Market Outlook

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Capital Markets Day 2016
Macro and downstream
Global macro development improving, uncertainty persists

Primary demand at or above GDP in key regions

Real GDP, annual growth (%)

Primary demand annual growth, key regions (%)

Source: Global Insight, CRU, Hydro analysis
Global aluminium demand prospects remain encouraging

Broad-based demand growth across segments, better growth outlook than other base metals

Diversified consumption base
Global semi demand per segment, 2015

Continued strong underlying drivers
Cars per 1,000 persons of working age

Source: CRU, UN, Hydro analysis
Strong substitution trend for aluminium in automotive

High demand within body-in-white driving rolled products demand

Main module          Aluminium potential

Body                 Rolled products
Interior             Extrusions castings
Chassis              Extrusions castings
Powertrain           Castings

Global semis demand for transport sector by product form (Mill t)

- Castings
- Extrusions
- Other
- Rolled products

Source: Ducker Worldwide, CRU, Hydro analysis
Rolled products demand driven by transport segment

Transport share increasing in total rolled products demand

General rolled products demand, selected regions

Expected market development
- Continued substitution trend in transport segment contributing to overall demand growth
- Packaging segment key growth driver in terms of size

Global segment composition, rolled products (2015)

Source: CRU, Hydro Analysis
* Total EU27+EFTA
Continued growth in extrusion demand

Gradual improvement expected in Europe

Extrusion demand, selected regions

Expected market development
- US housing market still sustaining positive momentum
- Weakness in US truck and trailer segment
- Construction activity in Europe continues to improve from low levels

Global segment composition, extrusion (2015)
- Construction: 63%
- Transport: 14%
- Machinery & equipment: 12%
- Consumer Durables: 4%
- Electrical: 4%
- Other: 3%

Source: CRU, Hydro Analysis
* Total EU27+EFTA
Extrusion market supported by continued momentum in B&C market
Trend towards Green buildings also shaping up

Housing market indicators
Index, Jan 2006=100

Drivers of the development in the Building & Construction industry

Global trends
- US Building permits
- US Housing starts
- Wells Fargo construction index
- EU construction order book

Regional legislation
- USA: Building Energy Use laws
- Region/country specific

Aluminium in buildings

40% of global energy use related to buildings

Source: CRU, Hydro Analysis
China’s consumption pattern changing, with transport emerging as a key engine of growth

Chinese semis demand per key segments
Mill tonnes

Source: CRU, Hydro Analysis
Growth in Chinese semis exports largely stable

Periods of higher arbitrage leading to increased exports

**Chinese semis exports**

- **Monthly exports**
  - Thousand tonnes

- **Net semis exports**

**Net semis exports as share of total semis production**

- **Share of semis production**

Source: CRU, Antaike, Hydro Analysis

* Est. metal cost China versus Europe

Europe: LME cash + European duty-paid standard ingot premium

China: SHFE cash + avg. local premium + freight – export rebates (~13 %)
Trade regulations and duties impacting trade flows

Chinese semis exports by destination (2015)

US
- 3 – 6 % import duties on semis

Europe
- 7.5 % import duties on semis
- Turkey introducing EU duties

Asia
- In general low duties
- India assessing higher duties

Source: Hydro Analysis, Antaike
Primary metal market
Recap CMD 2015: Global surplus expected to moderate in 2016

Surplus moderating from ~1 million tonnes to 0-1 million tonnes

Global surplus influences 2016
- Key regions in China adding capacity
- Indian projects
- Further curtailments

Demand influences 2016
- Chinese construction sector
- Continued strong transport segment
- Sustained US momentum
- Emerging markets weakness
- Regional effects from Chinese semis exports

Global growth expectations 2016
- Demand: 4-5%
- Supply: 2-4%

Source: CRU, Hydro Analysis
Market balance progressing better than expected

Surplus moderating from ~1 million tonnes to a small deficit

Global ('000 mt)

Supply influences 2016
- Key regions in China adding capacity
- Indian projects
- Further curtailments

