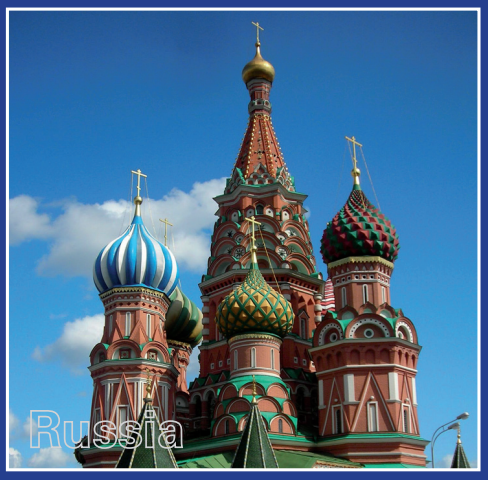

Mineral Information and Statistics for the BRIC countries

1999–2008

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

British Geological Survey

Mineral Information and Statistics for the BRIC countries 1999–2008

Authors: P E J Pitfield, T J Brown and N E Idoine

With the assistance of: L Noakes, I A Longhurst and A Hill
Additional statistics compiled by: T Bide and L Hetherington

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Keyworth, Nottingham NG12 5GG
0115 936 3100

Murchison House, West Mains Road, Edinburgh EH9 3LA
0131 667 1000

BGS London, Natural History Museum, Cromwell Road, London SW7 5BD
☎ 020 7589 4090 Fax 020 7584 8270
☎ 020 7942 5344/45 e-mail: bgslondon@bgs.ac.uk

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All communications regarding the content of this publication should be addressed to the Head of Science, Minerals and Waste, British Geological Survey, Keyworth, Nottingham NG12 5GG ☎ 0115 936 3495 Fax 0115 936 3446 E-mail minerals@bgs.ac.uk

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Foreword

The term 'BRIC', used to refer to the four countries of Brazil, Russia, India and China (Figure 1), has become almost synonymous with the rise of emerging economies in the global market. It originated with Mr Jim O'Neil, Chief Economist of Goldman Sachs, in 2001 when he was looking to convey the increasing importance of globalisation and to express the belief that the non-western world would become increasingly important to the global economy compared to the 'established order' dominated by the USA, Europe and Japan. At the time he predicted that the economies of the BRIC countries would overtake the six largest western economies by 2041. This prediction has since been revised, first to 2039 and then to 2032. Although many critics still consider it to be no more than 'marketing hype', the 'BRIC' tag has subsequently been widely used in relation to the rapid growth of emerging economies.

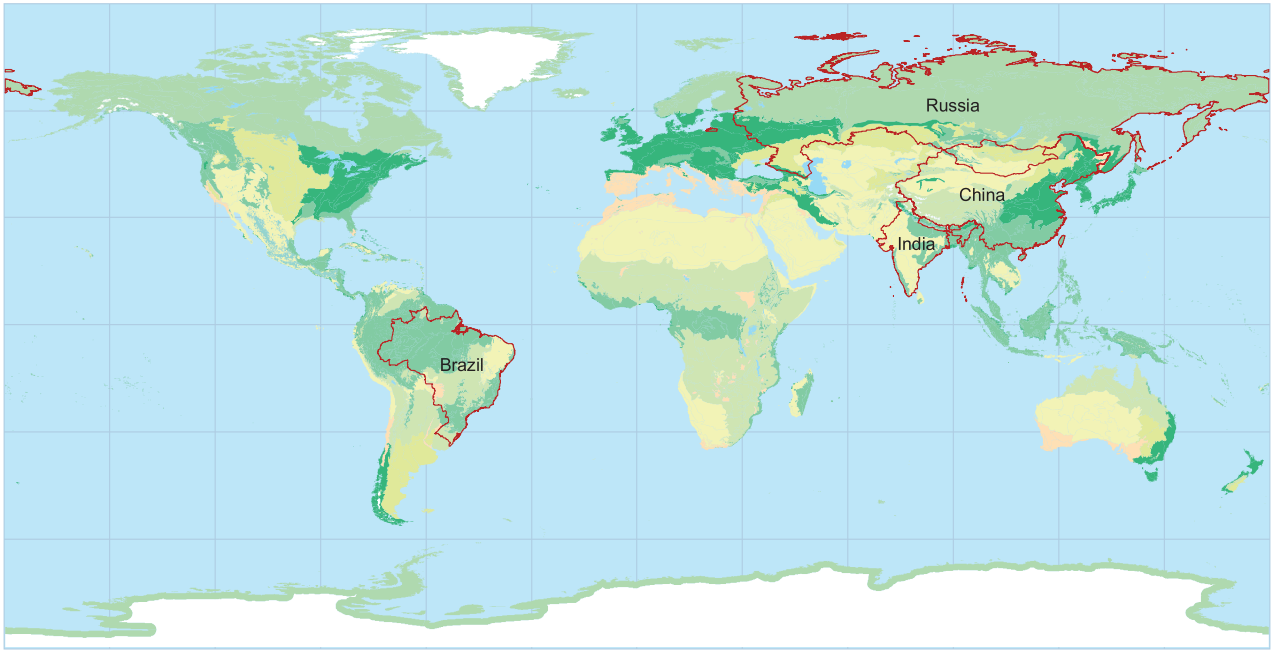

Figure 1 The location of the BRIC countries.

