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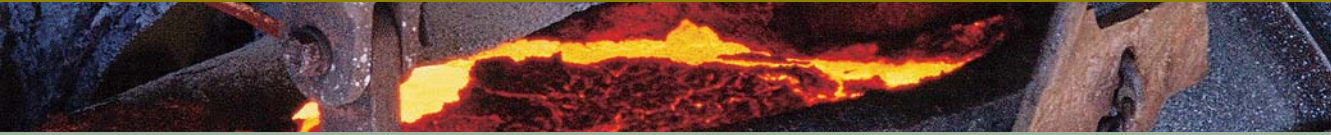
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iron and steel in India

prospects for the sector and implications for Australia

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- > *India exhibits many characteristics of a nation poised for strong growth in its iron and steel sector – a large population, strong economic growth, low current rates of steel consumption, and growing economic integration with the global economy.*
- > *Potential impediments to realising growth in the iron and steel sector include mining regulation and approval processes, insufficient infrastructure, and restrictive trade policy.*
- > *Indian steel production is estimated by ABARE to reach over 70 million tonnes by 2011, with longer term production targets set by the Indian Government for 2020 appearing attainable.*

introduction

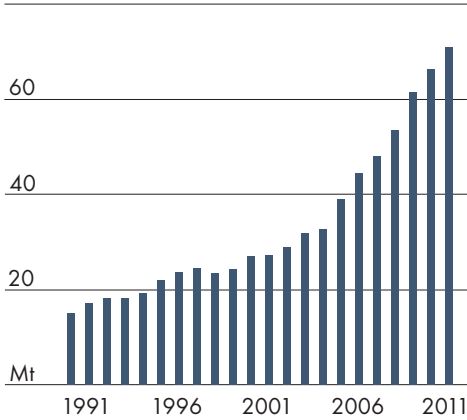
China's continuing industrialisation phase has resulted in strong demand for raw materials and has raised the prospect of India following in China's path and significantly increasing its demand for raw materials. The drivers of stronger demand for raw materials are similar as both countries have large populations, strong rates of economic growth, relatively low rates of materials use per person compared with developed countries, and increasing integration into the world economy. However, realising India's potential will require further institutional and regulatory reform, infrastructure development and trade liberalisation.

the iron and steel industry in India

Until 1990 the Indian iron and steel industry operated in a protected environment, with steel production capacity largely reserved for public sector consumption. The Indian Government regulated production and determined prices largely to secure steel supply, but also to support the government company Steel Authority for India Limited (SAIL). At that time the privately owned Tata Steel (also known as TISCO) was SAIL's only significant competitor.

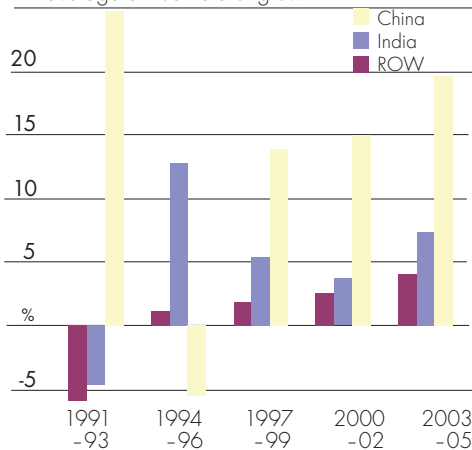
The development of India's iron and steel industry has occurred under the government's ongoing economic reform program that commenced in the early 1990s. The program includes spending cuts, deregulation, selected privatisation, and modernisation of government owned enterprises (OECD 2006b). Subsequent deregulation of the steel sector, coupled with increased liberalisation and reform of the Indian economy, has resulted

A Indian crude steel production



B growth in steel consumption

average annual rate of growth



in more market driven steel consumption and production.

Industry reform has led to increased private investment that has introduced many large integrated steel producers to compete with the existing government controlled SAIL, and private player Tata Steel. In addition to SAIL and Tata Steel, the bulk of India's steel production capacity is now supplied by Jindal Vijayanagar Steel Limited (JVSL), Rashtriya Ispat Nigam Limited (RINL), Ispat Industries, and Essar Steel. These six major producers have backward integration, production capacities in excess of 1 million tonnes and, in 2005, accounted for over 75 per cent of India's steel production.

