



SUPPLY SITUATION REPORT: Abrasive bauxite weathers rough markets

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- Abrasive demand recovering
- BFA export demand "weak"
- Chinese aluminium market diverting non-met supply

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SUPPLY SECURITY

Around 10m. tonnes of non-metallurgical grade bauxite were produced in 2010, led by China with 62% of output, UK consultancy group Roskill Information Services estimates. The country further dominated the segment of calcined bauxite, producing 82% of world supply.

China is a crucial producer of calcined bauxite and, in particular, monopolises supply of refractory grades - the only operation outside of the country that produces refractory grades for export markets is China-owned Bosai Minerals Group (*see panel*).



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Stockpiling bauxite at Alunorte's alumina refinery in Barcarena, Para, northern Brazil. Demand for metallurgical alumina in primary aluminium production has seen the world's largest supplier, China, diverting non-metallurgical to alumina smelters Norsk Hydro ASA

Worldwide, sources of calcined bauxite are limited - with the majority of non-metallurgical bauxite producers supplying raw, untreated material, for markets such as calcium aluminate cement and steel slag conditioning.

Brazil

The only remaining producer of calcined bauxite in Brazil is Mineracao Curimbaba Ltda, part of Grupo Curimbaba, which produces a range of abrasive grades for jet blasting, polishing and road surfacing. The company is thought to have a capacity of about 1m. tpa bauxite, including raw bauxite but also covering abrasive, ceramic, proppants, refractories and welding grades.

Guyana

At present the only commercially developed source of refractory grade bauxite outside of China is owned by Chinese-controlled Bosai Minerals in Guyana, but hot on the group's heels is Canadian company First Bauxite Corp.

Earlier this year First Bauxite detailed its plan to bring a new source of refractory bauxite to production in Guyana as part of its completed feasibility study. The Vancouver-based company will mine the Bonasika 1, 2 and 3 deposits at a rate of 298,500 tpa raw and dry bauxite ore from which it will produce 160,000 tpa of bauxite concentrate.

Although the company will initially target refractories markets, it is understood that bauxite production for abrasives and proppants will also be evaluated (*see IM July 2009: China's bauxite blockade*).

First Bauxite is being partially funded by private equity investor Resource Capital Fund, which already has several investments in industrial mineral projects globally; including NYCO Minerals Inc., USA (wollastonite), Molycorp Inc. (rare earths), and Queensland Magnesia Pty Ltd, Australia (magnesia).

India

Ashapura Minechem is India's largest producer of calcined bauxite, with capacity thought to be close to 100,000 tpa. The majority of production is consumed by domestic refractory companies, although a portion is also sold to abrasive markets.

Government-owned Gujarat Mineral Development Corp. Ltd has a capacity of around 850,000 tpa raw bauxite. Production of calcined bauxite is 50,000 tpa from its facilities in Gadshisha, sold to abrasive and refractory markets.

Turkey

Demireller Mining Co., formed in 2002, is Turkey's largest producer of calcium aluminate cement and cement grade bauxite, but produces smaller amounts of calcined bauxite for abrasives.

The company operates several pits in the Taurus Mountains, and offices in the port city of Mersin, southern Turkey, from which it is aiming to boost production to 750,000 tpa this year, up from 330,000 tpa in 2010.

In addition Albuck Mining, a joint venture established in 2006 between the German Buck family and two Turkish families, exploits monohydrate diasporic bauxite deposits from two different locations in Turkey.

Albuck produced 200,000 tpa in 2008 and is aiming to increase this to 350,000 tpa by 2012. The company's main products are calcium aluminate cement, Portland cement, and slag conditioning - but smaller amounts are supplied for mineral wool and abrasives.

MARKET DEMAND

Regionally speaking, China's demand for all grades of bauxite has climbed rapidly \pounds reducing the amount available for export. The country's aluminium industry has been the primary bauxite consumer, resulting in the diversion of high quality non-metallurgical grades to alumina smelters to feed the material-hungry industry, as Alison Saxby, senior consultant at Roskill, told **IM**.

