



16th International Bauxite and Alumina Seminar

Alumina Industry Evolution

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Alumina Industry Evolution

- Overview: Aluminium within BHP Billiton
- Historical trends
- Pricing dynamics in other commodities
- Why a change to the alumina pricing system is inevitable

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Aluminium within BHP Billiton

Metallurgical Coal

Produce and market high quality hard coking coals for the international steel industry

Energy Coal

One of the world's largest producers and marketers of export thermal coal

Petroleum

A significant oil and gas exploration and production business

Base Metals

#3 global producer of copper, silver and lead

Iron Ore

One of the world's premier suppliers of iron ore

Aluminium

#4 global producer of bauxite and #4 aluminium company based on net third party sales

Manganese

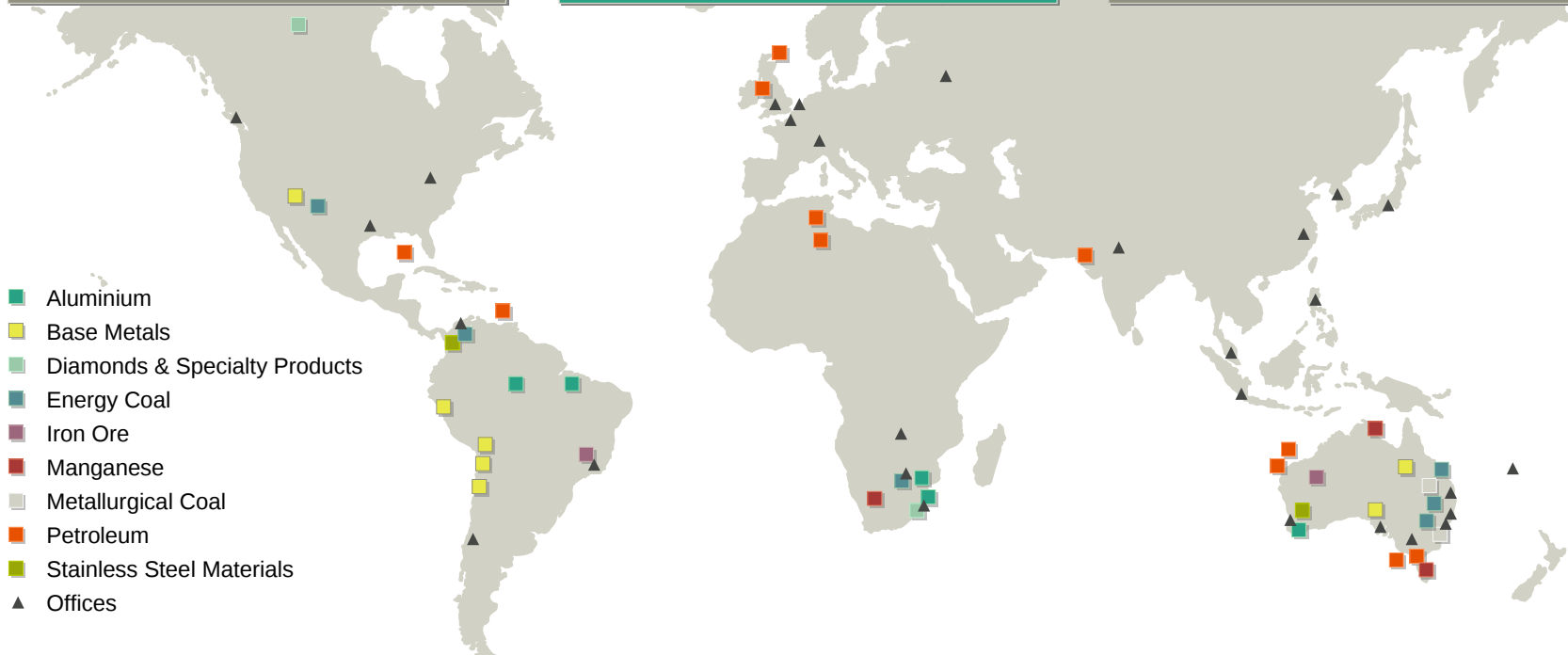
Operations produce a combination of ores, alloys and metal

Stainless Steel Materials

#3 global nickel producer

Diamonds & Specialty Products

EKATI Diamond Mine is one of the world's largest gem quality diamond producers



Note: Ranking based on production volumes. Location of markers indicative only.