India's steel production capacity has risen from 23 million tonnes in 1990 to around 45 million tonnes in 2005, with capacity utilisation rising from 65 per cent to 85 per cent over the period. Recent high rates of capacity utilisation reflect strong growth in domestic and global demand for steel, which is expected to continue in the short term. ABARE estimates that Indian steel production will increase at an annualised rate of around 10 per cent to over 70 million tonnes by 2011 (figure A).

steel consumption per person low

Steel consumption in India is linked primarily to manufacturing, housing and infrastructure. Steel consumption has increased by over 90 per cent since 1990, at an average growth rate of 4.4 per cent a year – a rate second only to that in China – as the Indian steel industry has become more market driven (figure B). Despite recent strong growth in steel consumption, at 38 kilograms of crude steel per person in 2005, consumption in India is still very low by world

standards. Steel consumption in China, which is still considered to be an industrialising economy, was 270 kilograms per person in 2005. Rates are even higher in some other Asian nations (Japan 644 kilograms; Republic of Korea 959 kilograms; Chinese Taipei 1129 kilograms). India has strong potential for greatly increased consumption rates as the process of industrialisation accelerates and India's urban population continues to swell.

national steel policy 2005

The 2005 National Steel Policy (Government of India 2005) sets out the Indian Government's vision for the future of the steel industry. The central goal is the creation of an industry with 110 million tonnes of capacity and 100 million tonnes of production by 2019-20 – implying an average growth in production of nearly 7 per cent a year. The Indian Ministry

of Steel estimates that achieving this goal will require an extra A\$65 billion in capital expenditure in addition to funds for technology upgrades at existing facilities.

The national policy seeks to facilitate the creation of additional capacity, removal of procedural and policy bottlenecks that affect the availability of production inputs, increased investment in research and development, and the creation of road, railway, and port infrastructure. The policy focuses on the domestic sector but also envisages a steel industry growing faster than domestic consumption, which will enable export opportunities to be realised.

current steel investment plans

India's ready availability of iron ore and low cost labor contribute significantly to the cost competitiveness of producing steel in India. Notably, Tata Steel, the second largest steel producer in India, has been (with Posco) the world's lowest cost steel producer since 2001 (OECD 2006a). These advantages underpin major global producer, Posco Steel's current investment plans in India, while Mittal Steel, Nippon Steel and Sterlite Industries are actively considering investment. As at September 2005, there were 349 steel projects under consideration in India, with a net value of US\$243 billion. Existing proposals for green and brownfield expansions that could, in aggregate, potentially lift crude steel capacity in India to 100 million tonnes by 2012 are detailed in table 1.

A comparative advantage for India's iron and steel industry is the ready domestic availability of significant reserves of high quality iron ore (a key raw material input to steel making), predominantly in the east of India.

Although current steel production capacity is located in both the east (flat products from large producers near iron ore supplies) and in the west (long products from smaller producers nearer large construction centres), most significant forthcoming developments are planned in the east to take advantage of low cost iron ore supply.

Of particular interest to investors in the Indian iron and steel industry is the state of Orissa, where abundant natural resources and a large coastline make it an attractive target. It contains 25 per cent of India's iron ore reserves and 20 per cent of India's coal reserves. Consequently, Orissa is receiving an unprecedented inflow of investment in the

box 1: HIs melt process – potential for India

HIs melt is a direct iron making technology developed with the support of the Australian Government by a Rio Tinto led joint venture. HIs melt steel is made by injecting iron ore fines and noncoking coal directly into a molten metal bath to create high quality pig iron.

The technology is potentially of great benefit to India as quality iron can be made using low priced, low quality metallurgical coal. HIs melt uses much of the same equipment as a blast furnace so existing facilities can be easily upgraded.

The process reduces operating costs and is also capable of reducing greenhouse gas emissions from traditional iron and steel making by between 20 and 50 per cent with zero dioxins or furan emissions.

HIs melt technology is a competing technology to the FINEX process under development by a Posco joint venture. Posco's COREX technology is comparable but can only be used with iron ore pellets or lumps. Midrex's iron ore reduction technology is also similar but has the disadvantage from India's perspective of using gas instead of coal.

