

Bauxite industry background

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Hannam & Partners

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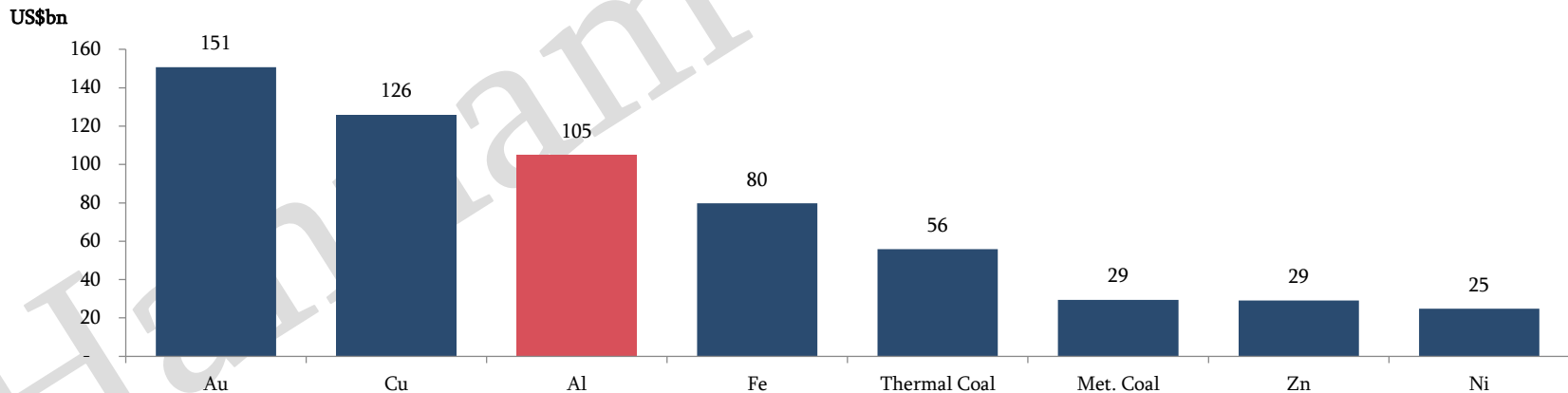
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Executive Summary

- The primary aluminium market is material with a market size of more than US\$100bn and attracts considerable interest from sophisticated players, including traders and emerging market players
- The market has reached a size of ~56Mt of aluminium, ~107Mt of alumina and ~270Mt of bauxite
- Aluminium production and demand has grown faster than all other major metals in the last years and is expected to continue to grow faster than other major commodities – there is a clear trend now for Cu replacement
- China is generally long aluminium and the rest of the world has shown supply discipline and the deficit is growing
- Bauxite (and alumina) is in considerable demand after a build up in smelting capacity in the Middle East and China
- The ban of bauxite exports from Indonesia led to a replacement of volumes by Malaysia
- Majors have started to focused on their bauxite reserves and close refining to fill the gap in the market (mainly from Australia)
- Hannam & Partners commodity advisory team has unparalleled sector expertise, including an in-depth knowledge of the aluminium value chain

Value of major traded commodities (2015E)



Note: Aluminium price includes an average premium of US\$150/t Other commodity prices are as per 2015 broker consensus.

Source: Equity research, Hannam & Partners

Performance of aluminium companies vs. the commodity







Source: S&P Capital IQ

Note: Peers index rebased to Aluminium price

Aluminium peers: Rusal, Alcoa, Norsk Hydro, Chalco, Hindalco, Alumina Ltd, Century Aluminium, Nalco, Alba, Noranda Aluminium

