

Iron ore review

Iron ore is used almost solely to produce pig iron and direct reduced iron (DRI), the main raw materials together with coke for the production of crude steel.

World crude steel production increased from 1140Mt in 2005 to 1240 Mt in 2006, an increase of 8.8 %. For the first 10 months of 2007 production has grown 8.1% compared to the same period in 2006 and reached 1.1Bt. World pig iron production in 2006 was 871.5Mt. This represented an increase of 9.8% compared with 2005. DRI production grew at a lower rate to almost 60Mt. All parts of the world experienced strong growth in steel demand, with the increase being particularly large in Europe and the North American Free Trade Agreement (NAFTA) region. Production of crude steel in China increased by 18% to 419Mt and China now accounts for a third of world production. All regions, including Europe and the Americas, experienced slight rises in production. In Europe production rose by 5.9% (211Mt), Asia (excluding China) produced 286Mt, an increase of 4.3% and Africa saw a rise of 3.3% to reach 185Mt. In the Americas, production increased slightly by 2% to 177Mt. Among the larger producers, production fell only in Brazil (31Mt), minus 2.2%. Russia, Germany, India, Ukraine, Italy, Turkey and Taiwan Republic of China all saw increases of more than 5%, in Turkey's case by as much as 11.2%. The US had an increase of 3.8% (98Mt) and Japan 3.3% (116Mt).

market economies (including Eastern Europe), and except Australia and Sweden, iron ore production has fallen by 23% during the same period. Australian and Swedish production has grown, however, the first by 140% and the latter by 17%. In the CIS republics, iron ore production in the same period fell by 17%, but the recovery in recent years has been remarkable,

Right: Table 1: Iron ore: World production* (Mt)

Country	2002	2003	2004	2005	2006
Sweden	20.3	21.5	22.3	23.3	23.3
Sub-total Europe excl. CIS	24.4	25.3	26.2	30.1	30.7
Kazakhstan	15.4	17.3	18.7	16.5	18.6
Russia	84.2	91.8	97.0	96.8	103.9
Ukraine	58.9	62.5	65.6	68.6	73.1
Sub-total CIS	158.6	171.6	181.3	181.8	195.6
Sub-total Europe	182.9	196.9	207.5	211.9	226.3
Canada (1)	30.9	33.3	28.6	30.1	34.1
USA	51.5	48.5	54.7	54.3	52.9
Brazil	225.1	245.6	270.5	292.4	318.6
Venezuela	20.9	19.2	20.0	21.2	22.1
Sub-total Americas	350.4	371.3	400.2	425.2	454.8
Mauritania	9.6	10.1	10.7	10.7	11.1
South Africa	36.5	38.1	39.3	39.5	41.2
Tunisia	0.2	0.2	0.3	0.2	0.2
Sub-total Africa	51.8	53.3	54.3	55.3	57.1
India	86.4	99.1	120.6	145.5	165.0
Sub-total Asia excl. China	103.0	116.4	139.7	167.9	190.6
China (2)	108.8	122.7	145.7	200.3	276.4
Sub-total Asia	211.8	239.1	285.5	368.2	467.0
Australia	187.2	212.0	234.7	257.5	275.1
Sub-total Oceania	188.9	213.9	237.0	259.8	277.3
Total world	985.9	1074.5	1184.4	1320.4	1482.6
*) Not for steel production.					
**) Iron ore production is converted, so that its iron content is about equal to that on average in the rest of the world.					
China ore production (unconverted):	231.4	261.1	310.1	426.2	588.2

and production has increased by 23% in the last five years. It is however still far below the 250Mt produced annually in the mid 1980s.