India's steel firms have shown a strong interest in licensing the HIs melt technology.

proposed steel capacity expansions in India

	2004-05	2011-12	status
	Mt	Mt	
company			
TISCO (Jamshedpur)	4.0	7.4	Expansion: 1 million tonnes under construction; 2.4 million tonnes second stage to be completed by 2009
TISCO (Orissa)	-	6.0	Greenfield: land has been acquired, construction to commence shortly, iron ore not yet allocated by Orissa Government as 20 per cent of equipment orders must be completed first
TISCO (Jharkhand)	-	3.0	Greenfield: planned total capacity is 12 million tonnes; Memorandum of Understanding has been signed with state government
SAIL (incl. IISCO)	12.8	20.7	Planned capacity expansions at all four integrated steel mills: Bhilai, Durgapur, Rourkela and Bokaroc
Others	9.4	51.4	Companies considering expanding Indian operations include RINL, Essar, JVSL, Ispat, Mittal, Bhushan, Murugappa and Posco, with many developments planned in the state of Orissa

iron and steel and electricity generation sectors, as well as significant funds to develop port infrastructure at Paradip, Dhamra and Gopalpur.

The accompanying case study on Posco’s investment in Orissa (box 2) highlights a number of regulatory and institutional issues relevant to the development of the iron and steel industry in India.

institutional and policy settings

Many government initiatives have been aimed at increasing investment in the steel industry in India, with the following issues being prominent in this context.

allowing private ownership and foreign investment

Revised foreign investment rules for steel and other high priority industries have increased capital inflow, and ownership of crude steel operations is now split approximately evenly between private and public entities.

Although profitable publicly owned companies (which include RINL and SAIL) appear unlikely to be privatised for political reasons (Gupta 2005), the Indian Government has sought to improve their performance by granting some of them ‘Navratna’ status, which affords them greater autonomy in investment, joint venture and commercial decisions.

improving intellectual property laws

The compulsory licensing regime, which still applies to some sectors, enables the Indian Government to force the granting of a technology licence if it deems that a patent has not provided a sufficient public benefit at a reasonable price. Its removal from the steel sector has provided greater security in intellectual property ownership and will facilitate the transfer of intellectual property to India and the development of indigenous technology solutions.

box 2: Posco investment in Orissa

The largest ever foreign investment proposal for India is a US\$12 billion steel plant in the state of Orissa that looks set to proceed. Development of the proposal has highlighted issues faced by foreign investors in India's steel sector and the role of government support in addressing these issues.

In August 2004 Posco, a company based in the Republic of Korea, and BHP Billiton approached the Orissa state government with a proposal to construct a 12 million tonne annual capacity steel plant in the state. The initial approach was made before any specific iron ore resource was identified and reserved for the project. The state government accepted the proposal and agreed to sign a Memorandum of Understanding (MOU) by December 2004 but this event was delayed for reasons that are unclear.

In April 2005 the Orissa state government, which has substantial regulatory powers and can act independently of the Indian Government, agreed to identify iron ore resources for the Posco proposal. Posco wanted access to 1 billion tonnes of iron ore over fifty years. However, the Orissa state government's investment rules specify that a 12 million tonne steel plant can access a maximum 480 million tonnes of iron ore over a mandated maximum mining lease term of 25 years.

The Orissa state government then rejected a Posco proposal to export a proportion of the identified iron ore resource and replace it with low alumina ore from Brazil for blending purposes. Posco responded by refusing to sign an anticipated MOU on the basis that export of iron ore was essential to the project because of the high alumina content of the identified iron ore reserve. Local steel makers have overcome this characteristic of Orissa's iron ore by charging quartzite in blast furnaces; however, this method reduces productivity.

In mid-2005 the joint venture between Posco and BHP Billiton was dissolved (reportedly at the request of the state government so that a local firm could enter into partnership with Posco). Posco then agreed to set up the steel plant without exporting iron ore, and curtailed its request for iron ore reserves to 600 million tonnes as suggested by the Orissa state government. The government indicated that it may allow export of a small amount of iron ore so that ore could be imported for blending purposes, and in June 2005 signed an MOU that allowed export of 30 per cent of the identified iron ore.

The lack of quality infrastructure in Orissa underlies Posco's proposal to construct significant infrastructure for this project, including a US\$200 million world class port at Jagatdhari, a four lane highway, an exclusive railway line, a water treatment plant and a township.

Allied to this, the Orissa state government requested that the Indian Government create a 'special economic zone' in which to site the Posco plant. This has subsequently been approved on the coast of Orissa from Paradip to Gopalpur. This aspect of the project, together with the proposal to export high alumina iron ore and import low alumina iron ore, generated significant political opposition based on the perception that exporting iron ore and setting up a special economic zone as opposed to domestic processing was against Orissa's interests.