Aluminium: Part of a Balanced Portfolio

Steelmaking Materials

- Iron Ore
- Metallurgical Coal
- Manganese

Non-Ferrous Products

- Copper
- **Aluminium**
- Nickel
- Diamonds

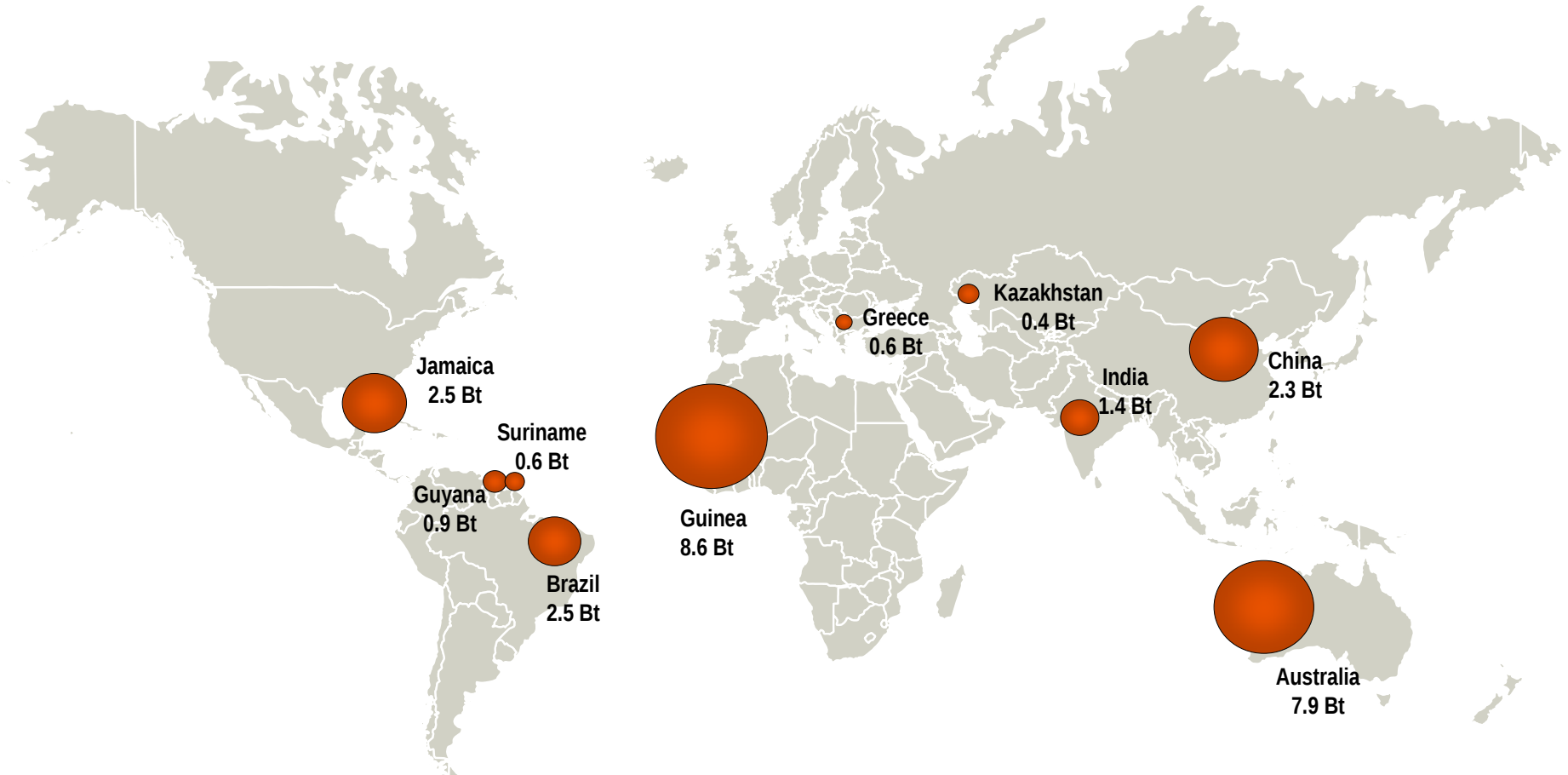
Energy Products

- Petroleum
- LNG
- Energy Coal
- Uranium

