World aluminium industry: the China factor
World aluminium industry: overcoming a disbalance

The China factor

An alternative for China
Despite a healthy growth in aluminium consumption…

Global aluminium consumption outlook remains positive…

…with China accounting for its major part(1)…

… and key consuming industries growing at a steady pace

Aluminium consumption is set to grow at c. 7% CAGR over 2012-2015


Notes: (1) Aluminium consumption forecast by region in 2012
…low metal prices continue to hit the industry…

The metal price is well below the pre-crisis level…

USD / t
3500
3000
2500
2000
1500
1000
2006 2007 2008 2009 2010 2011 2012

07.09.2012 - USD 1966

0.4%

…while production costs have inflated significantly

USD / t
3500
3000
2500
2000
1500
1000
0
5000
10000
15000
20000
25000

Total aluminium production, thousand tonnes

2012 2007

Unprofitable production 32%

+15-20%

Over 30% of global capacity is unprofitable at the current aluminium price

Source: Bloomberg, Brook Hunt
Historically drop in capacity utilization rate below 75-78% tended aluminium price increase by 25-50%

Since June 2011 all major producers have been unilaterally announcing production cuts of around 1.5 mtpa (more than 3.2% of global production) to date

Global aluminium capacity utilization rate may further drop to 78-80%

“\textit{The heavy burden of overcapacity and high stock levels exert huge pressure on the sector. To remain competitive, the industry needs discipline and proper caps in terms of output. In the short term, further curtailments of unprofitable and inefficient production capacity in all regions will be a step in the right direction as the industry looks to create a healthier market structure. Further on, the industry should be more focused on its customers, requiring greater collaboration between manufacturers and producers.}”

\textit{Oleg Deripaska, CEO of UC RUSAL}

\textit{Financial Times, 12 September 2012}
China aluminium production not in line with global industry

- China aluminium stocks increased 3.3 times throughout the late 2011 and 2012 YTD while the metal price on SHFE declined by 6% to RMB 15,400 per ton making over 30% of China capacity unprofitable.

- China has been cutting production throughout 2011 and 2012 YTD:
  - permanent shutdowns of outdated capacity – 443ktpa
  - temporary idling due to power disruptions and economic reasons – 2,139ktpa

- However, introduction of power tariff discounts in Guangxi, Henan and Guizhou in May-June 2012 have already resulted in restarts of 800ktpa of idled capacity with further restart of 400ktpa until the end of 2012 announced

Despite the unfavorable price dynamics, China has seen its aluminium production rising in 2011-2012

Source: Bloomberg, Brook Hunt, CRU
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An alternative for China
China 12th 5-year plan: addressing a need in Al…

- “12th Five-Year Plan for National Economic and Social Development”:
  - calls for rebalancing economy away from exports and investments, towards consumption and efficient, value-added industry and services
  - national GDP growth of ~7% p.a.
  - closing urban/rural divide, income gap and regional development differences (Western Region Development Program)
  - protecting the environment and increasing energy efficiency

- MIIT guidelines for the non-ferrous metals industry for the 12th Five-Year Period:
  - aluminium demand growth of 8.6% p.a. to 24mtpa in 2015
  - smelting capacity to be capped “at the level sufficient to meet domestic demand”
  - industry consolidation: 90% of China’s smelting in 10 companies
  - 800ktpa of inefficient capacities earmarked for closure
  - relocation of smelting to the West encouraged, while no new smelting projects will be approved
  - encourages establishing of overseas aluminium capacities

China’s aluminium consumption to double by 2020

Source: World Bank, MIIT, Brook Hunt, UC RUSAL research
Notes: (1) notional GDP growth of ~7% p.a. as per 12th Five-Year Plan; (2) based on China Govt. reports; (3)based on MIIT guidelines; (4) UC RUSAL projections
...through technological modernisation...