The Posco project involves compulsory land acquisition and compensation for estimated 4000 displaced families that, in some cases, lack land title documentation. An incident in January 2006 in which police opened fire and killed twelve people demonstrating against the acquisition of their land for the Posco plant highlights the sensitivity of such issues (Kumarjha 2006). After the incident, Posco reduced its request for land to 4000 acres from 5000 acres in order to minimise the number of people displaced.

At the time of going to print, construction of stage 1 (3 million tonnes annual capacity) was expected to commence in January 2007.

deregulation of pricing and distribution of iron and steel

Steel was the first major industry to have pricing and distribution controls removed. Before these controls were removed, prices did not necessarily reflect production costs or product quality and regulation of product distribution prevented the industry from implementing efficient logistics.

customs policy

The government has significantly reduced the duty payable on inputs to steel production, on capital equipment and on finished steel products and has streamlined the associated approvals processes.

The government administers schemes covering duties, licences and taxes to support firms that export steel, although some (for example, the Duty Entitlement Passbook Scheme and Duty Free Replenishment Certificate) have the net effect of remitting duty in excess of what was levied on the inputs to the production of the export goods (OECD 2006d) and are potentially subject to challenge in trade forums.

special economic zones

The government introduced 'special economic zones' in June 2005, with the aim of creating internationally competitive regions in which exporting businesses can base their operations. Eight of these zones are functional or under construction and approval has been given for an additional eighteen zones. Previously existing 'export processing zones' have been converted to special economic zones.

Steel plants operating in special economic zones are not subject to restrictive normal laws for the purpose of export operations and also receive some additional advantages including tax holidays, freedom to source inputs domestically or externally without any specific approval or duty payable, and sales tax reimbursement on domestic purchases. However, the proposed new economic zones will be relatively small, which may limit their effectiveness given that economies of scale are one of the key advantages of such zones (Press Trust of India 2006).

special investment regions

The government has recently announced plans to set up 'special economic and investment regions' in six states, modeled on similar regions established in China (Pudong), the United States (Houston), and the Netherlands (Rotterdam). The regions are planned to support further downstream processing, such as steel production, and encompass a number of special economic zones, with central and state governments providing world class infrastructure linkages to form a larger industrial region. This policy is at an early stage of development, but the key difference between special economic and investment regions and special economic zones appears to be that linking infrastructure will be built by the government in the former but is generally the responsibility of industry in the latter.

impediments to expansion

Steel production targets set in the National Steel Policy by the Indian Government recognise that success will depend on addressing a number of impediments. While India ranks 116th of 155 countries in the World Bank's ease of doing business index, such a rating conceals major differences between individual states within India and the extent of government support at all levels to facilitate investment in the steel sector. Further, many impedi-

ments to business present in the wider economy will not be so significant in the special economic zones and special economic and investment regions where a large proportion of planned new steel capacity will be sited.

infrastructure

The state of infrastructure in India is a significant consideration for investors in the steel sector. A number of studies, including one released by Morgan Stanley in 2005 (Ahya and Sheth 2005), concluded that the low level of spending on infrastructure, compared with other emerging economies, is the major macroeconomic constraint on the Indian economy. Morgan Stanley note that China spent 10.6 per cent of gross domestic product, equal to US\$150 billion, on infrastructure in 2003 compared with India's 3.5 per cent or US\$21 billion. Notably, India, in contrast to China, has low rates of domestic savings, which is a factor in limiting capital formation and domestic investment.

For new steel projects, infrastructure costs can be significant, as in the case of Posco's steel plant development in Orissa. Infrastructure development requires the transport of raw materials for steel production. Every tonne of steel produced requires 4 tonnes of raw material to be transported. Hence, achieving the goal of 75 million tonnes of additional capacity by 2019-20 will require the movement of an additional 300 million tonnes of raw material. On this basis, the Indian Government estimates that rail and road capacity will need to approximately triple and port capacity double by 2019-20 to meet demand for steel and raw material movements (Government of India 2005).

An analysis by McKinsey Quarterly (Bhargava, Gupta and Khan 2005) showed that Australia, Brazil and South Africa can deliver iron ore to China at a lower price than India, with Australia's fob delivery price less than half India's. A major factor in India's competitive disadvantage is high transport costs stemming from a lack of infrastructure, but mining costs are also high. However, this is somewhat offset by the closeness of India's raw materials to its ports and steelworks relative to other steel producing countries (De Bassompierre and Arendse 2006a,b).