In recent years the four BRIC countries have begun to appreciate the potential value of working together in their areas of common interest in order to gain greater influence in the world. The four heads of state met in Russia in 2009 and have recently met again in Brazil to discuss ways in which they could collaborate for their mutual benefit.

The economic growth of these four countries has been remarkable for the past decade, contributing 50 per cent of the total global growth between 2000 and 2008. They have also coped better with the global economic crisis than many more developed economies. China and India saw the growth in their gross domestic product (GDP) slow only slightly, while Brazil's economy stagnated but did not shrink. Only Russia amongst the four countries experienced a 'recession', but even here growth is expected to return more strongly than for most western nations.

A significant proportion of the growth in the BRIC economies has been driven by trade, which has created some concern around the world relating to the increasingly large trade imbalances between them and more developed nations. This trade includes large quantities of minerals and mineral-based products. Exports of minerals and mineral-based products in 2008 amounted to 79 per cent, by value, of all exports from Russia (chiefly oil and gas), 41 per cent from India, 30 per cent from Brazil and 10 per cent from China. The latter probably hides the fact that many minerals are processed or manufactured into other products within China and it is the finished goods that are exported.

The European Union (EU) is an important market for exports from the BRIC countries, particularly for Russia where the EU's 27 member states take 57 per cent of all Russia's exports, by value. The EU is also important for Brazil (23 per cent of exports), India (22 per cent of exports) and China (21 per cent of exports). By comparison the USA received only three per cent of Russia's exports, 14 per cent of Brazil's, 12 per cent of India's and 18 per cent of China's exports, by value.

From a European perspective, the BRIC countries are equally important, being the source of origin for 31 per cent, by value, of all imports to the EU. Of this 16 per cent were from China, 11 per cent from Russia and two per cent each from Brazil and India. If the trade in minerals or minerals-based products are specifically considered, the BRIC countries are the source of origin for 28 per cent of imports of these materials to the EU of which 23 per cent is from Russia, with one per cent from India and two per cent each from Brazil and China.

Given that the EU is import-dependent for a major proportion of its supplies of many mineral commodities, the importance of these imports should not be under-estimated. Within the EU there is no mine production, for example, of antimony, cobalt, iodine, molybdenum or zirconium and consequently the EU is 100 per cent import-dependent for supplies of these commodities. Furthermore, the EU produces less than 25 per cent of its requirement for several other minerals and metals including bauxite, graphite, iron ore, tin and phosphate rock. The BRIC countries make essential contributions to the EU supply of many of these materials. For example, Brazil provides 54 per cent of the EU's imports of iron ore and Russia provides 36 per cent of its imports of mined cobalt. China provides 63 per cent of the EU's imports of graphite and 28 per cent of its imports of antimony ores and concentrates.

In light of the current and likely increasing future importance of the BRIC economies, this report aims to present production and trade data for each of the four countries between 1999 and 2008 relating to the majority of economically important mineral commodities. It also provides some analysis of the 10 year trends and includes a synopsis of the main physiographic, geological and demographic features of each country. In addition, the extent and locations of the major reserves, producing districts and deposits are described, together with some indications of where expansions to these are expected in the near future.

The statistical data presented are derived from the BGS World Mineral Statistics Database which contains data on more than 70 mineral commodities, derived from numerous sources throughout the world and updated annually. The BGS holds a historical dataset that dates back to 1913 for many mineral commodities, enabling trends to be analysed over long time periods. The other information presented has been gathered from published reports, news articles and publically available websites (as indicated under 'Key information sources' for each country).

Further information relating to the BGS World Mineral Statistics work can be found on the website: www.mineralsUK.com

Contents

Explanatory Notes

The statistics in this publication are from the British Geological Survey's World Mineral Statistics database.

Coverage

The World Mineral Statistics database covers the majority of economically important mineral commodities. For each commodity constant efforts are made to ensure that as many producing countries as possible are reported. For some commodities, where statistics on production are not publicly available, estimates are made. Users of this compilation are advised that more statistical information than can be included in a publication of this nature is held in the British Geological Survey files and is available for consultation. Historical data (from 1913 for many commodities) can be obtained from the publication World Mineral Production and its pre-decessors entitled World Mineral Statistics and the Statistical Summary of the Mineral Industry many editions of which are available to download from the BGS website: www.mineralsUK.com.

