Global aluminium industry overview

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Aluminum consumption forecast strong growth through to 2018

Primary Aluminium consumption

- 2013’s global aluminum demand growth rate was at 6%. Expected another 6% growth in 2014. Largest contributors are still expected to be China, ASEAN countries and the United States.

- The NA consumption forecast at 3% growth on strong auto demand and stable property markets development.

- European consumption forecast in 2014 revised upwards to 3% from 2% mainly due to robust growth forecast in Turkey and recovering demand in Germany and GB.

- Expected strong growth in India, Middle East and ex-China Asia at 3-4% on strong local demand and continued growth in China as well in developed counties.

- Increased car production, infrastructure investments and home appliance purchases in rural areas to drive further consumption growth in China. Expected 10% aluminium demand growth in 2014 despite GDP growth slowdown.

Source: CRU, UC RUSAL research
Global primary aluminium incremental consumption will add 14 mln mt in 5 years

- Construction: + 4 mln mt
- Transportation: + 5 mln mt
- Electrical: + 2 mln mt
- Engineering & Machinery: + 1 mln mt
- Consumer durables: +1 mln mt
- Packaging & Foil stock: + 1 mln mt

Population growth and Urbanization

Al/Cu substitution

Income increasing

Consumer behavior development

66 mln mt by 2018 (+27%)

Ford F-150, aluminium frame

Automotive production growth Aluminium content in cars increasing

Industrialization, Technological development

Source: CRU, UC RUSAL research
Further development of downstream industry in Middle East

### Further strong growth in aluminum downstream industry in ME to increase local primary metal demand

- **Downstream growth will be priority for Middle East in upcoming years in utilization of excess local primary metal supply and reduction in aluminium products import.**
- **Currently according to While Gulf Cooperation Council (GCC) nations now account for about 10% of the world's primary aluminium production but they only produce around 3% of its downstream products, and have almost no industry in the end-use sectors.**
- **As expected ME downstream production will almost double by 2015 compared to 2012 production level from 1.2 mln.t to 2.3 mln.t. With most dynamics in FRP production growth.**
- **This may potentially significantly increase local industry demand in primary metal and thus reduce excessive supply to open market and further improve aluminum balance.**

**Source:** Strategic Session 10-11 December 2013, Special Report by McKinsey & Company (ARABAL 2013)
Production ex-China declined on closure of unprofitable capacities

Ex-China aluminum production

Announced & actual production cuts since 2012

Operating capacity, cost and price

- Ex-China aluminum production by end of 2013 dropped by 0.7 mtpa from beginning of 2011 well below top levels of 2008 and 2011
- Producers react fast to aluminum price drops by cutting production but continue to raise production including inefficient capacity when the price recovers. This doesn’t allow the price to be sustainable
- Since 2012, all major producers have executed production cuts of around 3 mtpa (around 5% of global capacity). 33% of the global (Ex-China) production is estimated to be loss-making at the current prices. As expected 1.5 mtpa more Ex-China capacity to be cut in 2014
- Ex-China capacity utilization rate dropped below 75% level to crises low level of 2009 on production cuts and more unused loss-making capacity fully replicating past crises situation

Aluminum industry ex-China made sufficient capacity curtailments for sustainable upward trend in price

Source: Bloomberg, CRU, Companies announcements and reports

Notes: (1) UC RUSAL actual production cuts of 316,000 tonnes due in 2013;
Global aluminum stocks expected steady decline in 2014 and beyond

- Global aluminum stocks outside China decline steadily since beginning of 2012 by more than 1.1 mtpa YTD mainly due to decline in off-warrant stocks, producers and consumers stocks supporting our view on tight physical market supply. High physical market premiums also support this argument.
- High physical market demand, as expected, will make more metal outflow from LME locations mainly to off-warrant stocks. Good indication of this is soaring canceled warrant stocks reaching 47% of total LME registered stocks.
- Whilst total stocks are relatively unchanged, the amount on warrant has significantly reduced. Suggests that deliveries in have been reduced whilst warrants have been cancelled for delivery out.
- We expect LME visible stocks continue steady decline in main LME locations Vlissingen & Detroit during 2014 and will fall below 3.74 million by end of 2014 tonnes taking into consideration increasing physical market tightness.
- As estimated total stocks are to decline by 2.7 mln. tonnes by 2015.