"Growth in the primary aluminium industry in China has been phenomenal in recent years, up 25.5% to 16.1m. tonnes in 2010 alone \pounds which has necessitated increasing production and imports of bauxite," Saxby explained.

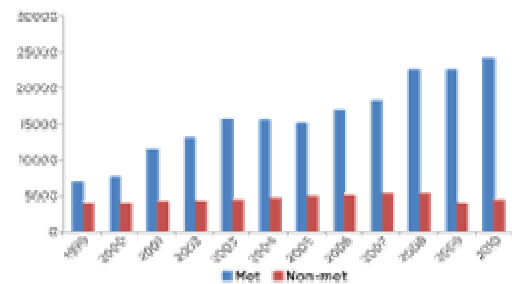
"This has meant that some abrasive grade bauxites are used up in aluminium production, rather than BFA. Although bauxite is still available for both end uses at the moment, if this trend continues it could have implications for future BFA supply and pricing," she added.

In addition to the aluminium boom, China's refractories sector has grown considerably - to about 23m. tonnes - accounting for around half of global production. Much of China's calcined bauxite has thus been required by domestic refractory companies - either in the form of refractory bauxite, or abrasive bauxite for brown fused alumina.

China is the world's largest producer of BFA - producing 1.2m. tpa of the global 1.7m. tpa capacity - and its largest supplier is Bosai Minerals Group.

In March the group announced it was adding 70,000 tpa of brown fused alumina capacity to its Chinese operations in response to increased demand for abrasives and refractories. 10,000 tpa of this is coming from an upgrade to its 90,000 tpa Guangxi BFA plant, with 60,000 tpa added from the acquisition of BFA producer Guizhou Kaifeng Mining LLC.

Brown fused alumina prices, refractory sized, FOB China (2009-2011)*



*Minimum 95.5% Al₂O₃

Bosai told **IM** that the BFA business was core to its group, with the Kaifeng plant acquisition representing a “good opportunity” to increase Bosai’s market share. The two upgrades will increase Bosai’s BFA capacity to 230,000 tpa, produced from four plants in China; one in Guangxi and three in Guizhou.

“The market is recovering slowly after the economic crisis,” Bosai commented. “US and European customers are slowly increasing their demand.”

Bosai is one of a handful of Chinese calcined bauxite producers with capacities over 50,000 tpa (*see panel*), and the company’s acquisition of Guizhou Kaifeng Mining represents further consolidation in the non-metallurgical bauxite sector.

Last year the Chinese government announced that it would decrease the country’s bauxite export quota from 930,000 tonnes to 830,000 tonnes for 2011, with 500,000 tonnes scheduled for H1 2011 and the remaining 330,000 tonnes reserved for H2 2011 (*IM January 2011: Chinese 2011 bauxite exports in the hands of just a few*).

In addition, it was revealed that the government intended to impose stricter conditions on companies to qualify as exporters; including the requirement for companies to own a mine, or to purchase bauxite from a legal mine (one in possession of a mining license, environmental permit, and social security for workers).

This has limited the ability of small companies to compete in the Chinese bauxite export market, with the majority of supply handled by the country’s major producers and traders - perhaps as few as five.

MARKET OUTLOOK

A widely-reported concern is China’s diversion of calcined bauxite grades to the country’s booming alumina industry. Government policy to reduce China’s dependence on alumina imports for its aluminium industry has seen most available domestic bauxite consumed for alumina production.

But a recent market report, “*The non-metallurgical bauxite and alumina industry worldwide*”, authored by independent minerals consultant Ted Dickson and published by Materials Technology Publications, claims that the squeeze on Chinese calcined bauxite supply might ease in the future.

Dickson warns that if the growth of China’s metallurgical alumina and aluminium industry stalls, this could lead to greater availability of raw material (and perhaps greater export availability) - pointing to brown fused alumina as a major beneficiary.