Output increased mainly in the four major producing countries of Brazil, Australia, China and India. China had the fastest expanding iron ore mining sector again in 2006 with a growth of 38% production, reaching a new peak at 276Mt (at comparable ore grades total production is at a staggering 590Mt). The growth rate of India for 2006 was 13% (165Mt) while that of Australia was 6.8% (275Mt) and Brazil's iron ore production increased by 9.0% to reach 319Mt. In the CIS, Kazakhstan's production increased by 13% and reached 19Mt, Russia at 104Mt recorded a growth of 7.4% and the Ukraine saw a growth of 6.6% (73Mt). In Western Europe production seems to have bottomed out; Swedish production is on the rise, Austrian production is stable and in Bosnia-Herzegovina the production has just taken off. Total European production in 2006 was however only 30Mt. Output in Africa in 2006 increased by only 3.2% to 57Mt and the African share of total world production is continuously declining. In North America, the difficult situation of a few years ago has turned around completely and all American and Canadian operations are running at full speed, mining altogether 87Mt.

In 2006, global production of pellets was 349Mt. This is the highest level ever, up 4.3% from 2005. World exports were 136Mt, a decrease of 0.5% compared to 2005. The share of pellets in total iron ore production in 2006 was 24%, in 1997 the figure was 26.8%. A major factor behind this slow decrease in pellet production has been the fall in United States iron ore output. However, this trend seems to have stopped in recent years and there are some signs of leveling out.

Trade

International iron ore trade also reached a new record level in 2007 as exports increased for the sixth year in a row and is estimated to reach 825Mt in 2007, a growth of some 8%. In 2006, exports grew to 759Mt, up 6.1%. These figures include all export trade including intra-CIS trade. Seaborne iron ore trade increased by 9% in 2006 to about 711Mt.

Total iron ore exports have increased by approximately 92% since 1990. Exports by developed market economy countries excluding Australia have increased by 4.6%, while those of Australia have more than doubled, increasing by 150% during the same period. Exports (including trade between themselves) of the CIS republics rose by 51% between 1990 and 2006. Chinese exports are zero and will remain at that level. Developing countries accounted for 52% of total iron ore exports in 2006, and their exports have grown by 96% since 1990. The CIS republics represented 7.6% and developed market economy countries accounted for the remaining 40%.

Brazil managed a strong growth of 10% to 247Mt in 2006 and Australia barely managed to keep its position as the leading exporter at 248Mt. Indian exports

grew for the sixth consecutive year and the country is now, at 87Mt, by far the third most important exporter, clearly ahead of South Africa and Canada, the exports of which are both between 25 and 30Mt. Swedish exports regained its volumes lost in recent years and reached 18Mt. In Africa, Mauritanian and South African exports increased marginally.

The return of Kazakhstan, Russia and Ukraine to the international iron ore export markets has proved successful during the last couple of years. In spite of these countries being landlocked, export initiatives have progressed in recent years. Kazakhstan has also concluded a deal with China and exports in that direction have grown considerably in the last couple of years. The increase was 83% in 2006 and it might continue increasing over the next few years. Transport capacity is a limiting factor for expansion, but the last years have showed that iron ore producers from the CIS are ready to expand on the international market.

In 2003, China surpassed Japan as the world's largest iron ore importer, and at 326Mt, an increase by 18%, accounts for 42% of total imports. Japan's imports increased modestly to 134Mt. Together with the third and fourth largest importer, Germany and South Korea, these countries accounted for over 70% of total world imports. European imports are considerably smaller and account for 22% of the total.