The major investments required in infrastructure are expected to be a significant driver of steel consumption in the domestic market as infrastructure and construction combined account for 80 per cent of India's steel consumption (Gokarn, Sen and Vaidya 2004). Additional infrastructure will also provide indirect benefits to other sectors in the economy.

roads

The capacity and quality of Indian roads are also a constraint to economic development, with highways making up 2 per cent of roads but accounting for 40 per cent of freight movement in 2004. In addition, some 50 per cent of India's 600 000 villages are unconnected by all-weather roads (OECD 2006c; Economist Intelligence Unit 2005a).

Freight movements are further delayed by onerous transport regulations, which include restrictions in the hours of the day that heavy vehicles can operate, interstate border crossing closures and lengthy transborder crossing procedures, frequent tolls and inspections, and road closures at night due to the risk of attacks by insurgents or bandits (Long 2006).

In an effort to improve transport efficiency the government has announced a road building program known as the National Highways Development Project (Government of India 2002). Stage one is nearing completion and involves the construction of a highway, called the Golden Quadrilateral, connecting Delhi, Mumbai, Kolkata and Chennai at a cost of US\$12 billion. This is part of a wider plan to improve roads nationwide at a cost of over US\$30 billion shared between government and the private sector (Puliyenthuruthel 2005).

rail

The government owned and operated rail network is the third largest in the world after the Russian Federation and China and the biggest in the world in terms of passenger kilometres. However, cross subsidisation of passenger transport by freight transport has meant that steel freight and freight in general has moved away from rail to roads: 35 per cent of processed or final steel products were transported by rail in 2001-02, down from 72 per cent in 1991-92 (OECD 2006c; Economist Intelligence Unit 2005a).

The government has signalled its intention to improve the freight performance of the railways in its current five year plan, although the passenger cross subsidisation policy – which is aimed at assisting the poor – is likely to remain.

shipping

The efficiency of Indian ports is affected by shallow draught, low productivity, high costs, long vessel turnaround times, poor governance, and lengthy customs delays. Shipping costs are consequently high – a shipment from India to the United States can cost 20 per cent more than from Thailand and 35 per cent more than from China (OECD 2006c; Economist Intelligence Unit 2005a).

Expanding India's steel sector depends on lower port costs for handling key inputs such as coking coal which is predominantly imported, as well as servicing potential steel exports as envisaged under the National Steel Policy. The Indian Government has in place several initiatives to encourage private sector participation in ports, while recognising that modernisation of Indian ports is a long term project.

Some steel operations are, however, of sufficient size to overcome these impediments by investing in their own facilities. An example is Posco's plant in Orissa, which will include a US\$200 million new world class port at Jagadhari with berths up to 250 000 tonnes.

power generation

The electricity supply system is characterised by frequent outages and high voltage fluctuations despite half of all households not being connected to the grid. Average electricity consumption per person is 526 kilowatt hours a year, which compares with 1247 kilowatt hours in China (OECD 2006a; Economist Intelligence Unit 2005b).

The Ministry of Steel estimates that achieving the goals set out in its 2019-20 Steel Policy will require an additional 7000 megawatts of generation capacity. This compares to a nationwide capacity of 131 400 megawatts in 2003-04 and an overall target of an additional 100 000 megawatts of capacity within seven years so that all households can be connected to the grid.

However, the government has limited funds for the construction of power capacity and there are a number of risks for potential investors where political considerations have constrained reform. These include cross subsidisation by industry users of some consumer classes whose payments do not meet costs, as well as over 25 per cent of power being stolen or lost in distribution. These factors combine to limit overall electricity tariffs to 75 per cent of supply costs, which are estimated at twice those of the United States, and 60 per cent greater than in the Republic of Korea and Thailand (Economist Intelligence Unit 2005b).

The mismatch between costs and tariffs has bankrupted many of the government controlled state electricity boards and consequently restricted their ability to add capacity. A case in point is the defaulting on payment by the state electricity board that emerged in the case of the US\$2.9 billion Dabhol power plant, which was India's largest ever foreign direct investment project.