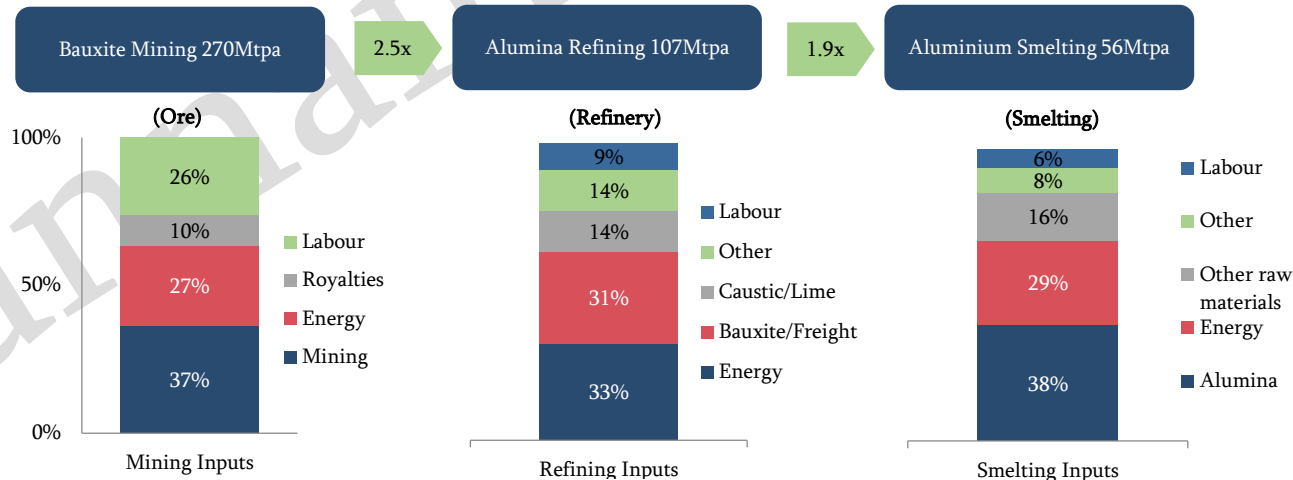
Aluminium market update

 <p><i>Alcoa to split into two separate upstream and downstream companies</i></p>	<ul style="list-style-type: none"> September 2015: Alcoa announce they will split the company into two industry-leading public companies An Upstream company focussing on bauxite, alumina and aluminium, continuing to trade as Alcoa <ul style="list-style-type: none"> Will include the world's largest bauxite mining portfolio with 46Mt of production in 2014 in lowest quartile cost curve position World's largest alumina refining system – Upstream will also include casthouses and energy assets Will be world's 4th largest aluminium producer with Q2 cost curve position Downstream Value-Add company with providing high-performance multi-material products and solutions in fast growing end markets Alcoa has aggressively reshaped its alumina and primary metals segments, closing, divesting or curtailing 1.4mt (33%) of total smelting capacity since 2007 to target 38th percentile of cost curve by 2016
 <p><i>Potline 6 expansion</i></p>	<ul style="list-style-type: none"> Alba is a publicly listed aluminium smelting business which currently produces 930mtpa of aluminium with EBITDA of \$180m in 2014 August 2015: Alba announces plans to develop a 6th Potline in Bahrain Will boost production by ~520Mt by 2020 (53%) Capex of \$3.5bn
 <p><i>Rusal JVs with Chinese</i></p>	<ul style="list-style-type: none"> September 2015: Rusal sets up more JV's with its Chinese partners in Russia to make high value-added, greener aluminium products So far Rusal is partnering with Chalco and China North Industries Corporation The company has been dedicated to developing key value-added products, such as aluminium sheet and foundry aluminium alloy, for modernization projects that target automotive, construction and electricity sectors
 <p><i>Norsk Hydro to buy Vale's 40% stake in MRN</i></p>	<ul style="list-style-type: none"> Norsk Hydro has settled a deal with Brazilian mining company Vale to possibly buy Vale's 40% interest in Brazilian bauxite producer Mineração Rio do Norte (MRN), which would strengthen Hydro's global position as a long-term player in bauxite and alumina Vale currently hold a 40% stake in MRN, while Alcoa owns 18.2%, South32 14.8%, Rio Tinto 12%, CBA 10% and Norsk Hydro 5% Hydro acquired Vale's other Brazilian aluminium assets in 2011
<p><i>Curtailments</i></p>	<ul style="list-style-type: none"> Vedanta to halve output at its 1Mtpa Odisha refinery due to shortage of bauxite ore and weak prices Alcoa to shutter Suriname alumina refinery by November 2015 due to falling bauxite supplies and to focus more on downstream aerospace and automotive products sector. This will curtail 887kt of capacity Century Aluminium said it will curtail 1 potline at its Hawesville smelter, bringing the operation to 40% capacity. The company cited unfair trade practices by China due to subsidies and global price decline as the driving factors The China Shandong Government announced it will not approve any new aluminium production capacity until 2020 in order to encourage producers to improve profitability from existing capacity
<p><i>Falling Premiums</i></p>	<ul style="list-style-type: none"> Premiums have collapsed over the last 6 months as new LME rules mean queues at warehouses are becoming much smaller and incentives to hold the physical commodity are reduced Prices have dropped from ~\$450/t in Q1 2015 to ~\$100/t in Sept 2015 (~-80%) and are now close to actual carry costs
<p><i>Malaysia replaces Indonesia as supplier of Bauxite to China</i></p>	<ul style="list-style-type: none"> Following the Indonesian ban on export of unprocessed bauxite Shipments from Malaysia to China surged to 6.14Mt in Jan to May 2015 compared to 127kt in the same period of last year Estimates for 2015 exports to China run as high as 15Mt