Prices

The Chinese firmly took the lead in the 2007 iron ore price negotiations. After several years with the Chinese steel companies sitting increasingly unhappy in the back seat, the Baosteel Group took over the steering wheel decisively by concluding the first agreement for 2007 in the first round of negotiations with Cia Vale do Rio Doce (CVRD) on 21 December 2006. The mark-up was 9.5% for fines. The price was set at US\$0.732/dmtu free on board (FOB) Ponta da Madeira and US\$0.7211/dmtu FOB Tubarão. The Baosteel Group is one of the major Chinese steel producers and represents a large group of Chinese steel companies with an annual iron ore import demand of over 300Mt. The following day (22 December 2006) Baosteel also concluded agreements with Hamersley and BHP Billiton for the same increase of 9.5%. The price was set at US\$1.0264/dmtu for lump ore and US\$0.8042/dmtu for fines. CVRD continued negotiations over Christmas and on 26 December 2006 deals were struck with both the Japanese negotiating groups composed of Nippon Steel, JFE Steel, Sumitomo Metals, Kobelco and Nisshin Steel, as well as with Korean firm POSCO. The Koreans had earlier agreed with the Japanese to coordinate their negotiations. All these deals were made at 9.5% increase. The first agreement in the European market was also made before the end of 2006 on 28 December, when Italian ILVA agreed to a 5.28% price hike for pellets from Tubarão (US\$1.1796/DMTU) and Ponta da Madeira (US\$1.2108/dmtu).

This was the first time since 1995 that the first settlement was made in the month of December. Previously this had happened a few times in the late 1980s and

early 1990s when Hamersley made quick agreements in the Japanese market. The Chinese are now leading the negotiations together with CVRD. The largest users of iron ore from China are setting the price with the largest producer (CVRD). This means that a certain order is restored to the negotiating mechanism after several years of unruliness. CVRD maintains a firm grip over the process and has been the first price setter during the last seven years.

The future of the negotiated agreements is still not certain even if Chinese demands for an entirely new system has been less vociferous after the successful 'blitz attack' by Baosteel, as it was labelled by one observer. The effectiveness of a system that forces all buyers to accept the first deal that is made is still questioned and calls for a different system are still heard in China. The present system, which evolved gradually in the late 1960s and early 1970s, is however deeply rooted all around the world. The difficulties in introducing a steel contract at the London Metals Exchange (LME), that could possibly have become the basis for iron ore sales, just as base metal LME quotations form the basis for concentrate sales, is one obstacle to a possible new system. The fact that many iron ore buyers, particularly in China, have argued for a new system. But nobody has so far proposed any alternative. A new system may in fact be more distant today than it was a year ago. The fact that Chinese iron ore buyers have taken the lead in price negotiations could mean that they will be satisfied with the present system for at least some years ahead. Had Baosteel not been able to make the first deal the situation would probably have been quite different and calls for an entirely new system probably much more vocal.

Before the start of the 2008 negotiations some analysts put forward the idea that price increases of as much as 50% would be a possible outcome of the coming rounds of negotiations. The Chinese reacted

strongly against these rumours. During the annual steel raw materials conference hosted by China Iron and Steel Association to mark the start of negotiations every year BHP Billiton announced that it will propose the scrapping of the negotiation system in its present format. Instead BHP Billiton proposed a new model taking the transport cost difference between Australia and Brazil to China into account. The soaring spot market prices for exports into China have given the sellers their best argument: Some Chinese steel works are willing to pay almost double the negotiated price on the spot market. Raw Materials Group is less bullish and suggests a price hike of some 15-20% , or possibly slightly more, for 2008.

Companies

CVRD maintains its position as the undisputedly largest iron ore producer in the world. In 2006, CVRD, with its production base in Brazil, controlled 271Mt of iron ore production, up from 241Mt, 18.2% of total world production (see Table 2). The three largest companies, including Rio Tinto and BHP Billiton, with most of their production in Australia, in second and third place (same as in 2005), together controlled 35% of the global market, a marginal decrease compared to 2005. The level of concentration thus decreased somewhat in 2006 after being constant in 2005. The 'Big Three' have not managed to increase their production as fast as total world production, mainly because of a very fast expansion by small producers in India and China. The iron ore industry has been consolidating more or less continuously since the 1970s but the process of consolidation has been more or less completed, except in the CIS countries and China. Until the iron ore industries in these countries start consolidating there will be only marginal further increases in the level of concentration of global iron ore production.