Metals

Mine production of many metals is expressed in terms of metal content. This is clearly indicated in the tables, adjacent to the unit used. For aluminium, cobalt, copper, iron, lead, nickel, tin and zinc, mine production and metal production are shown in separate rows. Unless otherwise specified, metal production statistics relate to metal recovered from both domestic and imported materials, whether primary or secondary, but exclude remelted material.

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Acknowledgements

Compilation of this volume of mineral statistics has been possible only by obtaining information from a very large number of organisations throughout the world, chiefly home and overseas government departments and specialist national or international authorities concerned with particular sectors of the minerals or metals industries. To all these bodies the British Geological Survey expresses its grateful acknowledgement for the information made available, whether in published form or provided by direct correspondence.

Particular acknowledgement is made to the Mines Departments and other government agencies of many countries whose regular statements, yearbooks and other reports are worthy of direct consultations by readers in search of detail.

Specialist commodity organisations which have kindly allowed information to be reproduced include the International Copper Study Group, the International Lead and Zinc Study Group, the International Nickel Study Group and the International Fertilizer Industry Association Ltd. In a few instances, information on specific commodities has been obtained directly from company sources. The co-operation of other members of the International Consultative Group on Non-Ferrous Metal Statistics is also gratefully acknowledged.

Supplementary information is also obtained from publications dealing with a wider range of commodities such as Société de l'Industrie Minérale, Annuaire Statistique Mondial des Minerais et Métaux; Mining Journal, Mining Annual Review; World Bureau of Metal Statistics, World Metal Statistics and, Metallstatistik; publications of the Interstate Statistical Committee of the CIS, the United States Geological Survey, and UN agencies.

In addition, information may have been obtained from the websites of the following organisations, statistical offices and government departments: United Nations; International Iron and Steel Institute; Kimberley Process; World Nuclear Association; Organisation of the Petroleum Exporting Countries; South East Asia Iron and Steel Institute; Instituto Latinoamericano del Fierro y el Acero; Departamento Nacional De Producao Mineral, Brazil; Grupo Paranapanema, Brazil; Agencia Nacional do Petroleo, Brazil; Brazilian Aluminium Association, China Mining Association; Energy Information Administration, United States of America.

Units

The Statistics shown in this volume are expressed in metric units. The following factors are given for converting to non-metric units:

tonnes × 0.9842 = long tons
tonnes × 1.1023 = short tons
kilograms × 2.2046 = pounds
kilograms × 32.1507 = troy ounces
cubic metres × 35.3147 = cubic feet
1 tonne of crude petroleum equals on average 7 barrels of crude petroleum.
1 flask mercury = 34.5 kilograms
1 metric ton unit = 10 kilograms

Symbols

...	figures not available
0	quantity less than half unit shown
—	nil
*	estimated
BGS	British Geological Survey

Brazil

Key facts

- *Fifth largest country in the world, with a land area of 8.5 million square kilometres.*
- *Dominated by the Amazon River basin containing nearly 20 per cent of the world's fresh water and about 30 per cent of its tropical forest.*
- *Fifth largest population in the world, totalling nearly 199 million.*
- *One of the fastest developing economies in the world, currently the ninth largest on a GDP (PPP) basis.*
- *The world's largest producer of niobium minerals and the second largest producer of iron ore and bauxite.*
- *Iron ore production has increased by 90 per cent between 1999 and 2008 and exports of iron ore make the largest contribution to Brazil's trade surplus.*
- *The world's largest reserves of niobium minerals, amounting to 93 per cent of the total. Production of these minerals has increased by 500 per cent in 10 years.*
- *Production of copper has increased by 600 per cent between 1999 and 2008, although it still produces less than two per cent of the world's total.*
- *Bauxite production has increased by 122 per cent in 10 years and in 2008 amounted to 28 million tonnes.*
- *One of the world's fastest growing oil producers following the discovery of significant offshore resources in 2007/08.*

Brazil is the largest country in Latin America and is ranked fifth in the world by population (198 739 000: July 2009 estimate) and fifth by area (8 514 877 square kilometres). It occupies nearly half of South America and borders every other South American country except Chile and Ecuador. It comprises four physiographic regions but is dominated by the Amazon basin (about four million square kilometres) which holds nearly 20 per cent of the world's fresh water and about 30 per cent of the world's tropical forest (Figure 2).

Figure 2 Brazil geography.

Brazil has transformed its economic performance over the last 15 years into one of the fastest developing economies in the world. Gross domestic production (GDP) in 2008 was US$1990 billion with a growth rate of 5.1 per cent in 2008. This growth slowed considerably in 2009, as a result of the global recession, but was estimated to be 0.1 per cent for the year as a whole. On the basis of GDP purchasing power parity (PPP) Brazil is currently the ninth largest economy in the

world. Brazilian mineral production, excluding hydrocarbons, reached US$23.2 billion in 2008, an increase of 17 per cent on 2007. Mineral ores accounted for 11 per cent and metallurgical products 12 per cent of total exports.