Since 2009 China has closed most of <160 KA outdated capacity

Outdated and high power cost aluminium capacity in the Central provinces should be closed sooner or later

Chinese producers actively build up new 400-600 KA aluminium technologies in the Western provinces

Some low cost aluminum capacity to be upgraded

By 2015 aluminum capacity of 300-500KA will account for 60% of total Chinese smelting capacity compared to 44% in 2009

Source: Sunlight Metal, UC RUSAL research
Share of western provinces in China’s aluminium production expected to increase from 51% in 2010 to 66% in 2015 (including ~22% from Xinjiang alone)

China actively replaces outdated capacities in the Central provinces by new ones in the Western provinces with cheap electric power.

**Xinjiang smelters effective power price vs. China**

- China average: RMB475/$64
- Xinjiang average: RMB320/$43

**Xinjiang vs. Henan**

- **Coal production costs**:
  - Xinjiang: $57/ton (1)
  - Henan: $38/MWh (1)

- **Power production costs**:
  - Xinjiang: $16/ton
  - Henan: $18/MWh

- **"Public" tariff for smelters**:
  - Xinjiang: $82/MWh
  - Henan: $48/MWh

- **Average smelting cash costs**:
  - Xinjiang: $2,227/ton
  - Henan: $1,920/ton

*Source: Brook Hunt, CRU, UC RUSAL research*  
*Notes:* (1) capacity numbers as per CRU estimates
…while focusing Central China production on downstream

- **30% CAGR of aluminium semis production vs. 17% for primary aluminium over 2003-2011**
- **9.1% CAGR of semis expected in 12th Five-Year Period**
  - focus on value-added products: alloy plate for aerospace, high-performance alloy semis and components, 6-series alloy plate for automobile, etc.
- **Positive impact on energy efficiency and employment:**
  - typical rolling mill employs 2-3 times more people than a similar-size primary aluminium smelter…
  - …while energy consumption averages just 244kWh per employee vs. 5,400kWh\(^{(1)}\), respectively
- **China's export/import duties policy encourages domestic production and exports of value-added aluminium products vs. primary aluminium**
  - 5-6% import duty and 11% export VAT rebate for fabricated aluminium
  - 7% import duty for aluminium alloys
  - 15% export tax duty for primary aluminium, scrap and bauxite

Sources: Antaike, UC RUSAL Research
Notes: (1) based on UC RUSAL estimates for typical 500ktpa smelter and typical 500ktpa rolling mill (hot-rolling, cold-rolling, finishing, casting)

**China’s semis vs. primary aluminium output**

<table>
<thead>
<tr>
<th>Kt</th>
<th>Al Semis Production</th>
<th>Al Production</th>
</tr>
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<tbody>
<tr>
<td>2,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,500</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1,000</td>
<td></td>
<td></td>
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<tr>
<td>500</td>
<td></td>
<td></td>
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<tr>
<td>0</td>
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</tbody>
</table>

**Smelter vs. rolling mill comparison\(^{(1)}\)**

<table>
<thead>
<tr>
<th></th>
<th>Smelter</th>
<th>Rolling mill</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,250 people</td>
<td>2,500 people</td>
<td></td>
</tr>
<tr>
<td>6,750 GWh</td>
<td>611 GWh</td>
<td></td>
</tr>
<tr>
<td>10.8m tons</td>
<td>0.8m tons</td>
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</tr>
</tbody>
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\(^{(1)}\) smelter = 100%

Focus on downstream increases value-added and improves energy-efficiency in aluminium sector
Low aluminium price caused setbacks in projects realization

- Chinese smelters have, on average, turned red during October 2011 and have since been accumulating losses of RMB400-550/ton, or RMB6.1bn in total
- Recently introduced power tariff discounts translate in smelters’ cost savings of RMB1,100-1,300/ton but...
  - ...come at the expense of power generation and grid companies’ earnings
  - ...ultimately result in downward pressure on SHFE
- Local governments support of loss-making smelters in their provinces distorts production/consumption balance making modernization/transition projects uneconomical
- Despite some of the capacity restarts, realization of new green-field projects goes slowly: delays in the build-up of power plants, “competition” for outbound railway capacity with other cargoes, etc.
- There are several constraints for the realization of new projects in North-Western provinces including absence of bauxite resources, shortage of water and lack of skilled labor force