Aluminum visible stocks will continue declining following off-warrant stocks decline on physical market deficit

Source: CRU, LME, UC RUSAL estimates
Upcoming projects doesn't compensate closing of non-profitable capacities in 2014

Incremental Supply structure in 2014, ex-China

<table>
<thead>
<tr>
<th>Region</th>
<th>Smelter</th>
<th>Production 2013</th>
<th>Production 2014</th>
<th>Incremental</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saudi Arabia</td>
<td>Ma’aden</td>
<td>190</td>
<td>550</td>
<td>+360 kmt</td>
<td>Alcoa’s projection</td>
</tr>
<tr>
<td>UAE</td>
<td>EMAL</td>
<td>800</td>
<td>1100</td>
<td>+300 kmt</td>
<td>In full operation from summer</td>
</tr>
<tr>
<td>Malaysia</td>
<td>Press Metal</td>
<td>300</td>
<td>438</td>
<td>+138 kmt</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>Angul</td>
<td>310</td>
<td>416</td>
<td>+106 kmt</td>
<td></td>
</tr>
<tr>
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<td>Hirakud</td>
<td>140</td>
<td>189</td>
<td>+49 kmt</td>
<td></td>
</tr>
<tr>
<td>India</td>
<td>Korba</td>
<td>250</td>
<td>309</td>
<td>+59 kmt</td>
<td></td>
</tr>
</tbody>
</table>

Production ex-China is projected to go down by 89 kmt in 2014 vs 2013

Highlights 2014

• Middle East projects come in form of VAP or as part of liquid metal supply chain to integrated/cooperated downstream industry

• Development of the local downstream industry will allocate previously exported metal for domestic market (Oman: SOHAR / OARC; Mozambique: MOZAL / MIDAL; Saudi Arabia: Ma’aden / Ma’aden rolling project; Australia: TOMAGO / MIDAL, Canada / SURAL)

• Expectation of announcement about further cuts production in Brazil due to increasing of domestic electricity prices to a record of over $800 per MW/h

• Shortage of “fresh” metal in the deficit regions like North America, Europe and SE Asia become more sizable

• Delivery of new metal in Primary ingots form to the LME warehouses is projected to be reduced significantly
Ex. China aluminum balance

Continuing aluminum capacity curtailments & consumption growth will significantly improve balance in 2013-15

- Aluminum consumption (Ex. China) is expected to grow at 4% CAGR in 2013-15 with consumption predicted to increase by 2 mln tonnes during this period
- More that 1.2 mln. tonnes of aluminum capacity (Ex. China) has been cut in 2013(according to official announcements) another 1-1.5 mln. tonnes as expected to be cut in 2014
- This supports our view that the aluminum market (Ex. China) will be in deficit of 306K in 2013 to 1,2 mln.t. in 2014 and 1 mln.t. in 2015, supporting aluminum price growth
- Most aluminum deficit growing regions are South East Asia, Europe and North America increasing further deficit in 2015
- Russian Government is considering the opportunity of establishing up to a 1 million tonne state reserve facility in order to support future consumption growth on domestic market

Deficit growth by region

- Source: CRU, UC RUSAL estimates
Aluminium premiums have bounced to record highs on strong demand and tight supply.

- Market premiums soared to record high on current physical market tightness. Market premiums remain well supported due to:
  - Supply and demand balance
    - Market to remain very tight, with estimated 455Kt global deficit
    - Tradable commodity grade production to fall as producers increase VAP output
    - Tight primary/secondary spreads to continue to underpin the demand for primary aluminium
  - Attractiveness of “cash and carry” deals
    - Main exposure of the financier is the mark to market value of the premium today vs end of holding period
    - Positions to be drip fed into the market over time, should metal financiers choose to reduce their exposure whilst preserving the premium value
    - Aluminium to continue to be drawn into low cost storage locations and financed for as long as the contango supports the trade
  - UC RUSAL believes that the broader industry context is greatly supportive of the premiums paid in the market today and for the foreseeable future

Source: LME, UC RUSAL estimate

### Aluminium premiums

![Graph showing aluminium premiums over time](source)

### Profitability of carry trade deals

![Graph showing profitability of carry trade deals over time](source)

Global premiums to be supported by improved market fundamentals and strong financial demand.
Aluminum price expected to rebound in 2014 and beyond

Real aluminum price at beginning of 2014 price level was at a historical low despite improved market fundamentals. Thus all signaling possibility of strong price rebound in 1H2014, opening a good opportunity for consumers and financial investors to enter the aluminum price at an attractive level.