Brazil is the world's largest producer of niobium and the second largest producer of iron ore, bauxite and tantalum. Other top 10 world rankings are shown in Table 1, together with the proportion of the world's total of each mineral that is produced in Brazil.

Commodity	World rank	Percent of total world production	Commodity	World rank	Percent of total world production
Niobium	1	95	Aluminium (primary)	6	4
Tantalum	2	19	Phosphate rock	6	4
Iron ore	2	17	Pig iron	6	4
Bauxite	2	13	Magnesium metal (primary)	6	1
Rare earth minerals	2	1	Talc	7	5
Asbestos	3	13	Chromium ores & concentrates	7	3
Alumina	3	10	Tin (smelter)	7	3
Graphite	3	4	Zirconium minerals	7	2
Kaolin	4	10	Salt	8	3
Cobalt (mine)	4	7	Lithium minerals	8	2
Manganese ore	5	8	Magnesite	8	2
Tin (mine)	5	5	Bentonite	9	3
Vermiculite	5	4	Steel (crude)	9	3
Beryl	5	0.1	Nickel (mine)	10	4
Sillimanite minerals	5	0.1	Tungsten (mine)	10	1

Table 1 Brazil's top 10 world rankings by commodity, with proportion of world total produced.

The location of selected major mines and important deposits are shown in Figure 3. Many mines and deposits are clustered together in the Carajás, Corumbá and Quadrilátero Ferrifero districts and are not necessarily shown individually for reasons of clarity.

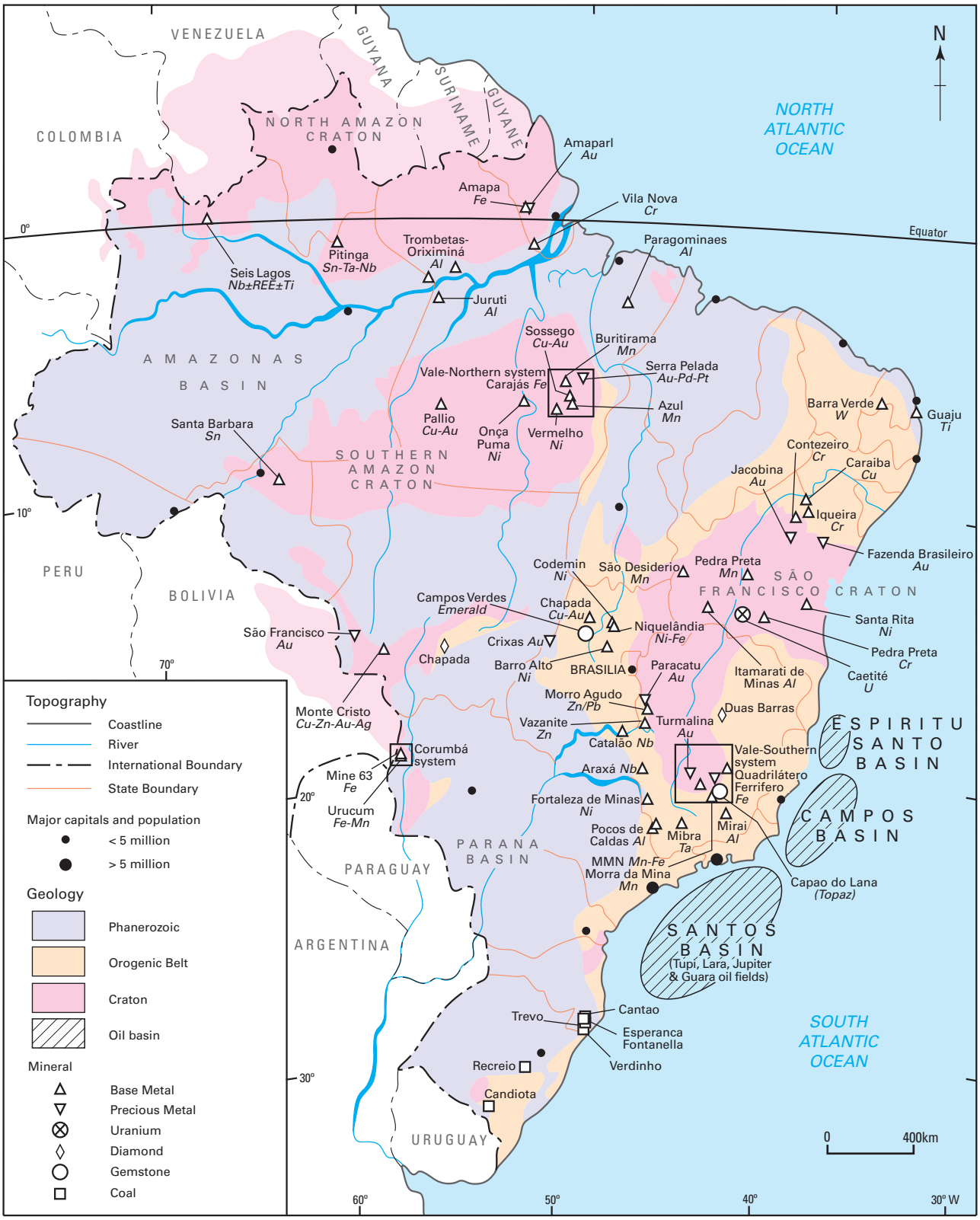

Figure 3 Selected major mines and important mineral deposits in Brazil.