The Aluminium value chain is highly integrated

Aluminium has historically been an integrated industry

- Aluminium is not a naturally occurring element due to its reactive nature
- It is extracted from hydrous aluminium oxides (bauxite), which is mined using open cast methods
- Through the Bayer Process, bauxite is refined (dissolved in a hot solution using caustic soda) to clean it from impurities
- In a smelter an electrolytic reduction takes in a fluorinated bath (in pots) at around 950°C with carbon cathodes being consumed during the process
- Between 4.75-5.00 tonnes of bauxite are required to make 1 tonne of primary aluminium
- To limit transport costs, refineries were traditionally built close to occurrences of bauxite, while smelters were build close to secure sources of cheap electricity
- Aluminium smelting is an energy-intensive process, but the energy required to produce a unit of aluminium has reduced by 70% over the last century



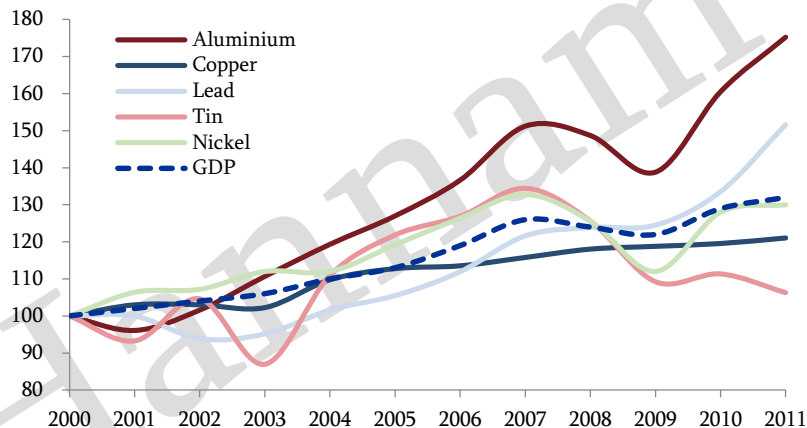
Source: Hannam & Partners research

Aluminium demand was a runaway success and we expect so going forward

Aluminium demand outperformed all major metals in the past and is expected to do so in the future

- Global aluminium demand has outgrown other industrial metals in recent years
- Demand growth is not a pure China story, aluminium exhibits broad based emerging market demand uplift
- Consumption of aluminium continues to rise after an economy's initial development phase in line with disposable income
- Aluminium is the ultimate late cycle commodity with the best still lying ahead in terms of demand fundamentals
- Sustained growth of per capita GDP in BRIC nations presents a window of opportunity that extends 15 years into the future
- Prices have not followed demand as supply has at least matched demand, in particular China and the Middle East

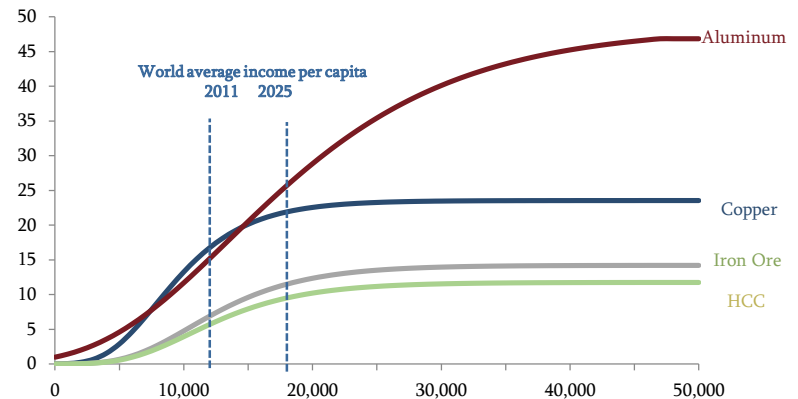
Strong global historical demand growth



Source: Hannam & Partners Research and US. Geological Survey
Note: Rebased to 100