Current LME price is traded at USD102/t average discount to aluminum alloy price since beginning of 2014 versus normal premium of USD116/t in average over 2009-13.

Significantly improved market fundamentals and tight market supply should support strong aluminum price rebound.

**Source:** Actual global balance is based on data from CRU, BrookHunt, Metal Bulletin and Aladdiny, UC RUSAL estimates for future Ex.China S/D balance, Harbor
China’s operating capacity

<table>
<thead>
<tr>
<th>Capacity Dec 2013</th>
<th>Idled</th>
<th>New commissioning</th>
<th>Resumed capacity</th>
<th>Capacity Mar-2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27 292</td>
<td>-1 389</td>
<td>1 928</td>
<td>230</td>
<td>28 063</td>
</tr>
</tbody>
</table>

In 2013 Chinese aluminium market was characterized by falling SHFE price, increased pressure to operating capacities, commissioning of large number of new capacities and strong efforts by the Central government to control expansions and regulate Al industry.

- In spite of weak prices majority of new projects already built in China were commissioning with 1.9 Mt put into operation in Jan-Mar 2014.
- Increasing cost pressure led to 1.4 Mt of capacities leaving the market, but net capacity increase still reached 771 Kt. We expect 2.5-3 Mt of new additional capacities are expected to be commissioned in China in 2014, putting more pressure to SHFE price.
- Up to 3 Mt of production are expected to be cut in 2014 due to tight financial situation.

Chinese aluminium capacity utilization rate

- Al production in 2013 reached 25.1 mln.t with apparent consumption of 25.48 mln.t, Chinese market faced a deficit of 339 kt.
- Al capacity increased to 31.37 mln.t, operating rate in Al industry slump to 87%.
- Al production grew – 10.9% while operating capacity showed 11.9% growth, installed capacity – 11.6%.
- Unlike ex.China capacity utilization rate at 74% in January of 2014, China keeps capacity utilization rate at 85% for the same period.
- China needs more aggressively to cut capacity to improve aluminum balance and support aluminum price.

Source: UC RUSAL research, Aladdiny, Bloomberg

Notes: (1) VAT excluded

Chinese aluminium market was facing deep transformation and imbalance in 2013 that will likely to continue in 2014.
... leading to SHFE price collapse and sharply increasing industry losses

In 2013 Chinese Al smelting Cost curve underwent serious changes – it evolved to lower-cost position due to following factors:
- high-cost capacity left the market
- smelters engaged in captive PP construction thus reducing power costs
- slump in coal price helped smelters operating captive PPs to decrease power generation costs
- new capacities located in low-power price regions, entered the market
- Drop of SHFE price during Jan – Mar 2014 has made all previous efforts of smelters on costs cutting insufficient
  - ~ 15.2 Mtpa (~57%) of capacities became unprofitable at the average SHFE Cash price for Mar 2014 (RMB 13,112/t)

- The SHFE aluminum cash price dropped by RMB 2555/t to RMB 12,565/t in Jan 2013 – Mar. 2014 but recovered a bit in April, showing 27% decrease from its peak in Jul 2011
- Aluminum inventories in China started declining since May 2013 and by the end of November 2013 it fell by 659Kt to 1.297 Mt, mostly triggered by increasing demand from downstream industries and SRB’s purchase. In April spot aluminium stockpiles declined for the first time in over a year in China amid production cuts and the demand growth.
- The aluminum smelters in Central and Southern provinces are under increasing pressure in 2014 due to falling aluminum price while large amount of low-cost aluminum capacity go into production in Xinjiang and other western regions

As expected China to cut up to 3 million tonnes of aluminium production in 2014

Sources: Aladdiny, SMM, MB and UC Rusal Research
Positive signs of Chinese aluminum market in March 2014

According to Aladdiny’s data, China’s daily average aluminum production in March 2014 fell by 5.3% M-M to 75.3 kt. Annualized production decreased by 1524 kt to 27.5 Mt in March on the monthly basis and rose by 2501 kt from March 2013.