Notes: Certain mines and/or deposits mentioned in the text have been omitted for clarity.

Fe = iron ore, Au = gold, Sn = tin, Ta = tantalum, Nb = niobium, REE = rare earth elements, Ti = titanium, Cu = copper, Ni = nickel, Mn = manganese, Pd = palladium, Pt = platinum, Al = aluminium, W = tungsten,Cr = chromium, U = uranium, Zn = zinc, Pb = lead, Ag = silver

Iron ore

Brazil has around 6.7 per cent of the world's iron ore resources and 10 per cent of the world's reserves. Production rose from 354.7 million tonnes in 2007 to 368.8 million tonnes in 2008; an increase of four per cent and a continuation of a longer term trend (Figure 4). Iron ore exports rose to 282 million tonnes in 2008 (Figure 4), worth US$16.5 billion, an increase of 4.5 per cent by volume and 57 per cent by value compared to 2007. This is more than the growth in value of Brazil's total exports which grew by 23 per cent. Iron ore exports made up 90 per cent of the total value of mineral exports in 2008 and now represent 8.4 per cent of the total value of Brazilian exports. Iron ore continues to be the product that makes the largest contribution to Brazil's trade surplus. Exports went to 39 countries with China taking almost 30 per cent by value.

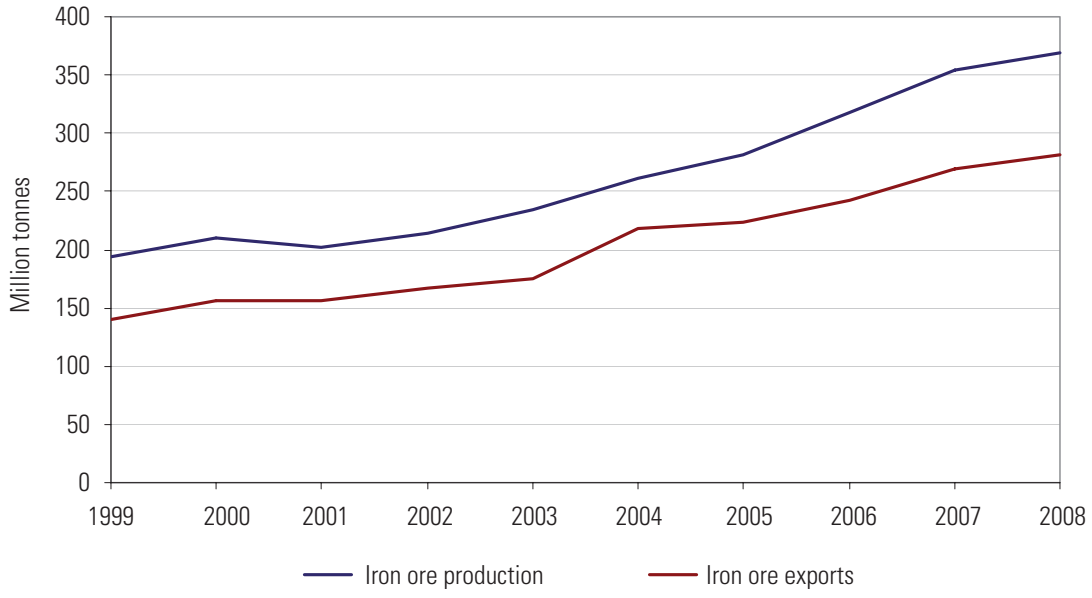

Figure 4 Brazil's production and exports of iron ore from 1999 to 2008.

Three companies account for more than 90 per cent of Brazilian production: Vale (293 million tonnes), Cia Siderúrgica Nacional (about 29 million tonnes) and Samarco Mineração SA (17 million tonnes).

Vale (previously known as CVRD) is expanding production at Carajás to 110 million tonnes per year for the second half of 2009 and to 140 million tonnes per year in the first half of 2011. The Carajás District has known reserves of about 18 billion tonnes at 65.4 per cent iron. Rio Tinto is to sell its Corumbá operation to Vale. A feasibility study to expand mine production from two million tonnes per year to ten million tonnes per year is nearing completion.

