

## IRON ORE

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**S**timulated by a 6.2% increase in world crude steel production, world production of iron ore increased by 7.5% in 2002, for the first time exceeding 1 billion tonnes to 1,008 million tonnes. International iron ore trade also reached record levels at 512 million tonnes (Mt), an increase of 7.8% compared with 2001.

Price negotiations in 2003 were even tougher and more protracted than in 2002. The first deal was announced only on May 16, when Companhia Vale do Rio Doce (CVRD) and Arcelor settled at prices 9.0% higher than in 2002. A few days later, five Japanese steel mills reached an agreement with BHP Billiton involving similar price increases.

The rapid restructuring of the iron-ore industry in 2000-01 lost momentum in 2002 but in Brazil CVRD strengthened its position as the world's undisputed leading producer. The top three companies, including Rio Tinto and BHP Billiton, now control over 30% of the total world production of iron ore.

### **Supply**

World output of iron ore increased by 7.5% in 2002 to reach 1,008 Mt compared with 938 Mt in 2001 and easily surpassing the previous record of 970 Mt in 2000. Earlier peak years were 1989 (910 Mt) and 1997 (925 Mt). Developing countries accounted for 56% of iron-ore production in 2002, the former Soviet Union (FSU) for 16% and the industrialised economies for 29%. Production increased in all the major producing countries, although in some cases, notably Canada and the US, production is still far below the levels reached in the 1990s (Table 1).

Brazil increased its output by 15% to a record high of 239 Mt. Australia remained the second-largest producer with output of 187.2 Mt (wet weight). Significant increases were also recorded in China, India, South Africa, Sweden and Venezuela. China produced 109 Mt (on a comparable grade basis) or 11% of the total world production in 2002.

The pattern of iron-ore production follows the global economic trend, with troughs and crests. Since 1990, total growth has been 12%. In developed market economies (including Eastern Europe but excluding Australia and New Zealand), production has fallen by one third. Among developed market economies, only Australia's production has grown, by an astounding 65%. In the FSU in the same period production of iron ore fell by one third.

In 2002, production of iron-ore pellets recovered to almost exactly the 2000 level of 259 Mt after a sharp dip in 2001. This is one of the highest levels ever. Total world exports are estimated at around 88 Mt. These figures translate into a growth of 10% in production and by a more modest 2.5% for exports. In

spite of the rise in pellet exports, their share of total iron-ore exports declined in 2002, a tendency first seen in 2001.

### **Demand**

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

World pig-iron production in 2002 was 608 Mt, 5.1% higher than in 2001. China, which accounts for more than 25% of world production, exhibited the largest increase, from 147 Mt to 171 Mt, a rise of 16%. There was an increase of 12% in world production of DRI, from 40.3 Mt to 45.1 Mt. This is a new record figure as well.

World crude steel production increased by 6%, from 850 Mt in 2001 to 902 Mt in 2002. Production increased in all five regions of the world. China experienced the largest change as it did in 2001, with a 21% jump in the production of crude steel, 150 Mt to 182 Mt. Considering that China represents approximately 20% of the total market for crude steel (in 2002 it overtook the US to become the world's largest steel importer) it is obvious that this change is having an impact on the entire world market.

The steel industry in the rest of the world experienced a more moderate growth rate. In the US, production grew by 2.4% and in Canada by 4.8%. Total production of crude steel in the US and Canada amounted to 108 Mt in 2002. Europe had the weakest growth rate of all the major areas at only 0.4%, from 190 Mt to 191 Mt. Japan's production of crude steel increased by 4.7% from 103 Mt in 2001 to 108 Mt in 2002. Asia (excluding China and Japan) achieved a 5.1% increase in production but the FSU experienced a growth of only 0.8%. Steel production rose by 5.6% in Africa and by 8.4% in Latin America (including Mexico).

### **Trade**

International trade in iron ore reached record levels in 2002, with exports rising by 7.8% and surpassing the previous all-time high of 489 Mt in 2000 by 33 Mt or 6.7%.