Capacity utilization fell to 83.8% in March from 88.8% in February 2014 and versus 90.5% in March 2013.

The strong rise in apparent consumption and production decrease in March led to a 26 kt supply deficit after big surplus in Jan-Feb 2014.

Net operating capacity rise was only 771 kt as of March 2014 due to 1.4 mln tonnes of capacity cuts. We expect this trend to be continued with possibility of negative rise in 2H14.

Chinese aluminum market recovery is underway with expected strong recovery in 2H2014.

Sources: Aladdiny and UC Rusal Research
China State Council guidance on addressing severe overcapacity and its impact on aluminum industry

Policy overview

- On Oct-15, 2013 the State Council issued its “guiding opinions” ordering a halt in the construction of new capacity in sectors burdened by excess production facilities in the steel, flat glass, cement, electrolytic aluminum and shipbuilding industries, in particular
  - Projects where construction hadn’t yet started should be canceled;
  - Projects under construction to be halted unless they receive central government approval
  - Barriers to entry and environmental standards will be two key indicators for phasing out old or adding new capacity
  - Banks have been ordered to write off some of the nonperforming loans on their books and prohibited to grant loans for new projects in industries with overcapacity

- On Nov-5, 2013 China’s central ministries sent a stern message in support of the key State Council document implementation
  - According to Hu Zucai, deputy director of the NDRC, local governments will be held accountable regarding overcapacity.
  - Those who continue to violate these guidelines will be heavily punished

Chinese aluminum balance 2012 - 2017

Measures in aluminum industry

1. Eliminate prebaked anode cells (<160,000A) before end of 2015
2. Power tariffs raise by 10% for AL smelters with AC power consumption over 13,700kw*h/t and for capacities which fail to meet standards before the end of 2015 - multi-step electricity pricing
3. Local governments are forbidden to introduce preferential electricity price policies, cheap land, tax breaks. Measures should be taken to relocate aluminum smelters to regions with abundant hydro power
4. Aluminum smelters are encouraged to sign long-term power supply contracts with power plants
5. Chinese enterprises are encouraged to build aluminum smelters overseas where energy is rich

Chinese aluminum growth will slow down, capacities will move to the North-western parts of the country, only modern and integrated players will survive. China is not likely to have a surplus before 2015

Source: MIIT State Council’s guidelines as of October 16, UC RUSAL research
Proven bauxite reserve in China amounts to 17.8 billion tonnes, the inferred bauxite resource - 16.3 billion tonnes, mostly in Shanxi, Henan, Guangxi, Guizhou, and Yunnan provinces.

Extractable reserves of 539 million tonnes (2012) sufficient for 6-7 years of current domestic bauxite consumption.

Dominantly diaspore, with high alumina content but low Al/Si ratio – expensive to process.

Over 400 deposits.

Domestic bauxite production in 2013 is evaluated at about 73-74 million tonnes in comparison to 18 million tonnes in 2006.

China is still one of the largest world bauxite importers and its bauxite self-sufficiency rate in 2012-2013 was about 61-63%. Indonesian bauxite import accounted for 70% of total.

China’s bauxite import rose to record 71.6 million tonnes in 2013 (+79% YoY). Such a growth was stipulated by bauxite stockpiling during the year before Indonesia’s export ban implementation in Jan 2014.