Samarco (Vale 50 per cent and BHP Billiton 50 per cent) increased production by 20 per cent in 2008 to 18.5 million tonnes of pellets. With the start of operations at a third pellet plant Samarco's capacity grew to 21.7 million tonnes per year in 2009.

Cia Siderúrgica Nacional (CSN) owns the Casa de Piedra and Pedreira da Bocaina iron mines. Casa de Piedra produced 17 million tonnes in 2008 and should reach 19 million tonnes in 2009. Namisa mine (CSN 60 per cent, six Japanese steel makers 40 per cent) is currently under development. By the end of 2013 Namisa, Casa de Piedra and neighbouring mines should provide 13 million tonnes, 20 million tonnes and about six million tonnes respectively to bring the total output to 39 million tonnes.

MMX Mineração & Metálicos SA (EBX Group) sold Amapa and Minas-Rio to Anglo American in late March 2008; the new subsidiary is renamed IronX. Minas-Rio will begin production in the first half of 2010 with a capacity of 26.5 million tonnes per year. MMX Corumba (6.3 million tonnes per year) and MMX Sudeste, represent a total installed capacity of 10.8 million tonnes per year of iron ore which can be expanded to 40 million tonnes per year. The MMX Sudeste system comprises Serra Azul and the greenfield site of Bom Sucesso in Minas Gerais State. Iron ore production from Serra Azul in 2008 was 4.3 million tonnes and is expected to rise to 16.7 million tonnes per year in 2012. Bom Sucesso start-up is planned for 2012 with an output of 17.4 million tonnes per year.

Bahia Mineração Ltda. intends to construct a mine and plant at Pedra de Ferro near Caetité on Bahia State. Production is planned to start in the fourth quarter of 2011 at 15 million tonnes per year, expanding to 25 million tonnes per year.

Manganese

Brazil has about 7.6 per cent of the world's reserves and 1.1 per cent of the total world resources of manganese ore. Brazil's production for 2008 stood at 3.21 million tonnes of manganese ore and 387 900 tonnes of manganese ferroalloys.

Vale (CVRD) is one of the world's largest manganese ore producers and a leading player in the global manganese and ferroalloy market. It owns and operates four manganese mines within Brazil (Azul, Urucum, Morro da Mina and MMN) and seven ferroalloy plants (including four under RDM, Urucum Mineracao, RDME in France and RDMN in Norway). Production at the Azul Mine in the Carajás Complex, Para State, Vale's largest manganese mine, was just over two million tonnes in 2008 but this decreased by 31 per cent in 2009.

Nickel

Brazil is estimated to have 6.3 per cent of the world's nickel reserves (ranked sixth in the world) and 5.5 per cent of the overall nickel resources (ranked seventh). Mined nickel production for 2008 at 58 500 tonnes was virtually the same as for 2007, but 29 per cent lower than the peak in 2006 (Figure 5). However, with the commissioning of several new mines, output is set to increase substantially. Smelter/refinery production of nickel amounted to 36 000 tonnes in 2008, a small increase on 2007 (Figure 5). Exports of nickel matte increased to 14 970 tonnes, worth US$106 million. Exports of electrolytic nickel decreased to 10 292 tonnes, worth US$203.5 million.