Late stage sustained consumption growth

Expenditure per capita
US\$ (2011 terms)



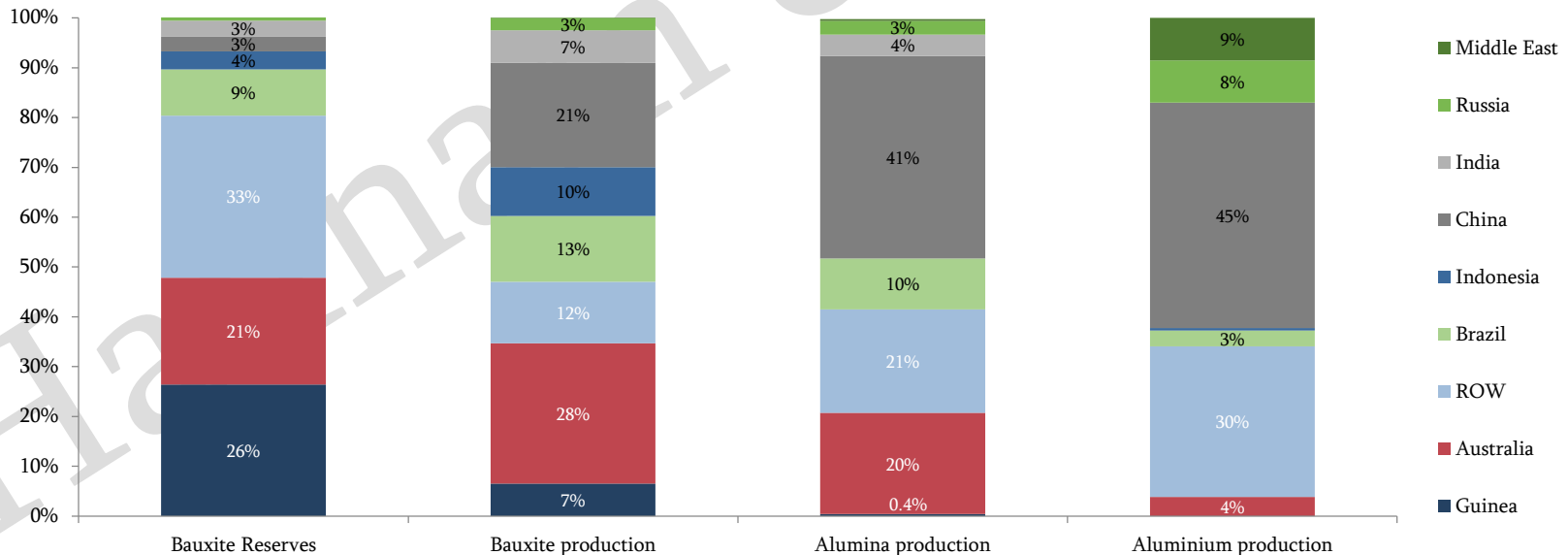
Source: Rio Tinto and US. Geological Survey

Many newly emerged smelting operations are not integrated and are looking for a reliable supply of alumina or bauxite to create a natural hedge

Reserves, production and downstream processing

- After an impressive build up driven by cheap credit, China will want to utilise its existing assets in refining and smelting
- After the Indonesian export ban, the Middle East and China will need to turn to other countries for bauxite supply security
- Indonesia irrespective of the export ban, will not be able to maintain its role as a large exporter for ever
- The Middle East has already 9% of market share in smelting and has committed funds to add refining assets, but does not own quality bauxite resources of real value
- Brazil is a well-balanced producer with all good assets locked up by major players (Vale / Hydro)