This development has made it necessary to create new corporate structures with the necessary financial muscle. This restructuring is now almost completed and the scene is set for an intensified Russian presence in iron ore projects both inside and outside of Russia and the CIS countries. The major companies such as Evraz and Severstal are most likely to make the first overseas investments in iron ore mining. In the Ukraine, where the ownership situation was settled more recently than in Russia it will take a few more years to reach this point of development.

After a period of limited merger and acquisition (M&A) activity during 2004-2005, the possibility of an extended period of high prices together with both mining and steel companies having coffers fully loaded with cash triggered another M&A wave in 2006, which has continued into 2007.

This time, focus has shifted from Australia to Brazil. It began in early 2006 when CVRD acquired all the minority shares in Caemi. In an all shares deal, CVRD issued new stock to the holders of preferred shares in Caemi to a total value of over US\$3.5bn. CVRD also took over Rio Verde for US\$45m. Later, in early 2007, the Brazilian mining tycoon Eike Batista's new MMX

Below: Table 2:
Corporate control in iron ore mining in 2006

Controlling entity	Country	Controlled production	Share of Total World production
1 Cia Vale do Rio Doce	Brazil	271	8.2
2 Rio Tinto plc	UK	129.5	8.7
3 BHP Billiton Ltd	Australia	115.2	7.8
4 State of India	India	52e	3.5
5 Arcelor Mittal	UK	42.3e	2.8
6 Metalloinvest	Russia	38.1	2.6
7 Anglo American	South Africa	31.1	2.1
8 Cleveland-Cliffs Inc	USA	28.5	1.9
9 Mitsui & Co Ltd	Japan	26.1	1.8
10 LKAB (State of Sweden)	Sweden	23.3	1.6
11 Ferrominera (State of Venezuela)	Venezuela	22.1	1.5
12 US Steel Corp	USA	22.0	1.5
13 System Capital	Ukraine	17.5	1.2
14 Smart Group	Ukraine	17.4	1.2
15 Evraz Group	Russia	17.0	1.2
Total, 15 largest		853	57.4
Total, World		1485	100.0

Notes: State of India includes SAIL, NMDC and Kudremukh (no production in 2006).
Source: Raw Materials Data, Stockholm 2007, www.rmg.se

company clinched two major deals. The first was announced in March when US based Cleveland-Cliffs completed a deal to buy 30% of MMX's Amapá project for US\$133m. In April, a second major deal was completed by Anglo American plc taking 49% in MMX Minas-Rio from MMX and the second 30% share holder in MMX Rio Centennial Asset Participacoes. Anglo paid US\$1.15bn, which makes the deal one of the largest ever in the iron ore sector.

In spite of recent years' attempts to create larger steel companies through M&A activities, the iron ore producers are still one step ahead of the steel producers. But the gap is steadily decreasing both because of continued M&A in the steel sector and decreasing concentration in iron ore. The five largest crude steel producers control around 18% of world production while for iron ore the figure is 41%. The iron ore industry's level of concentration is roughly on par with the average for other metal industries.

The trend to de-link iron ore mining from steel production, which was strong during the 1990s and early 2000s, had not even been completed before a reverse trend could be observed. A captive iron ore mine is now seen by some companies as a hedge against continued future price increases. ArcelorMittal is leading this new development. Other steel works are following Mittal's example, including Essar Steel in India and several Chinese and Russian steel companies. Chilean steel producer CAP has even taken the consequences of the iron ore boom as far as discussing to make iron ore its core business and putting steel in the back seat.

The recent hostile bid for Rio Tinto by BHP Billiton would create a near monopoly situation in the iron ore market in particular for seaborne trade. It is, as RMG sees it, unlikely that the bid will pass the scrutiny of regulatory watchdogs either in the US or in the European Union at least not without considerable divestitures, perhaps of all non-Australian iron ore assets of the two companies. In Western Australia the merging of the two companies would however undoubtedly create some important cost benefits and savings opportunities when combining the two adjacent operations and transport systems.