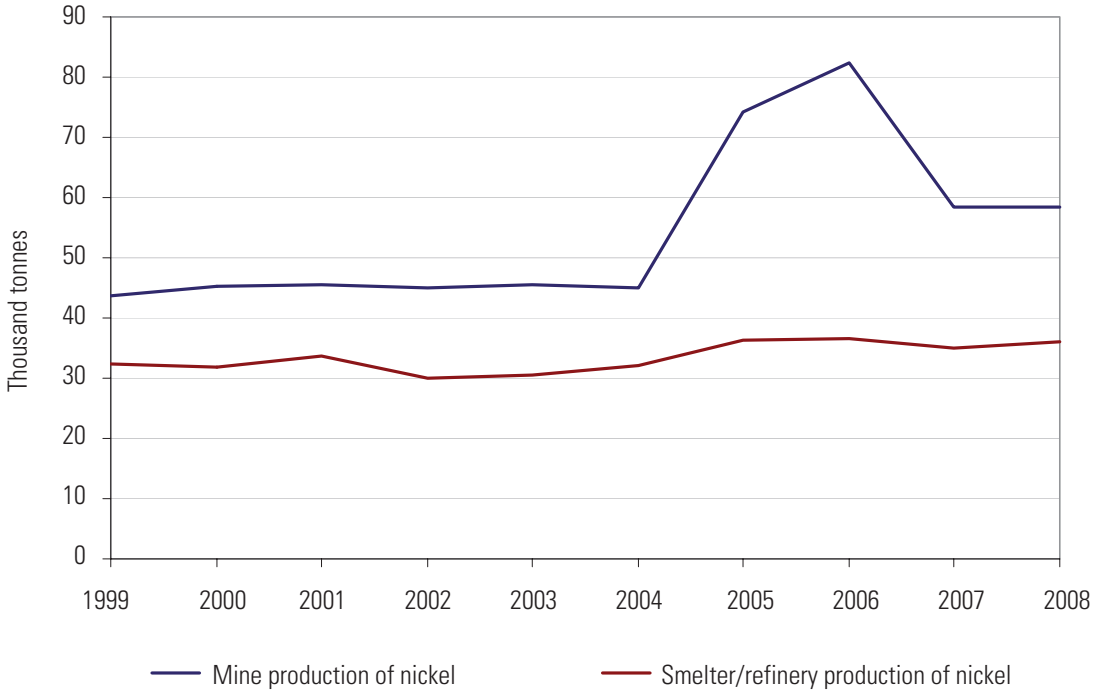

Figure 5 Brazil's production of nickel between 1999 and 2008.

The Vale-owned, Vermelho lateritic nickel mine project in the Carajás region of Pará State started production in September 2008 with a capacity of 45 000 tonnes per year nickel and 2800 tonnes per year cobalt. Vale has postponed completion of its 58 000 tonnes per year Onça Puma nickel laterite project till January 2010.

Mirabela Nickel Ltd. commenced mining the Santa Rita nickel sulphide deposit in Bahia State at the beginning of August 2009. The plant is expected to produce 18 500 tonnes per year of nickel in concentrate increasing to 26 000 tonnes per year by September 2010.

Votorantim Group, which owns the Niquelândia Mine in Goiás State with a current production of 17 000 tonnes per year, has begun a new ferro-nickel production unit in Niquelândia with completion expected in the first half of 2010. With this new plant, production will reach 40 000 tonnes per year of electrolytic nickel and nickel in ferro-nickel.

First production at Anglo American's 36 000 tonnes per year Barro Alto nickel project (117 million tonnes at 1.5 per cent nickel) in Goiás State is expected in the second quarter of 2011.

Tin, tantalum and niobium

Brazil has the world's fourth largest reserves of tin (9.64 per cent) and between 16–22 per cent of the global resources of tin. It has by far the largest known global reserves of niobium and tantalum accounting for up to 93 and 68 per cent respectively.

Brazil produced 13 000 tonnes of mined tin in 2008, a small increase compared to recent years. Smelter production of tin also increased from just under 10 000 tonnes in 2007 to 11 000 tonnes in 2008. Brazil's output of pyrochlore (containing

niobium) increased by 16 per cent in 2008 compared to 2007, continuing an upward trend that has amounted to nearly 500 per cent over ten years (Figure 6).

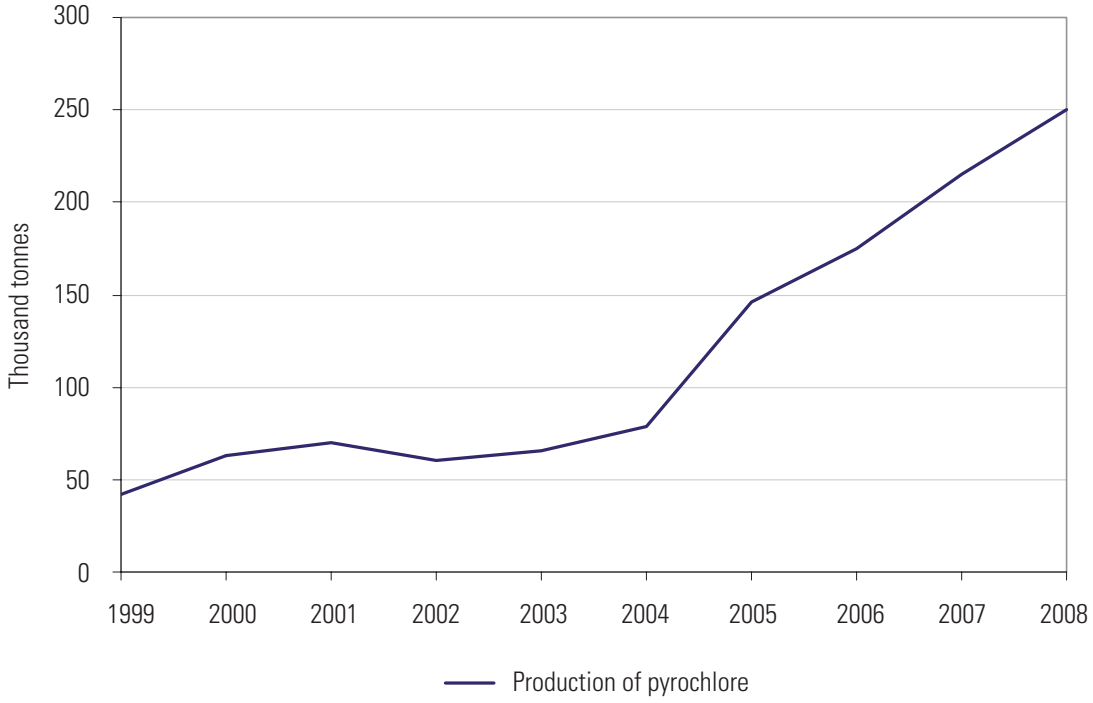

Figure 6 Brazil's production of pyrochlore (containing niobium) between 1999 and 2008.