The Chinese government has embarked on a programme of closing inefficient and polluting plants, including 17 aluminium producers, as well as cutting export tax rebates for aluminium to discourage production. If successful, this could ease demand for smelter grade alumina and thus lower competition for local bauxite resources - even if, worldwide, primary aluminium demand continues to rise.

“As demand for bauxite for metallurgical alumina falls off, it is likely that many of China’s alumina suppliers will increasingly focus on supply of non-metallurgical grades,” Dickson reported. “This, in turn, is expected to ease exports to consumers in the refractories, abrasives, and medium alumina CAC businesses.”

But how likely is this scenario? As Peter Deneen of River Edge Nonferrous LLC explained during his presentation at Metal Bulletin’s 17th Bauxite and Alumina seminar in March, China has become a less significant market for imported alumina but a bigger one for imported bauxite - largely because the country has the technology and experience to process lower grades, although at higher cost and lower competitiveness.

Deneen forecasts that China’s bauxite imports will likely hit 50m. tpa by 2014 - up from just over 30m. tpa in 2010 and an estimated 35m. tpa this year. With such forecasts, it would suggest that the country’s consumption of its own bauxite reserves is likely to increase & not decrease.

Deneen explained: “China is insulated from rising international alumina prices, but is heavily exposed to rising bauxite prices.”

On that basis, Chinese bauxite importers may shift toward more spot market purchases as traditional LME-linked term contracts expire, creating greater market “volatility”, Deneen added.

PRICE TRENDS

Despite new export controls implemented by the government, export and domestic prices of Chinese non-metallurgical bauxite have remained fairly stable since the start of the year - in sharp contrast to the market in 2010.

But reports suggest that producers of brown fused alumina, on the other hand, are at the mercy of China's electricity supply, as the government attempts to conserve the nation's energy and reduce pollution.

"Chinese brown fused alumina producers are currently being squeezed by rising labour and energy costs. Meanwhile, export demand is still weak for BFA, making it a difficult climate to make any significant price increases," Roskill's Saxby told **IM**.

The outlook for abrasive bauxite and BFA prices is, in the long-term, dependent on China's future export policies - if the trend of decreasing export quotas and consolidation continues, then price increases are likely also. Combined with short-term issues such as labour and electricity (although arguably these are core long-term concerns also), it is unlikely that prices will decrease - unless demand falls off.

But the World Trade Organisation's imminent ruling on China's restriction of key steelmaking raw materials - a complaint brought by the European Union, Mexico and the USA some two years ago - may be a shake-up for the Asian country's export status quo.

EU Trade Commissioner Karel De Gucht has said he expects the WTO's findings to "considerably strengthen" the position of the original complainant, the European Union - signalling that report will not find in favour of China. How this will affect trade and prices, if at all, remains to be seen.

Selected Chinese producers of calcined bauxite*

Bosai Minerals Group
 Guizhou Star Minerals
 Henan Mines & Refractories
 Jie Xiu Bauxite
 Shanxi Fangxing Mineral Industry Co
 Shanxi Yangquan
 Xiaoyi Maotai Minerals Co Ltd
 *Capacity >50,000 tpa

Source: Roskill Information Services, 2011

Spotlight on abrasive bauxite

Production of abrasive grade calcined bauxite is similar to the process for calcining refractory grade material, with the main difference being the temperature (typically abrasive bauxite is calcined at around 1,100°C while refractory bauxite is calcined in the range of 1,400-1,800°C).

The method of calcination has changed from largely shaft and downdraft-based technology to rotary kilns, mainly for environmental reasons owing to the type of fuel used. Round kilns still in production have changed from coal- to gas-fired, and grades produced by this method command a premium price due to the small quantities.

Some abrasive bauxite is used directly as a cheap abrasive, but the majority is used to produce brown fused alumina (BFA) for abrasives and refractories. BFA is produced from the fusion of calcined abrasive grade bauxite, coke, and iron in an electric arc furnace at temperatures exceeding 2,000°C.

There are two types of brown fused alumina - regular and semi-friable - with the main compositional difference being the relative titanium dioxide content (regular BFA contains higher TiO₂ levels). Regular BFA is slightly tougher.