Projects

During 2006, new iron ore projects with a total investment amount of over US\$10bn were presented. This is 27% of all new mining projects announced and by far the largest share of all metals. There were US\$3bn earmarked for iron ore developments in 2002, US\$14bn in 2004, US\$25bn in 2005 and US\$34bn in 2006. No other metal has experienced such a phenomenal growth during these years.

New iron ore mining capacity taken into operation in 2006 reached almost 70Mt globally. This is a considerably higher figure than in the preceding year when only 30-40Mt of new capacity was registered. These figures do include known brown field projects. However, the figures for both years exclude many small, locally owned projects, mostly in China and India,

but in 2006 also in Brazil, which are not announced in the same way as a project run by a listed junior company or a major producer. The figures further do not include incremental capacity increases in existing mines, such as de-bottlenecking, capacity increases due to reorganisations and avoiding closing down for maintenance etc., which we have with one term called 'creep'. However, all of the incremental 500,000t or 1Mt iron ore projects add up to considerable quantities.

In 2006, and even more pronounced in early 2007, a new wave of expansion projects has been started. It has become obvious that the period of strong demand growth has lasted longer than anybody expected and that the first round of new projects, together with all brown field projects that have been started, will not be sufficient to keep up with the ever growing demand. The question marks and hesitations about a new generation of green field projects that was felt in the industry in the late 2005 and early 2006 has been replaced by a determination to go ahead with some of the more long term projects in West Africa and a quicker than planned expansion, in Brazil in particular. The fact that iron ore prices increased in the 2007 round of negotiations was perhaps the final hurdle to overcome before new investment decisions could be made in board rooms all around the world.

The majors, Rio Tinto, CVRD and BHP Billiton, are of course anxious to protect their market shares, which declined in 2006 for reasons discussed above. It seems that all three will now launch a series of new projects to try to increase the speed of adding capacity and possibly recover lost market shares. CVRD, in spite of having invested heavily during recent years, is accelerating its capital spending considerably. The new Carajás expansion to over 130Mt alone will need over US\$1.8bn of investment until 2009. In early 2007, a new strategy was announced, aiming at becoming a player in the Chinese domestic market. This is going to be achieved by opening up a massive additional 150Mt of capacity in Brazil in the next four years until 2011. The production from these new mines will be transported on new, very large ore carriers with long term shipping contracts to avoid the volatility of freight rates in recent years. After unloading in China, ores will be blended and distributed by CVRD. CVRD has also decided to take a 25% stake, together with a Chinese partner, in a 1.2Mt pellet plant in Guandong, China. These moves will intensify competition in China and will hit mostly traders, spot price exporters from India and smaller Chinese producers. CVRD has also decided to enter the coal business on a massive scale, aiming at 30Mt production in 2010. In this way CVRD will be able, as are already both Rio and BHP-Billiton, to supply both major inputs for steel making.

Rio Tinto plans to increase its output from 170Mt (including joint ventures and on a 100% basis) in 2006 to 235Mt by 2008. Since 2003, Rio Tinto has invested nearly US\$5bn in its Pilbara operations alone and capacity is expected to reach 220Mt in 2009. Iron ore accounted for half of Rio's capital spending in 2006. The development of Rio's green field projects has been

intensified and although no new announcements have been made recently it would not be a surprise if a decision is taken to go ahead at any of its major green field projects in Guinea (Simandou), in Corumba Brazil or in India (Orissa), as all of them are already far advanced.

BHP Billiton has expanded its capacity by 31Mt over the last couple of years and plans another 28Mt before the end of 2007 to reach a total of 152Mt/year. Its major Third Rapid Growth Project (RGP3) adding 20Mt of capacity in 2007 had not yet been completed before the next phase was announced. RGP4 will expand BHP Billiton's capacity in Western Australia with an additional 26Mt annual capacity by the first half of 2010 through an investment of US\$1.85bn.

The junior companies continue to present new ideas and some that were only presenting some speculative geological ideas in last year's review have now presented pre-feasibility studies. Meanwhile, new juniors have entered the scene with fresh ideas or dusted off old ideas from the previous iron ore boom during the 1960s and early 70s and re-packaged them.