Global Bauxite Reserve Base

Three-basin strategy

World's top 10 bauxite deposits (By country)



Source: USGS



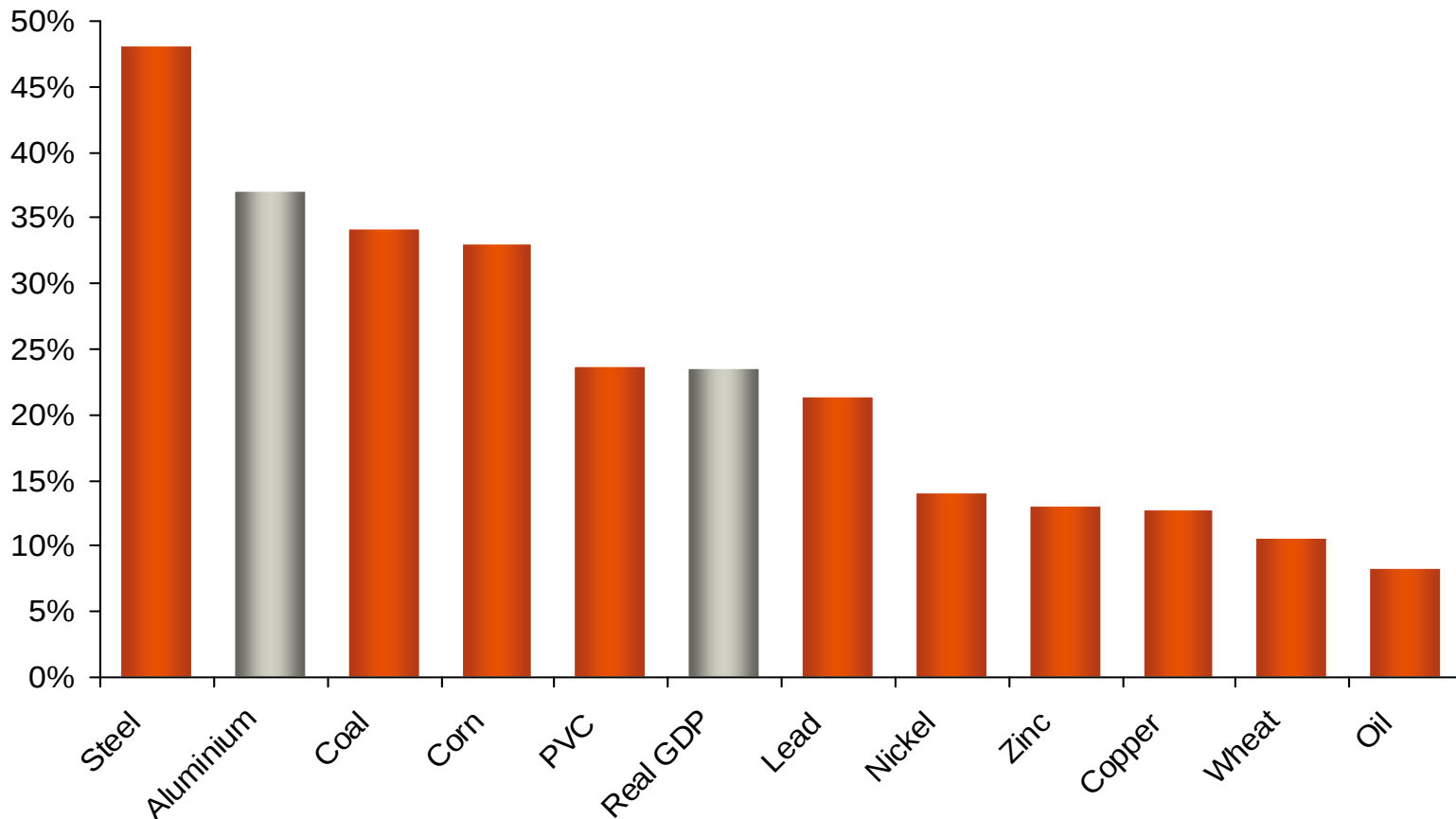
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Aluminium demand growth has exceeded nearly all other commodities