While the Indian Government has sought to reform the electricity market for some time and recently offered to guarantee over US\$5 billion of the state electricity boards' debts, investor perceptions are that if payment is not assured, these efforts are likely to meet with limited success and capacity will continue to be constrained (Saraf 2006). However, to the extent that capacity is added, it will be a significant driver of steel demand as machinery and equipment accounts for 13 per cent of total demand for steel in India (OECD 2006a).

mine policy

Mine policy in India is subject to significant market intervention and distortion. Government controlled mines account for 75 per cent of total mine production by value. However, since the reform process began in 1991, 90 per cent of recent mining leases have been awarded to the private sector (PricewaterhouseCoopers 2006).

SAIL and Tata Steel, the largest and second largest of India's steel producers, have been granted exclusive access to specified iron ore resources, which serves to subsidise their operations. These 'captive' mines ensure access to low priced iron ore and insulate integrated steel producers from global price movements. In December 2005, SAIL's iron ore production costs were approximately equal to 15 per cent of the market price (Mukherjee 2005). However, captive mining distorts the market by increasing costs for new entrants and is opposed by India's mining sector and the nonintegrated steel producers.

Although India is a major iron ore exporter, there are opposing political views on the exporting of iron ore versus undertaking value adding processing within India. The value adding policy is advocated by the Ministry of Steel and opposed by the Ministry for Mines.

The iron ore rich states restrict access to iron ore mines until construction of an associated steel plant is well under way. This policy is intended to increase the ratio of actual developments to investment proposals. Once mining rights are granted, access to the mine may further be prescribed by the state government according to the capacity of the steel plant.

An example of the application of these policies is Tata Steel's expansion plans. The Tata Iron and Steel Company (TISCO) is adding 23 million tonnes of capacity in three steel plants: 6 million tonnes in Orissa, 5 million tonnes in Chattisgarh and 12 million tonnes in Jharkhand. The Memorandum of Understanding that Tata signed with the Orissa state government states that 20 per cent of plant equipment orders must be placed before lease applications will be processed. In granting access to iron ore, Orissa's government also specified a total reserve based on 1.6 tonnes of iron ore for every tonne of steel production capacity, and that all iron ore must be consumed by steel producers within the state.

Such policies hinder specialist mining companies in developing India's mineral resources. For example, Rio Tinto approached the Orissa state government in the 1990s with a proposal to develop the Gandhamardan and Malangtoli iron ore mines and export most of the product. Rio Tinto formed a joint venture with the government owned Orissa Mining Corporation in 1995 to pursue the 15 million tonnes a year development. The joint venture broke up in 2002, and Rio Tinto was advised by the Orissa state government in 2005 that the development would only proceed if the iron ore was exclusively sold into the domestic market.

mine policy review

A company seeking regulatory approval for a mine in India can expect to wait three to seven years if no special facilitation effort is made – this compares with around eighteen months for approvals in Australia. The largest steel maker in India, SAIL, has not been able to obtain a new mining lease for fifteen years. Such lengthy delays increase costs and reduce investor confidence and certainty (Gupta 2005).

In June 2006 the Indian Government announced plans to review its mining laws to reduce permitting delays and increase output. As part of the review the government is considering whether the captive mining policy should be maintained for new mining operations, and whether the preference given in some states to value adding over exports should continue (Kumarjha 2006).

employment laws

The most significant employment law for steel manufacturers in India is the mandated employment of displaced persons policy and chapter 5B of the 1947 *Industrial Disputes Act*.

Steel plants require relatively large amounts of land – hence, the establishment of new steel plants in India usually entails the displacement of many people.

The iron ore rich state of Orissa requires the employment of one person from each family displaced by a new project. Such policies can have a major influence on the employee profile of steel firms and the effect can be seen in the workforce of RINL, a third of which is employed as compensation for displacement.

Chapter 5B of the 1947 *Industrial Disputes Act* also places a major restriction on the ability of employers to adjust to downturns in demand. Under the law, firms with more than 100 employees must seek the permission of the state government before terminating any employment contracts.

These policies deter employers from taking on additional staff, encourage an inefficient mix of capital and labor, and force companies to hire staff that may not be suited to their operations.

implications for Australia

Australia is a major exporter of iron ore and metallurgical coal, the key inputs in iron and steel production. Forecast strong growth in steel production in India in the medium and longer term is expected to affect Australia's trading relationship with India and India's trading partners in these commodities.

iron ore

India exported 81 million tonnes of iron ore in 2005 (56 per cent of production) and was second only to Australia in supplying 69 million tonnes to steel mills in China. Given that China is expected to be the significant driver of demand for iron ore in the short and medium term, India's ability to supply this market will have direct implications for Australian iron ore exporters.