Position by country and processing step

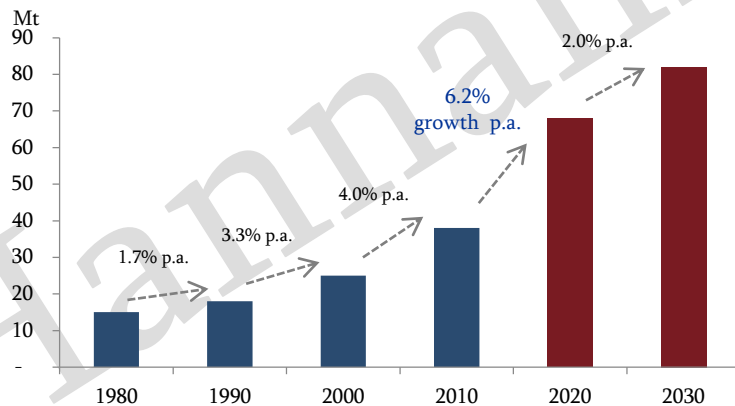


Bauxite has finally broken the link with Aluminium

Bauxite pricing and future demand growth make it an investible commodity

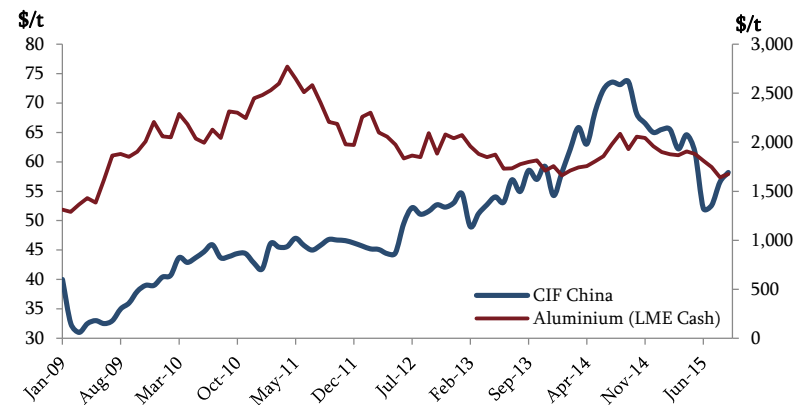
- In the next decade demand forecasts predict bauxite will experience impressive absolute growth
- Consensus amongst consultants is that annual growth in aluminium demand will be above 5%, probably up to 2030
- Historically, the industry was integrated and the prices of both alumina and bauxite was linked to the price of aluminium
- Since 2010, alumina and bauxite sellers have tried to change the pricing system, similar to iron ore
- Their efforts were successful in that the price link finally broke in mid 2011 resulting in bauxite becoming a spot traded commodity and traders entering the scene
- Bauxite prices continue to climb and today the price of bauxite is the fastest increasing input in the aluminium value chain

World primary aluminium demand growth



Source: Aluminium Association of Canada

Bauxite versus Aluminium pricing



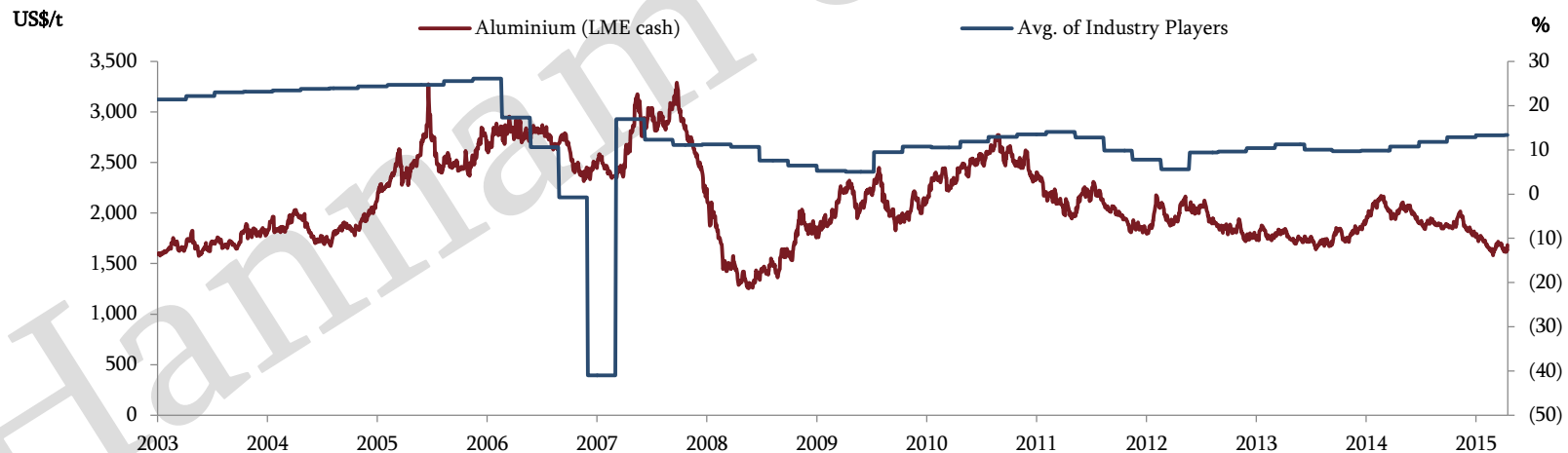
Source: Hannam & Partners research and Bloomberg