Total iron-ore exports have increased by approximately 31% since 1990, ie a growth almost twice of that in global iron-ore production. Exports by developed market economy countries excluding Australia have decreased by 33% but those from Australia have almost doubled, increasing by 74% since 1990. Exports from the FSU countries (excluding intra-trade) fell by 18% between 1990 and 2002. Chinese exports are zero and will remain at that level. Developing countries accounted for 51% of total iron-ore exports in 2002, and their shipments have grown by 31% since 1990. The FSU represented 6% and developed market economy countries accounted for the remaining 43% of total iron-ore exports in 2002.

Brazil's exports grew by 9% in 2002 to reach 170 Mt, almost matching the 176 Mt exported by Australia. India's exports grew for the third consecutive year and the country is now the third most important exporter. At 32.9 Mt, India is

clearly ahead of South Africa and Canada, which each exported about 25 Mt in 2002. Sweden regained some of the export volumes it lost in 2001, reaching 14.5 Mt last year. Mauritania continues to export around 10-11 Mt/y as it has done for the past decade.

Japan remains the world's largest iron-ore importer, although it could be overtaken by China this year if the present trends continue for another eight months. Japan's imports increased by 2.2% in 2002, whereas China's imports grew by more than 20% to exceed 100 Mt for the first time. Together, Japan, China and the Republic of Korea account for 55% of total world imports of iron ore.

The geographical distribution of iron ore imports has changed considerably since 1990. Europe was then the dominating import region, with 47% of total imports (including Eastern Europe). Japan followed at 31%, North America accounted for 6% and China for only 3.5%. By 2002, European imports accounted for only 30% of the world total. Most of this decline is due to the fall in imports to Eastern Europe which have decreased by 40% since 1990 to a level of 29 Mt in 2002. Japan's imports were of the same magnitude in absolute figures in both 1990 and 2002, but its share of world imports has fallen to 25%. North American imports, which had been almost constant since 1990, have fallen in recent years, from 22 Mt in 2000 to 19 Mt in 2002. The growth in China's imports has been phenomenal, rising from 14 Mt in 1990 to 112 Mt in 2002, an eight-fold increase.

The freight rates for spot iron ore have been moving upwards since early 2002 and this trend has accelerated in the first months of 2003.

### **Prices**

Price negotiations in 2003 were as tough and difficult as in 2002. The first deal was announced only on May 16, when CVRD and Arcelor settled at US\$0.32/t fob, a 9.0% rise compared with 2002. A few days later, five Japanese steel mills reached an agreement with BHP Billiton containing similar price increases, for example US\$0.39/t for Hamersley lumpy ore.

Negotiations had also been protracted in 2002, the first agreements being reached only at the end of May after five rounds of talks. On May 29, 2002, CVRD concluded its iron ore and pellet price negotiations with Thyssen Krupp Stahl (as in 2001, the first agreement). The deal meant a 2.4% price decrease for Carajas fines, to US\$0.29/t and a 5.47% decline for pellets compared with 2001, to US\$0.47/t. The first agreement concerning Australian ores was reached two days later when BHP Billiton announced its new prices with Nippon Steel and Kawasaki Steel. The decreases were of the same order of magnitude.

Although the price increases in 2003, as expressed in US dollars, are relatively high, historically speaking, it must be underlined that they look less impressive when expressed in the currencies of iron-ore exporting countries, most of which have seen their currencies appreciate against the US dollar in recent months.

The lengthy negotiations in 2002 and 2003 reflect the conflict between a strong demand for iron ore on the one hand and a weak economic performance of the steel industry on the other. The fact that iron-ore producers have been consolidating heavily in recent years has given them increased clout. Consolidation among the steel producers is slowly increasing but still lagging. When CVRD's president Mr Roger Agnelli on two occasions during the tough talks in early 2003 publicly called for double digit price increases he sent "ripples through steelmakers" according to the trade publication, Tex Report. This is probably true because the new situation, with demand increasing at a much higher rate than supply and no weakening of demand in sight, is truly worrying for Japanese steel mills, even though steel demand in Asia in general, and China in particular, is high. Chinese demand will be the key to iron-ore price developments over the next few years. And Chinese demand will most likely remain high in 2004 and perhaps even in 2005 as well.

During recent years, the Brazilian iron-ore producer CVRD has assumed price leadership. For the 12 years prior to 2000, however, price-leadership was exercised ten times by one or other of the two major Australian iron-ore exporters - BHP and Hamersley - in their negotiations with steel producers in Japan.