Commodity demand growth

% cumulative increase in global markets (2000 to 2009)

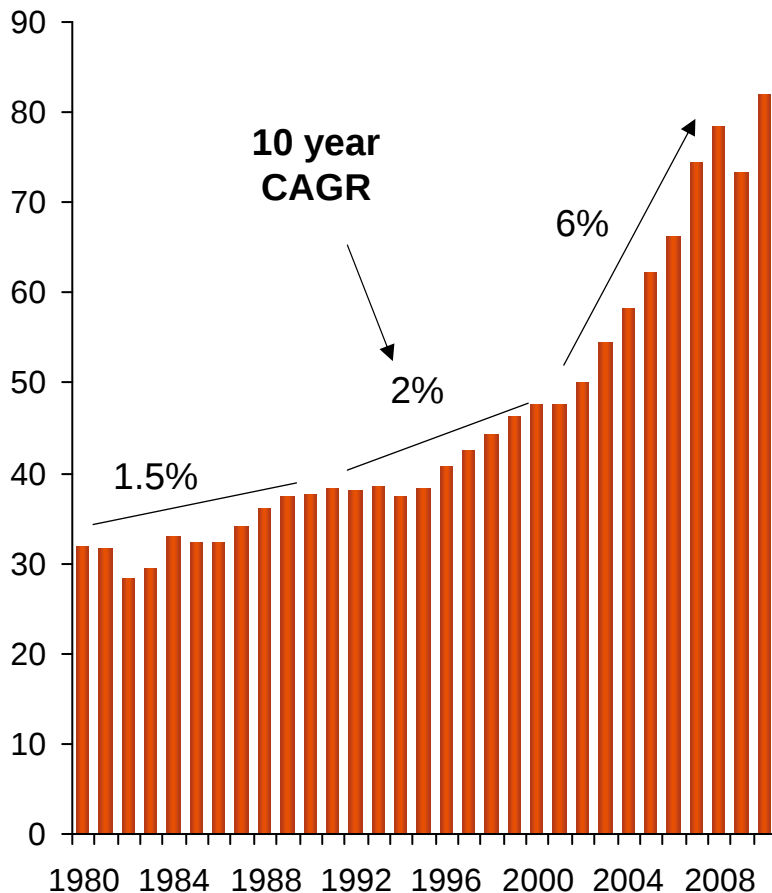


Source: BHP Billiton, EIU, USDA, CMAI, MEPS, Brook Hunt, IEA, EIA. Estimates are used for coal and PVC consumption in 2009.



Alumina production has had to grow rapidly

Smelter grade alumina demand
(M tonnes)