The extent to which Indian iron ore producers remain substantial suppliers to the Chinese market depends on four key factors. First, the ability of Indian iron ore producers to expand operations to increase access to India's iron ore reserves. Second, the rate of growth of domestic consumption of iron ore for use in steel production. Third, the degree to which regulation of India's iron and steel industries and underinvestment in infrastructure limit

export growth. Finally, the continued willingness of Chinese steel mills to import relatively high cost iron ore from India.

The availability of iron ore for export will depend on the pace of development of India's steel industry, which will be influenced by many factors. While acknowledging these uncertainties, ABARE projects that iron ore consumption in India will rise to almost 140 million tonnes by 2011.

The Indian Government has been mindful to secure sources of iron ore for future domestic iron and steel production but the current export restrictions on grades and quantities of iron ore leaving India are expected to ease further as the benefits from deregulation – such as increased foreign investment – are realised.

As the Chinese steel industry continues the process of consolidation, it is expected that newly formed large steel producers will have a preference for securing long term supply and avoiding possible costly fluctuations in spot market trading. Conversely, small Chinese steel mills that currently exclusively use the spot market for importing iron ore are expected to become unprofitable and cease operations as Chinese government policy forces them to compete with larger, more economic steel producers.

Indian iron ore producers are currently heavily involved in trade on the spot market – primarily because the Indian iron ore industry is considerably more fragmented than either the Australian or Brazilian industries. The iron ore spot market is favored by the relatively small scale Indian iron ore producers for two reasons. First, limited production capacity means Indian iron ore producers are unable to consistently deliver large volumes to the larger Chinese steel producers. Second, the spot market offers a premium over the contract market, reflecting its flexibility for buyers and higher payment risk for producers.

The comparatively fragmented nature of China's steel industry has supported imports of Indian iron ore, despite the cost of the ore being above that sourced from Brazil or Australia. Given that the Chinese steel industry is likely to remain comparatively fragmented into the medium term, and the inability or unwillingness of alternative iron ore suppliers to substitute their iron ore for Indian exported iron ore, demand from China for Indian iron ore is expected to remain strong in the medium term.

Despite infrastructure impediments in India's mining industry, and other factors discussed above, India's iron ore producers are projected to be able to increase iron ore production at rates only marginally less than those in Australia and Brazil. ABARE projects that iron ore production in India will grow at an average rate of over 7 per cent a year from 2005 to reach around 220 million tonnes by 2011. However, if India's government removes or significantly reduces the impediments to greenfield iron ore expansions, future iron ore production in India could grow more rapidly.

ABARE forecasts that Indian iron ore exports will grow to 91 million tonnes in 2006 and to 94 million tonnes in 2007. However, from 2008, iron ore exports are projected to stall and subsequently decrease as a result of a combination of the factors outlined above.

The implications of this analysis for Australian iron ore exports are generally supportive. Given that India's ability to supply China (and the rest of the world) with increasing quantities of iron ore is limited by the conditions discussed above, the scope for Australian iron ore exports to increase are substantially improved. Existing Australian exporters will continue to secure contracts for large volumes of iron ore into China as larger Chinese steel mills display a preference for reliable, inexpensive sources of iron. While there is upside potential to India's future iron ore exports arising from improved competitiveness, this is only expected to lead to marginal reductions for Australia's iron ore exports (table 2).

The outlook for the continued development of the iron ore industry in Australia is also positive. Chinese steel mills are exploring backward integration strategies to secure long

2 Australian iron ore exports

	2004	2005	2006	2007	2008	2009	2010	2011
	Mt	Mt	Mt	Mt	Mt	Mt	Mt	Mt
China	80.1	117.5	126.8	163.5	189.8	219.5	244.7	270.6
Japan	80.3	76.2	78.8	82.1	84.9	88.2	90.9	94.3
Korea, Rep. of	26.5	25.0	25.6	26.7	27.6	28.8	29.8	30.9
Chinese Taipei	9.1	9.1	9.8	10.2	10.6	10.9	10.9	10.9
European Union 25	12.3	10.8	10.1	10.3	10.1	9.9	9.9	10.0
Total	209.8	239.3	254.8	294.0	331.1	366.5	400.3	429.1

term sources of iron. Given the impediments to foreign investment and greenfield mine development in India detailed above, Australia is viewed favorably as an investment alternative. Talks are currently under way between junior Australian iron ore miners and Chinese steel producers seeking equity partnerships in Australian iron ore developments in return for a captive iron ore supply in the medium term.

metallurgical coal

Strong growth in India's production of iron in blast furnaces will underpin strong growth in metallurgical coal consumption over the medium term (figure C).