Indonesian bauxite ban to increase Chinese aluminum cost by USD80-100/tonne through the alumina chain.
Coupled with higher transportation costs as aluminum industry relocation to the West

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
China to import more aluminum after 2015 lifting seaborne alumina prices

### Installed alumina capacity in China, 2013

- Alumina production in 2013 increased to 49 million tonnes (+14% YoY). Utilization rate – 80%.
- Installed alumina capacity at the end of 2013 reached 60.9 Mln t/y, running capacity – 54 Mln t/y.
- Most of alumina production is concentrated in Shandong (30%), Henan (23%) and Shanxi (22%) provinces.
- China’s alumina import fell to 3.8 million tonnes in 2013 from 5 Mt in 2012 but expected to grow to 5.5 Mt in 2014 and to 10 Mt by 2018. Significant alumina import to China after 2015 will lift seaborne alumina prices.

### Chinese alumina self-sufficiency

- Source: Aladdiny, AsianMetal, UC RUSAL research
Chinese semis export influences ex.China semis market not primary aluminum supply/demand balance

China is a major net exporter of semis... while a number of countries have already introduced protective antidumping measures

Global aluminum semis consumption

- 12% of primary aluminium consumption in China accounts for semis production, which is subject to further export
- For 2011-2013 period Chinese semis net export grew just by 4%. In Jan -Feb 2014 net semis export from China was down by 4% YoY.
- Chinese semis export passes only 6% of global semis consumption,
- As for the end of 2012 Japan, South Korea, Malaysia and Thailand accounted for the major part of Chinese alloys export
- At the same time throughout 2009-2012 a number of regions, such as USA, EU countries and Australia introduced protective antidumping measures against Chinese aluminium semis
- China is importing up to 2,7 million tonnes of aluminum scrap annually, thus is a short of aluminum materials supply

Further growth of Chinese semis is limited by LME/SHFe price arbitrage and global protectionism measures

Source: Macquarie research, CRU, China Customs, Press releases
Global aluminum product balance (including primary and secondary)

### Total Al Balance model (including primary and VAP), kt

<table>
<thead>
<tr>
<th></th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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</thead>
<tbody>
<tr>
<td>Supply</td>
<td>67 406</td>
<td>70 268</td>
<td>74 032</td>
<td>78 286</td>
<td>82 590</td>
<td>87 148</td>
<td>91 471</td>
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<tr>
<td>Demand</td>
<td>67 268</td>
<td>70 960</td>
<td>75 658</td>
<td>80 383</td>
<td>84 755</td>
<td>88 683</td>
<td>92 538</td>
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<tr>
<td>Balance</td>
<td>139</td>
<td>-700</td>
<td>-1 626</td>
<td>-2 097</td>
<td>-2 164</td>
<td>-1 536</td>
<td>-1 068</td>
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</table>

### Total Al Balance model by region, kt

<table>
<thead>
<tr>
<th>Region</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
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<tbody>
<tr>
<td>NORTH AMERICA</td>
<td>133</td>
<td>85</td>
<td>-464</td>
<td>-481</td>
<td>-671</td>
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<td>-651</td>
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<tr>
<td>CENTRAL &amp; SOUTH AMERICA</td>
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<td>643</td>
<td>436</td>
<td>427</td>
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<td>-3 456</td>
<td>-3 630</td>
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<td>-3 873</td>
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<td>-5 406</td>
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<tr>
<td>MIDDLE EAST &amp; OTHER ASIA</td>
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<td>3 457</td>
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<td>TOTAL</td>
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<td>-1 626</td>
<td>-2 097</td>
<td>-2 164</td>
<td>-1 536</td>
<td>-1 068</td>
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### Global Aluminium semis demand, kt

<table>
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<tr>
<th>CRU</th>
<th>2012</th>
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<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
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<tbody>
<tr>
<td>Total global semis production</td>
<td>65957</td>
<td>69525</td>
<td>73994</td>
<td>78583</td>
<td>83156</td>
<td>87000</td>
<td>90850</td>
</tr>
<tr>
<td>Al/Semis conversion</td>
<td>98,1%</td>
<td>98,0%</td>
<td>97,8%</td>
<td>97,8%</td>
<td>98,1%</td>
<td>98,1%</td>
<td>98,2%</td>
</tr>
</tbody>
</table>

- As expected total aluminum market balance to be in significant deficit in 2014 and beyond
- Secondary aluminum will not significantly influence the balance based on current tightness and more balanced market growing forward
- EU, China and other Asia regions will remain the most deficit markets for raw aluminum (including primary ingots and scrap)