### **Companies**

CVRD in Brazil controlled 14.5% of world iron-ore production at the end of 2002 and, together with Rio Tinto and BHP Billiton, controlled 30% of the global market. For the first time in many years, the level of concentration in the iron-ore industry fell slightly in 2002. The industry has been consolidating more or less continuously since the 1970s, but although the trend is clear, developments have been by leaps and bounds. The pace has been slow during periods limited to organic growth, as, for example, in the late 1990s, but much faster in times of intensive merger and acquisition (M&A) activity, for instance, during the past two years and in 1997 when CVRD was first privatised (Table 2).

M&A activity continued in 2002, albeit at a slower pace than in the two previous years. During 2000 and 2001, a series of transactions in the global iron-ore industry were valued at almost US\$2 billion. In 2002, the figure was less than US\$1 billion. During the first four months of 2003, deals worth over US\$1.5 billion have already been concluded.

Much of the focus of M&A activity in 2002 was on North America, with Cleveland-Cliffs continuing to consolidate its position in the US and Canada. In Canada, Dofasco and Caemi, 50:50 owners of QCM, have tried in vain to find a buyer for their loss-making mine. Rio Tinto, through Iron Ore Co. of Canada, declined to buy into QCM. The most likely outcome is that local government sponsored funds will recapitalise the company and thereby dilute the control of the previous owners. Dofasco and Caemi hope that the EU anti-trust authorities will be satisfied with this solution, which will allow some jobs to be saved, at least for a few years. Cleveland-Cliffs has managed to

consolidate a large part of the US taconite operations, including through a few deals also in 2002. Through the sale of Bethlehem Steel's and National Steel's iron-ore assets, the last traditional, vertically-integrated holdings in the pellet industry changed owners in the first part of 2003.

The second most active area continued to be Brazil where a few new deals were presented in the aftermath of the merger frenzy of earlier years. The failed merger between Dutch-based Corus and the Brazilian steelmaker Cia Siderurgica Nacional (CSN), which also operates the Casa de Pedra iron-ore mine, attracted much throughout 2002. Early this year, CVRD continued on the acquisition trail and took over Mitsui's 50% share of Caemi. At the same time, Mitsui announced that it would buy 15% of Valepar's shares from the investment bank Bradespar, thereby indirectly acquiring a 7.8% interest in CVRD.

This means that the links between Brazil's two major iron-ore producers, ranking No.1 and No. 5 in terms of control over production, will be even closer. CVRD is seeking regulatory approval for the Caemi deal from the authorities in Brazil as well as from the European Commission. It is not a priority, however, as CVRD should secure all necessary approvals from the anti-trust authorities. The links between Mitsui and CVRD will probably be carefully reviewed since Mitsui has other holdings in the iron-ore industry besides Caemi. Together, CVRD and Mitsui will control 180-190 Mt of annual iron-ore production. The two companies also have other links outside the iron-ore business.

Attempts by Anglo American to secure a foothold in the iron-ore sector were not entirely successful during 2002. Anglo bought into Kumba in three steps, first by acquiring 9.61% and then 10.47% from the mining investment company Stimela, and then by securing an option to buy 9.29% from Deutsche Securities. The last two deals required approval from South Africa's competition tribunal. At the same time as the first deal, in Kumba shares, Anglo American also acquired 34.5% of Avmin with interests in manganese and iron ore, together with other metals. The South African Government intervened through the state-owned Industrial Development Corp.'s minority holding in Kumba, and maintained that in the interest of the South African people and its own long-term engagement in the steel sector, society must have an important role in the consolidation of the iron ores of the Northern Cape Province. As a result, a deadlock developed.

In May 2003, Anglo American backed out and sold its Avmin holding to the Harmony/ARM joint venture, claiming that it would be more acceptable if Anglo American only had a holding in Kumba. The final outcome of the consolidation in South Africa could still hold some surprises. It could be argued that what Kumba needs is not only a new owner with financial and technical muscle, but one that could offer some specific advantages in the iron-ore industry.