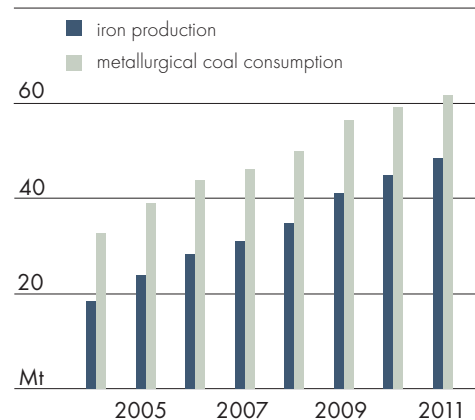
The National Steel Policy of 2005 aims to limit the steel industry's reliance on imported sources of metallurgical coal by efficiently using existing domestic sources while developing further domestic coal reserves. Domestic coal mines have been allocated to a steel plant to ensure partially secure supply, and a mechanism has been established to share excess coal between steel plants. The policy promotes development of new technologies that use lower grades of coal to limit dependence on metallurgical coal imports and promotes foreign equity participation and joint ventures to improve the rate of development of new metallurgical coal sources.

Despite these policy aims, imports are expected to supply the majority of increased metallurgical coal requirements as many Indian reserves remain undeveloped, and current

reserves are predominantly (over 97 per cent) lower grade coal, implying a continued reliance on imports for higher grade coking coals. In 2005, India imported almost 18 million tonnes – 46 per cent of the 39 million tonnes consumed. ABARE projects that, by 2011, metallurgical coal consumption in India will rise to almost 62 million tonnes – of which 18 million tonnes is expected to be sourced domestically. This means an increased reliance on imports, with 72 per cent of India's coal consumption being imported.

Australia, as a major metallurgical coal exporter contributing over 62 per cent to world metallurgical coal trade in 2005, is well placed to meet India's requirements for metallurgical coal imports. Since 2000 Australia has supplied Indian metallurgical coal consumers with over 95 per cent of their requirements. Australia also has a significant geographic advan-

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tage over its major competitors in world metallurgical coal trade – the United States and Canada – in supplying India with metallurgical coal. Australian exporters are expected to continue to supply similar proportions of India's requirements in the medium term. ABARE projects that total Australian exports will increase to almost 169 million tonnes of the 248 million tonnes projected to be globally traded in 2011.

A possible downside risk in the medium term to the continued dominance of Australian exporters supplying Indian consumers is the potential development of the Tuhub and Maruwai metallurgical coal mines in the central and eastern Kalimantan regions of Indonesia that could feasibly produce approximately 10 million tonnes of good quality metallurgical coal from 2010. However, these potential exports are only a marginal threat to Australian exports owing to the lack of existing infrastructure to support these developments and the existing trading relationship of Australian producers with India.

conclusion

Despite numerous issues that need to be addressed, India's steel sector is expected to show solid growth in the medium to long term. The country's very low steel use per person and increased economic growth arising from the ongoing economic reforms since 1991 will combine to produce much increased demand for steel. With a young and growing population, changes in India's demographics in the medium to long term are expected to lead to higher overall consumption (KPMG 2006), with a consequent rise in consumption of steel intensive items.

The overall lack of quality infrastructure will add to the cost of steel production, though in many circumstances steel firms will construct dedicated facilities for their plants. Additions to rail, power, road and port infrastructure will be major drivers of steel demand.

On the supply side, relatively supportive governments, increasing foreign investment, extensive iron ore supplies, low production costs relative to China, and the potential for the country to act as a hedge to investment in China, mean that the target of 110 million tonnes of productive capacity for 2019-20 set by the Ministry of Steel is likely to be achieved, and may be exceeded.

However, relative to many other countries, investing in India's steel sector will require continuing efforts to address the impediments outlined. The current number of steel investment plans indicates optimism over the future of the industry, albeit with the risk of overcapacity in the event of an economic downturn. Nevertheless, indicators are that India can progress to become a major producer of steel in the longer term.

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