The expected timeframe of new projects realization is shifting forward

Source: Bloomberg, SMM
Notes: (1) Based on SMM data; Profit margin = SHFE spot price – SMM estimate of China’s average total production costs (~RMB16,250/ton incl. VAT as of June 2012)
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An alternative for China
Russia and China: power sources and environment impact

**Principal sources of power for smelting**

<table>
<thead>
<tr>
<th>China</th>
<th>UC RUSAL</th>
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<tbody>
<tr>
<td>Coal 84%</td>
<td>Hydro 86%</td>
</tr>
<tr>
<td>Hydro 16%</td>
<td>Coal 12%</td>
</tr>
<tr>
<td>Other 2%</td>
<td>Hydro</td>
</tr>
</tbody>
</table>

**Average smelter power costs**

<table>
<thead>
<tr>
<th>China</th>
<th>Russia</th>
</tr>
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<tbody>
<tr>
<td>USD/MWh</td>
<td>72.6</td>
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**CO₂ emissions in aluminium production**

<table>
<thead>
<tr>
<th>China</th>
<th>Russia</th>
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<tbody>
<tr>
<td>ton CO₂ / ton Al</td>
<td>21.6</td>
</tr>
</tbody>
</table>

**Fundamental advantage of Russian aluminium – based on cheap and clean hydro energy**

Source: Aladdiny, CRU, UC RUSAL
Notes: (1) Brook Hunt 2Q 2012 (2) UC RUSAL 1Q2012 results
Investing abroad: a viable alternative for expansion

Investment rationale for a smelter project in Siberia

1. Secure access to low-cost green and renewable hydro energy in Siberia
   - 14GW of excess power capacity in the region + 5.4GW of new projects under way

2. Abundant raw material base for aluminium production
   - bauxite resources of 1.9bn tons, or 98 years of current aluminium production\(^{(1)}\)
   - 3.9mtpa of spare alumina capacity + 1.4mtpa alumina greenfield project\(^{(2)}\)

3. Geographic proximity to China
   - 4-8 days physical delivery time from Russian Far East sea ports to Shanghai

4. Proprietary smelting technology and proven in-house construction expertise

Notes: (1) including Dian-Dian project; (2) the Komi project
In November 2011 UC RUSAL entered into purchase agreement with NORINCO concerning 33% share acquisition in Shenzhen North Investments — a trading affiliate of NORINCO specializing in aluminium, alloys and other non-ferrous metals trading. The new JV was named North United Aluminium and started its operation in April this year.

In 2011, the Shanghai Futures Exchange registered RUSAL’s IRKAZ SUAL and RUSAL KH brands produced at the Irkutsk and Khakas aluminium smelters. The aluminium products are deliverable against the SHFE Aluminium Contract.

In June 2012, UC RUSAL signed a cooperation agreement with the Export-Import Bank of China, on an up to USD850 million greenfield project in Eastern Siberia. The agreement foresees the possibility of joint cooperation on financing of the project for construction of a new anode factory in the Irkutsk Region.

In July 2012, UC RUSAL became a member of the China Nonferrous Metals Industry Association (CNIA), the most influential national non-profit organization in the PRC.
Conclusions

1. Global demand for aluminium is growing at a healthy pace, but overproduction is an obstacle to the aluminium industry growth posing the it to the need of restructuring.

2. In order to restore supply/demand balance global aluminium companies announced production cuts, but China still suffers from overproduction, with inefficient smelters supported by local governments.

3. 12th Five-Year Plan calls for economy rebalancing from investments and exports towards consumption and efficient value-added industry and services.

4. China needs to more actively close outdated inefficient smelting capacity and replace it with a new one, however low SHFE price and low profits as well as infrastructure and labor constraints don’t allow industry to go through modernization and increase efficiency.

5. China’s investment in new low-cost aluminium capacities abroad in regions possessing a potential for clean and cheap hydro power production (like Siberia and Far East) presents an attractive proposition alongside – and in certain ways superior to – such locations inside China.
Thanks for your attention