Oversupply and margins still a concern in the industry overall

Aluminium industry continues to build capacity

- The only real barrier to enter the aluminium smelting industry is capital, which was not a constraint in recent years
- The market is expected to be 20% oversupplied in 2015 or ~12Mtpa
- Even with global primary aluminium production running at an all time record, supply discipline globally is moderated by output growth in the Middle East and China
- Curtailments have been insufficient to balance markets and but the slide of prices has be arrested
- In the last two years, Alcoa, Rusal, the Klesch Group and Rio Tinto having shut down 2.5Mt of capacity permanently
- Many major players are streamlining their mid-stream operations and focusing on value-added products

EBITDA margin trend over the last decade



Footnote: Alcoa, Hindalco and Norsk Hydro used as industry players
Source: Hannam & Partners Research, Factset, Bloomberg, S&P Capital IQ

Aluminium price consensus

Bank	2015	2016	2017	2018	Long term
Barclays Bank	1,805.0	1,850.0	1,960.0	NA	NA
CreditSuisse	1,691.0	1,700.0	1,800.0	1,850.0	1,900.0
JP Morgan	1,680.0	1,528.0	1,510.0	1,635.0	NA
Macquarie	1,729.0	1,700.0	1,750.0	1,800.0	1,950.0
Jefferies	1,653.5	1,543.2	1,653.5	1,763.7	NA
HSBC	1,688.0	1,580.0	1,580.0	NA	NA
Canaccord Genuity	1,653.5	1,543.2	1,763.7	1,873.9	2,094.4
Morgan Stanley	1,675.5	1,631.4	1,719.6	1,851.9	2,204.6
UBS	1,719.6	1,807.8	1,984.2	2,160.5	2,094.4
Deutsche	1,763.7	1,873.9	1,896.0	NA	NA
RBC	1,697.6	1,763.7	1,984.2	2,094.4	2,425.1
Mean	1,705.1	1,683.7	1,781.9	1,878.7	2,111.4
Median	1,691.0	1,700.0	1,763.7	1,851.0	2,094.4

Source: Equity research

Aluminium trading comps

	Market cap	Net debt	EV	EV/EBITDA		P/E		EBITDA Margin		Current	Price perf.	
	(US\$mm)	(US\$mm)	(US\$mm)	2015E	2016E	2015E	2016E	2015E	2016E	Gearing	YTD	3 M
Alcoa	13,439	7,538	23,074	6.6x	6.6x	17.2x	14.8x	15.4%	14.8%	56.1%	(35.4%)	(3.1%)
Norsk Hydro	8,251	(87)	8,883	5.1x	5.6x	12.1x	13.4x	15.9%	14.8%	(1.1%)	(28.5%)	1.1%
RUSAL	6,489	9,917	16,406	8.6x	11.5x	5.0x	5.6x	22.0%	16.9%	152.8%	(36.3%)	0.9%
CHALCO	5,404	14,574	21,836	14.2x	10.7x	NM	NM	7.3%	8.8%	269.7%	(20.6%)	(3.7%)
Alumina Ltd	2,689	76	2,765	11.9x	10.3x	12.1x	15.4x	NM	NM	2.8%	(36.5%)	(15.4%)
Hindalco	2,664	1,177	3,863	2.8x	2.4x	14.6x	8.1x	8.5%	9.3%	44.2%	(49.0%)	(21.4%)
Alba	1,740	99	1,839	3.7x	3.9x	6.2x	7.6x	22.5%	20.2%	5.7%	(9.5%)	(6.4%)
NALCO	1,546	(876)	670	3.8x	3.5x	13.3x	11.0x	16.5%	16.8%	(56.7%)	(31.0%)	(4.6%)
Century	602	87	690	5.0x	8.6x	15.3x	NM	7.0%	NM	14.5%	(71.9%)	(29.7%)
Noranda	26	654	686	16.8x	5.8x	NM	NM	NM	9.5%	NM	(89.3%)	(37.8%)
Average				7.7x	7.4x	10.0x	10.0x	15.2%	14.0%	79.0%	(30.1%)	(7.5%)
Median				6.9x	7.9x	12.1x	8.1x	15.9%	14.8%	24.9%	(32.4%)	(5.1%)

Source: S&P Capital IQ as at 12 October 2015