In Russia, there are some signs that consolidation is beginning to get under way. Evraz Holdings, with controlling stakes in several steel mills, has



confirmed that it is considering an alliance with two iron-ore producers, Mikhailovsky GOK in Russia and Sokolovsky-Sarbaisky GPO in Kazakhstan. At present, these are only ideas but if they are developed this could herald the arrival of a major new player on the iron-ore scene, with a capacity to produce over 30 Mt/y of iron ore. In Russia, the driving force behind the move to consolidate is, interestingly enough, a belief that vertical integration will be profitable. In the US, a contrary view is driving changes.

There have been no signs of consolidation in the fragmented Chinese iron-ore sector but it might well come in the near future when the need for investment in new Chinese projects becomes urgent and the lack of capital becomes acute. It should be noted that most of the major Chinese steelworks, which also control important iron ore mines, are still state-owned. This may facilitate future restructuring.

To some extent, measuring corporate control at the production stage underestimates the concentration of the iron-ore sector. This is because a large part of total production does not enter the market but is produced in captive mines or mines which have a protected or restricted market. An alternative way to measure the control is to look at the share of the seaborne trade in iron ore. Measured in this way, the market shares of the major companies rise considerably. CVRD alone controls over 34% of the total world market for seaborne iron ore and the three largest companies control 70%. This illustrates more clearly the potential influence over prices by the major producers.

### **New projects**

The recent strong growth in demand for iron ore has provided the stimulus for a range of projects around the world, both by major companies and smaller ones. The total project pipeline contains some 190-200 Mt/y of new production capacity. Over the period 2003-05, it is estimated that 110-115 Mt will come on stream, most of it only in the final year. Of these projects some 65-70 Mt of new capacity is already committed, with 25 Mt in 2003, 18 Mt in 2004 and 26 Mt in 2005. The balance will only be approved when market conditions permit. Given the substantive price increases that the mining companies have received in 2003, it is likely that many of the projects which are still pending will get a green light later this year.

A few of the projects are completely new, such as the proposed iron-ore mines in Guinea, Gabon and Senegal, where the deposits have been known for many years. Mining projects, however, are unlikely to go ahead until later in the decade. Some projects proposed by junior companies, particularly in Australia, have a chequered history and may not go ahead at all.

With respect to China it is more difficult to predict the investment trend, but the lack of high- or even medium-quality deposits limits the opportunities. Chinese steel producers have stated that they are interested in entering into further joint-venture agreements with existing mines such as Channar in the Pilbara region of Western Australia, or in obtaining full control as in the case of Hierro Peru. Chinese capital could provide the necessary push to allow

some projects to go ahead, not least in adjacent parts of Russia, the Democratic People's Republic of Korea, Mongolia, Vietnam and Kazakhstan.

### **Outlook**

World steel consumption is expected to continue increasing at respectable rates of more than 4% annually through 2003 and 2004, despite uncertainties about world economic growth prospects. The OECD sees a progressive, if unspectacular, recovery as the most likely scenario. The forecast for steel consumption implies continued strong demand for iron ore in 2003 and 2004. The scrap shortage that developed in late 2002/early 2003 limits the substitution possibilities, although scrap consumption should continue increasing.

The strong increase in demand for iron ore in recent years, together with the expectations of continued rapidly rising needs for steel-making raw materials in the future, may upset the balance between iron ore demand and supply.

Increasing iron-ore mine capacity is time-consuming and costly. The amount of new capacity coming on stream between 2003 and 2005 is not more than 100-115 Mt. Moreover, most of it will come into operation only towards the end of the period. In addition to these planned expansions, there is surely also potential for smaller increases in output without major investments, for example in India. Some closures of marginal capacity will take place in countries where captive mines are becoming increasingly expensive and subject to international and/or domestic competition.

The data available are sufficient for some preliminary conclusions. Assuming annual demand growth of 3%, around 30 Mt of new capacity will be needed every year. The Chinese boom will certainly not last forever, but the growth in China alone is forecast to be at least 35-40 Mt in 2003. In addition to this, there is a need to replenish depleted reserves at all mines. Thus, demand for annual new capacity is probably closer to 100 Mt than 50 Mt. There is a possibility, therefore, of a growing shortage of iron-ore capacity developing over the next few years.