Demand influences 2016
- Chinese construction sector
- Continued strong transport segment
- Sustained US momentum
- Emerging markets weakness
- Regional effects from Chinese semis exports

Global growth 2016
- Demand: ~5 %
- Supply: ~3 %

Happened to a limited extent
Happened to a large extent

Source: CRU, Hydro Analysis
Global primary market expected to be largely balanced also in 2017

Supply growth in world ex. China driven by India, pace of Chinese restarts uncertain

Global (’000 mt)

Supply influences 2017
- Chinese restarts
- Chinese curtailments
- Key regions in China adding capacity
- Indian projects

Demand influences 2017
- Momentum in Chinese construction and transport sector
- Continued strong transport segment
- Steady development US and Eurozone

Global growth expectations 2017
- Demand: 3-5 %
- Supply: 4-6 %

Source: CRU, Hydro Analysis
Divergence in market balances continuing in 2017

Global demand growth largely stable, production increasing in China driven by new projects and restarts

Source: CRU, Hydro analysis

**World ex. China**
- 2016 levels:
  - Production: 27 (mill t.)
  - Demand: 28 (mill t.)
- Growth: 2-4 %

**China**
- 2016 levels:
  - Production: 32 (mill t.)
  - Demand: 31 (mill t.)
- Growth: 7-9 %

Primary market balances 2016
- (mill t.)
  - China: -2000 to 0
  - ROW: -1000 to 0
  - Global: -2000 to 0

Primary market balances 2017
- (mill t.)
  - China: 2000 to 0
  - ROW: 1000 to 0
  - Global: 2000 to 0

% Growth from 2016 to 2017

Source: CRU, Hydro analysis

Growth from 2016 to 2017

83
Market deficits increasing in key consumer regions

Rising deficits in North America and Europe amid smelter curtailments and continued demand growth

Primary metal balances, selected regions outside China

Regional capacity balance (000t)
- Yellow: Metal deficit
- Blue: Metal surplus

South-America largely balanced

Source: CRU
Chinese primary stocks largely stable in 2016, while total stocks outside China are decreasing

Chinese exports not fully filling up deficits outside China

Source: CRU, Hydro analysis
Energy source for primary production varies between regions

Chinese and Indian smelters largely dependent on coal

Power source used in aluminium smelters in 2016

Source: CRU, Hydro analysis
Chinese smelters buying coal from market and on-grid smelters impacted by rising coal prices

Coal prices rising...

…but with varying impact on smelter cost

On-grid power rates impacted by higher coal prices with a lag

Largely insulated

Directly impacted, must buy coal from the market

Estimated effect of 1 USD increase in coal price is 5-7 USD/t higher primary production cost

Source: CRU, Thomson Reuters, WoodMackenzie, Hydro analysis
Global cost curve pressured by higher coal and alumina prices

Key development from 2014 to 2016:
- Lower energy prices
- Lower alumina prices
- Lower premiums
- Stronger USD

Cost pressure going into 2017:
- Higher coal prices
- Higher alumina prices

Source: CRU, Hydro analysis
Regional standard ingot premiums falling back to historical levels, all-in price level supported by currency effect

Source: Metal Bulletin, MW/MJP: Platts, Reuters Ecowin, Hydro analysis
Recycling is becoming more important as the generation of post consumed scrap material gains momentum

Estimated recovery from post-consumed scrap collected

Primary demand versus recycled material, global

Source: GARC, CRU/Hydro analysis
Bauxite and alumina market
Chinese primary production dependent on imported resources

Around 36% based on imported raw material (average 2013-2016)

Source: CRU, China customs, 2016 forecast
Bauxite production in China to level off, triggering more imports

Chinese bauxite imports influencing price development

• Depleting resources and deteriorating quality, not sufficient to sustain operations in key provinces, triggering:
  - increasing refinery conversion costs
  - inland refineries could convert to imported bauxite (additional inland freight of >$20/t)
  - relocation to southern provinces, Guangxi and Guizhou
  - new refinery capacity in coastal areas, dependent on imported bauxite
  - development of refinery capacity outside of China

