consider to participate in due to restrictions on domestic capacity expansion.

- On the whole we expect the Chinese aluminum industry to be balanced in the next 3-5 years, amid strong domestic consumption growth and moderate capacity expansion.