In China, the balance between domestic supply and imported iron ore is crucial to the development of the overall market. Our extended and deepened knowledge of the Chinese situation has made us revise our opinion of the survival capacity of China's small-scale iron-ore producers, and we expect them, as well the large Chinese iron-ore mines, to increase production in 2003. As a consequence, imports of iron ore may slow and not keep pace with the rate of increase of China's consumption of iron ore. In the longer term, it may prove difficult for China to continue expanding its iron-ore production at a reasonable cost, given the quality of the existing resources and the infrastructure developments that new capacity will require.

Outside China, the geographical distribution of the known projects suggests that the recent dominance by Brazil may come to an end and that Australia may return to being the most important iron-ore mining country. Africa might become a more important player if some of the greenfield projects are

approved and Kumba Resources succeeds with its planned South African expansion.

Over the next two years at least, it seems likely that demand for iron ore will remain strong and that the market will remain finely balanced. Beyond that, it is quite possible that a shortage of iron ore will develop, depending on developments in the world economy and the speed with which new capacity can be brought into production. The possibility of further increases in iron ore prices is, therefore, deemed quite likely, particularly taking into account the fact that the price increases agreed earlier this year look less impressive when expressed in the currencies of exporting countries rather than in a strongly depreciated US dollar.

Tables next page.



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

<b>Country</b>	<b>2001</b>	<b>2002</b>
Sweden	19.5	20.3
Sub-total Europe excl. CIS	23.3	23.9
Kazakhstan	14.1	15.4
Russia	82.5	84.2
Ukraine	54.7	58.9
Sub-total CIS	151.3	158.6
Sub-total Europe	174.6	182.5
Canada	27.9	30.8
US	45.8	51.5
Brazil	208.7	239.4
Venezuela	19.0	20.9
Sub-total Americas	331.7	373.1
Mauritania	10.3	9.6
South Africa	34.8	36.5
Sub-total Africa	49.8	50.9
India	79.2	86.4
Sub-total Asia excl. China	96.4	103.9
China*	102.6	108.8
Sub-total Asia	199.0	212.7
Australia	181.1	187.2
Sub-total Oceania	182.8	188.9
<b>Total world</b>	<b>937.9</b>	<b>1,008.0</b>

\*China ore production (unconverted): 218.3 231.4

Source: Iron Ore Market 2002-2004, UNCTAD 2003.

Notes:

1) Including minor volumes not for steel production.

2) Iron ore production is converted, so that its iron content is about equal to that on average in the rest of the world.

### Sources:

The Iron Ore Market 2002-2004, UNCTAD Iron Ore Trust Fund, Geneva 2003.

Indian Iron Ore 2002 – an in-depth review, Raw Materials Group & Techno Economic Services, Stockholm/New Delhi 2002.

Raw Materials Data, Raw Materials Group, Stockholm 2003.

Tex Report Vol 35, No 8283 p. 1, May 21 2003.

**Table 2: Corporate control in iron ore mining in 2002**

<b>Controlling entity</b>	<b>Country</b>	<b>Controlled Share of Total world production</b>	
		(Mt)	(%)
1 Cia Vale do Rio Doce	Brazil	163.6e	14.5
2 Rio Tinto plc	UK	93.8	8.3
3 BHP Billiton Ltd	UK/Australia	80.8	7.3
4 State of India	India	38.6e	3.4
5 Mitsui & Co. Ltd	Japan	31.8e	2.8
6 Kumba Resources	South Africa	28.6	2.5
7 Metalloinvest	Russia	27.7	2.5
8 State of Ukraine	Ukraine	20.5	1.8
9 State of Sweden	Sweden	20.3	1.8
10 Lebedinsky GOK	Russia	18.4	1.6
11 State of Venezuela	Venezuela	16.5	1.5
12 USX Corp.	US	16.4	1.5
13 State of China	China	14.9	1.3
14 Cleveland-Cliffs Inc.	US	14.4	1.3
15 Sokolovsky-Sarbaisky GPO	Kazakhstan	13.1	1.2
Total, 15 largest		599	53.3
Total, World		1,128	

**Notes:**

State of India includes SAIL, NMDC, Kudremukh and some smaller producers.

Metalloinvest controls Michailovsk and Stoilensk GOK

State of Ukraine includes Ukrudprom.

State of Sweden includes LKAB.

State of Venezuela includes CVG Ferrominera Orinoco.

State of China includes Anshan Iron & Steel only.

Source: Raw Materials Data, Stockholm 2003.