• Bauxite (equivalent) imports could increase from ~65 Mtpy in 2016 to ~85 Mtpy in 2020
  - increasing freight exposure

Source: CM Group
Chinese bauxite imports – a dynamic landscape
Malaysia ban continues, Guinea emerges as major supplier, increased exposure to freight, prices decreasing and converging

China bauxite imports, volume and price by country
USD/tonne CIF

Bubble size represents volume  5 Mt

Indonesia  Australia  India  Brazil  Guinea  Malaysia

Bauxite price CIF China
USD/tonne

Indonesia ban  Malaysia entrance  Guinea increases

Source: China Customs
Chinese bauxite imports increasingly exposed to freight

Freight represents ~10 to 50% of the CIF price, freight rates at current low levels.

Source: China customs, Bloomberg, Hydro analysis
Note: 2016 is Jan-Sep annualised
Higher cost Chinese refineries impacted by imported bauxite prices

20 Mtpy of high cost alumina capacity in Shandong, still growing

- Shandong refineries exposed to bauxite import prices
  - but necessary capacity, as domestic bauxite is insufficient
- Additional capacity planned during next 3 years in China;
  - Shandong 3 Mtpy
  - Hebei 2-4 Mtpy
  - Guizhou 2 Mtpy
  - Shanxi 1.8 Mtpy
  - Yunnan 0.6 Mtpy

Source: CM Group, CRU
Alumina curtailments reduce oversupply outside China

Capacity curtailments in the Atlantic basin, offset by growth in Pacific

Source: China customs, CRU, Hydro analysis
* Jan-Sep 2016 annualised
Alumina prices rising amid smelter restarts and cost inflation

Recent alumina price drivers

Market balances
- Smelter restarts and new projects ramping up in China
- Tight markets ex. China amid curtailments

Cost inflation
- Rising coal prices
- Higher caustic soda costs
- Higher transport costs (road & rail)

Other factors
- Transport bottlenecks
- Environmental issues

Source: Platts, Bloomberg
Long-term outlook
and summary
Strong growth drivers across segments providing solid demand outlook

Short-term macroeconomic volatility, long-term fundamentals still in place

Strong demand drivers in key aluminium segments

<table>
<thead>
<tr>
<th>Segment</th>
<th>Demand Drivers</th>
<th>Semis demand CAGR 2016 – 2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport</td>
<td>Growth in automotive vehicle production, Aluminium content in cars increasing, Growth in other transport modes, e.g. railway</td>
<td>4 – 5 %</td>
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<tr>
<td>Construction</td>
<td>Urbanization, Housing market recovery in mature regions, Energy neutral buildings</td>
<td>2 – 3 %</td>
</tr>
<tr>
<td>Electrical</td>
<td>Urbanization, Copper substitution</td>
<td>3 – 4 %</td>
</tr>
<tr>
<td>Machinery &amp; equipment</td>
<td>Improving industrial sentiment in mature regions, Manufacturing activity and industrial growth in emerging countries</td>
<td>3 – 4 %</td>
</tr>
<tr>
<td>Packaging</td>
<td>Urbanization, Environmentally-friendly solutions</td>
<td>3 – 4 %</td>
</tr>
</tbody>
</table>

Source: CRU, Hydro Analysis
Growth in global semis demand creates opportunities for both primary and recycled material

World outside China semis demand growth exceeding Chinese growth rates into next decade

CAGR 2016 – 2025

- Semis: 3-4 %
- Primary: 2-3 %
- Recycling: 4-5 %

Estimated semis demand growth, 2025 vs 2016

- World ex. China: + 14-15 million tonnes
- China: + 11-12 million tonnes

Source: CRU, Hydro Analysis

* Post-consumed and fabrication scrap
• Macro drivers and substitution effects supporting underlying aluminium demand growth
• Limited primary supply growth outside China and India
• Global primary market largely balanced this year and next
• Cost curve pressured upwards by rising alumina and coal prices, with regional differences
• Recycling growth accelerating with increased generation of post-consumed scrap
• Chinese bauxite import dependency continues to increase
• Solid long-term demand outlook supported by strong growth drivers across segments