Progress of the Canadian juniors has been steady during 2007, but no new investment decisions have yet been made. There is still a long way to go to get these projects, all in the Canadian Arctic, ready for an investment decision.

The government of Bolivia has privatised the Mutun iron mountain. Indian steel producer Jindal Steel and Power won the contract and is planning to build a modern integrated steel plant in the Bolivian jungles. Whether this huge and extremely complex project will ever materialise still remains to be seen. The political, infrastructural and technical problems at Mutun are formidable.

A few new projects in Mongolia, either sponsored by Chinese steelworks or by entrepreneurs aiming to supply iron ore to the buoyant Chinese market, could make Mongolia the next country to be added to the list of iron ore producers.

The Chinese so-called 'Two Ways Strategy' is firmly in place, with expanded domestic investment into exploration and production capacity constituting one strategy leg and imports and foreign direct investment the other. During 2006, Chinese direct investment abroad has increased considerably. More major Chinese foreign investment is expected in the next couple of years and this will expand the project list further. In addition to the numerous investments in Australian projects, Chinese companies have also started to invest in Africa. The Belinga project in Gabon operated by China National Machinery & Equipment Import & Export Co and the bid for the Gara Djebilet deposit in Algeria by BaoSteel are but two recent examples. The acquisition of the Sierra Grande project in Argentina is another.


Russian and Kazakhstan iron ore producers have been expanding their production rapidly in the last couple of years. They are fast approaching the level of production prevailing in the 1980s and probably their capacity limits as well. So far this has been possible

without any large investments in exploration to find new deposits, in infrastructure or in completely new mines. It seems that the situation has now changed, and huge investments are needed to maintain or increase production levels.

Projections for expansions presented by Indian industry leaders indicate that iron ore production must reach 290Mt by 2020 to meet domestic steel demand estimated at 180Mt annually. If exports are to be continued at the current 100Mt level additional production capacity of 220Mt (!) on top of the anticipated 170Mt of the fiscal year 2006/07 will become necessary. These are truly enormous figures and it is hard to imagine how this plan will come true.

Outlook

The iron ore market continues to be tight in late 2007. China continues to be the engine driving the world iron ore industry. While the steel export taxes recently introduced in China led to a slowdown in the rate of steel exports - and iron ore imports - in June 2007, prices for Indian spot deliveries, which can be considered a good indicator of the state of the market, are still reported to be high. Both production capacity and demand are expected to increase at high rates over the next couple of years and the question is which variable will increase fastest.

Capacity additions over the period 2007-2009 have been divided by region into three categories: certain, probable and possible. Certain and probable additions together correspond to about 21% of world production in 2006. Iron ore producers are convinced that the boom will continue and that there will be room for significant additional capacity. The many possible supply scenarios need to be matched against a forecast of demand. A scenario based on the International Iron and Steel Institute's (IISI) forecasts, with the additional assumption that world steel use will grow at the same rate in 2009 as that forecast for 2008, implies a 10% increase in China and 4% in the rest of the world. The IISI forecast for 2007 seems to be a bit too conservative when compared to growth during the first 10 months. This means that in 2009/2010 new additions to iron ore capacity would match demand growth and the tightness in the market of recent years would disappear. However, past experiences from using the same methodology is that it tends to over-estimate the additions to capacity and under-estimate the growth in demand. Raw Materials Group forecasts continued high iron ore prices in 2008 and most probably another year of price increases at a higher level than in 2007, at 15-20%. 

The background material for this article is extracted from 'The Iron Ore Market 2006-2008', published by UNCTAD in late May 2007. This study has been updated with the most recent material available to Raw Materials Group in December 2007. The UNCTAD study is researched and compiled by Raw Materials Group (www.rmg.se) for UNCTAD, and can be ordered from: ironore@unctad.org or by fax from Mr Olle Östenson at +41-22 9170509.