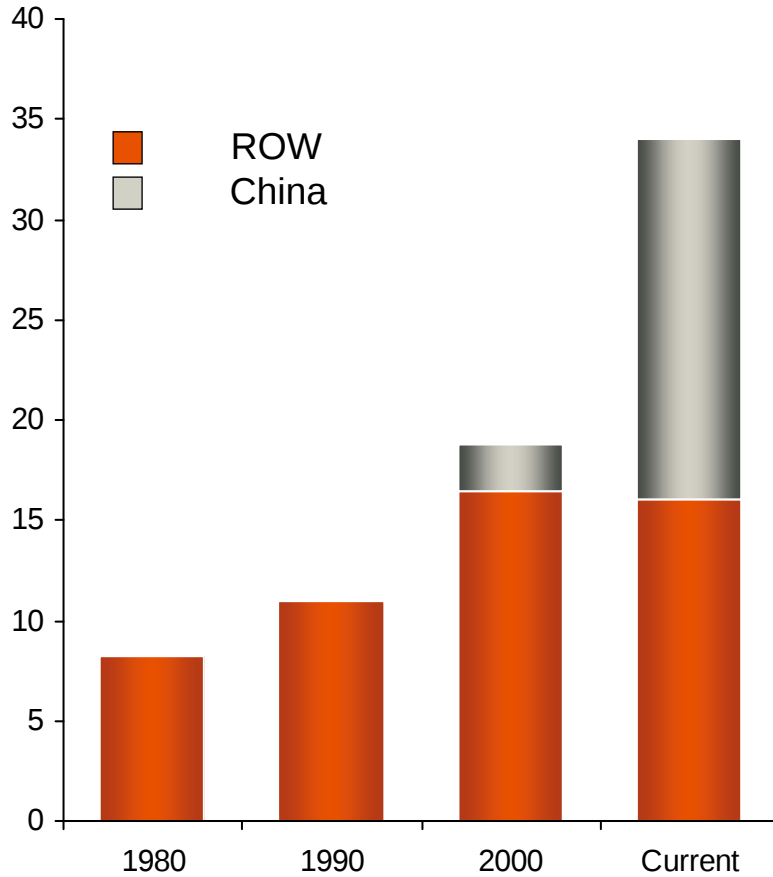


Source: CRU, James King

- Alumina previously a slow-growth industry
 - Economics relatively stable
 - Limited investment required
- China boom has meant rapid growth was required to meet metal demand
- Alumina industry has now reached a significant level of materiality (>USD\$25 BN)
- Industry now as large as nickel, lead or zinc

Emergence of Chinese refining has fundamentally changed the industry

Alumina third party market (M tonnes)



Source: CRU, James King

- Impact of Chinese expansion:
 - Global industry hugely reliant on Chinese alumina supply/demand
 - Shorter cycle of investment, production, consumption
 - A liquid spot market for alumina in mainland China
- Other developments:
 - Decoupling of the value chain continues (accelerated development of Middle East and Chinese smelting base)
 - Long-term shortages of high quality bauxite becoming a key driver of the Alumina industry

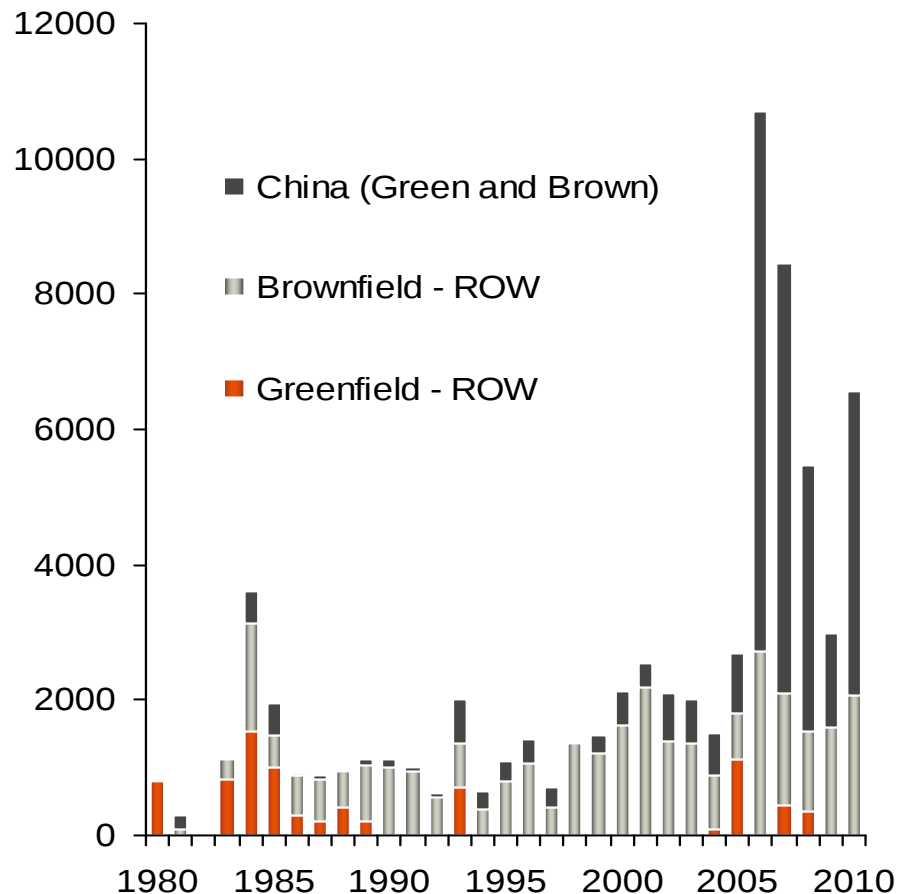
Chinese markets are now the major driver of global spot market

- LME price link developed in the 1980's when growth rates were sluggish and the industry was in oversupply
- Historically the price link provided stability across the industry in a low growth environment
- Industry growth and emergence of China has created dynamics specific to alumina:
 - The booming spot market induced high cost capacity development
 - China is the major contributor to the global spot price

Limited greenfield alumina expansion outside China

Annual Expansion

('000 tonnes)



Source: CRU, James King, BHP Billiton

- Surging demand for more low-cost, sustainable alumina capacity
- Industry is running out of competitive brownfield options
- Greenfield locations tend to be in new geographies with different investment and risk characteristics
- Traditional LME based pricing has not supported investment in low cost capacity
- Investment in refining capacity is capital intensive



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Alumina lags other commodities

- **Factors similar to those observable in the alumina market have led to a shift in pricing structures in other markets e.g. thermal coal, iron ore**
 - A sharp rise in demand led to the development of a spot market
 - Emergence of new entrants, with flexible but high cost positions
 - Sharp divergence in spot contracted prices, driving the evolution of a new pricing structure
- **Outcome for industries involved has been positive:**
 - Lower cost supply has been generated
 - Greenfield basins have been opened up
 - Supply outcomes have become more equitable
 - Increased ability to hedge exposures
 - Increased transparency
 - Attracted new market participants providing liquidity
 - Pricing closer to market reduces contract performance issues



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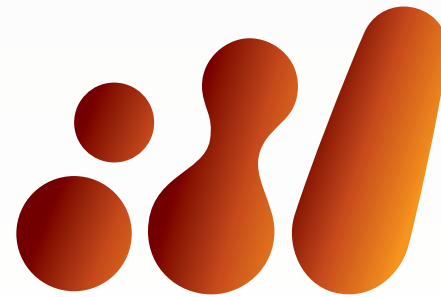
The future

- Other economies e.g. India and Brazil are expected to follow China and add significant incremental demand for aluminium
- To underpin the aluminium industry growth path, greenfield investments in competitive and sustainable refining capacity will be required
- Refining industry will retain its different drivers from smelting
 - main value driver for smelting is competitive power
 - main value driver for refining is size, quality and proximity of bauxite reserve
- Security of supply and production should not be compromised
 - Long term contracts are still common
 - Alumina supply and demand balance sets price
- For buyers and sellers a market clearing price ensured: the right *volumes*
the right *quality*
the right *price*
the right *time*
the right *cost*
the right *location*

Conclusions

- Alumina industry needs to become increasingly flexible in response to changing market dynamics (led by China)
- The right outcome for industry is the development of greenfield refineries in low opex locations, rather than high marginal cost Chinese production with unknown sustainability
- A price reflecting true supply/demand fundamentals of alumina would support these investments
- Pre-conditions are in place for alumina pricing off its own market characteristics
- Ideally the industry needs a clearing price against which long term contracts settle

The process will be an evolution.....but economics will make it inevitable



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