Pitinga mine produced 6257 tonnes of tin in concentrate in 2008 as well as niobium/tantalum ferroalloy (200 000 pounds of contained Ta_2O_5). Peru's Minsur, who acquired the mine at the end of 2008, is currently looking into exploiting the substantial heavy rare earth (HRE) resources at Pitinga. Mibra owned by the Metallurg Group produces 100 000 pounds per year of Ta_2O_5.

Companhia Brasileira de Metalurgia e Mineração (CBMM), the world leader in niobium production, accounted for 78.3 per cent of the Brazilian production of niobium concentrate and Mineração Catalão de Goiás Ltda (a subsidiary of Anglo American PLC) supplied the remainder. CBMM-owned Araxá niobium-tantalum mine in Minas Gerais State, is the world's largest known niobium deposit with total resources of 11.5 million tonnes of Nb_2O_5, and has the capacity to produce 84 000 tonnes per year of niobium in concentrate.

Copper and gold

Brazil, with three per cent of world copper reserves, contributed 1.4 per cent to the world's total mined copper production in 2008, and in 2007 changed from being a net importer to a net exporter of copper ores and concentrates. Brazil produced 216 000 tonnes of mined copper in 2008, an increase of five per cent on 2007 but an increase of nearly 600 per cent compared to 1999 (Figure 7).

Brazil has estimated reserves of gold amounting to 2 000 000 kilograms and produced 54 000 kilograms in 2008; an increase of nine per cent compared to the previous year. Mining companies produced 39 800 kilograms with Garimpeiro

(small-scale artisanal prospector and/or miner) operations accounting for the remainder. Gold exports rose by 3.2 per cent to 37 000 kilograms worth US$1.03 billion.

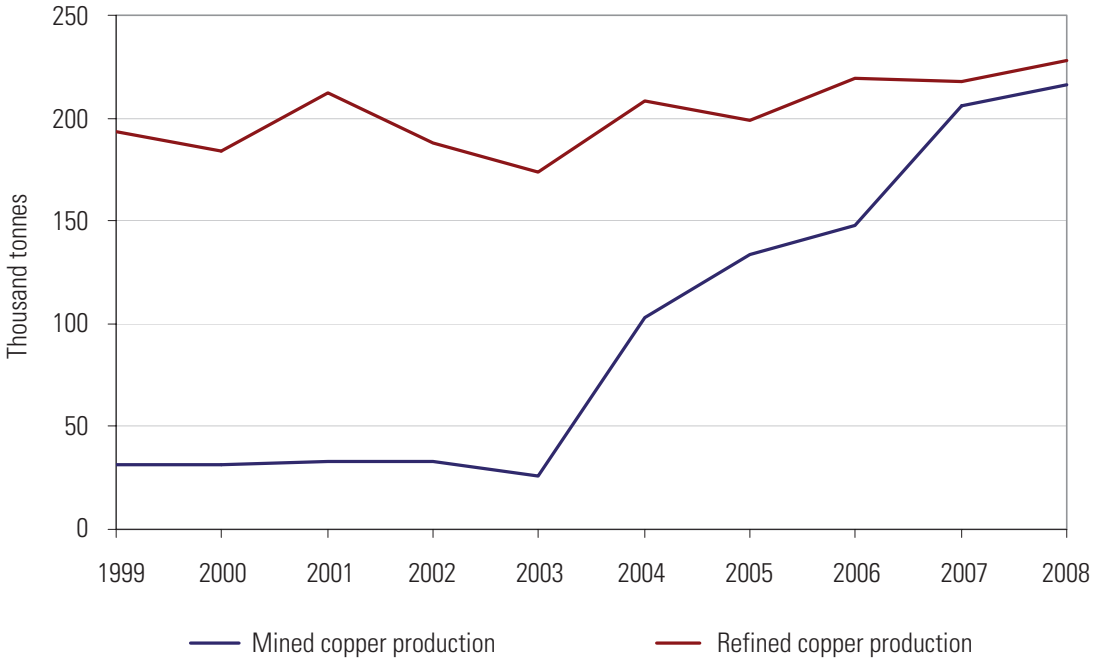

Figure 7 Brazil's copper production between 1999 and 2008.

Sossego mine, located in an iron–oxide–copper–gold (IOCG) Mineral Province in Pará State, is owned by Vale and is Brazil's largest copper producer at 140 000 tonnes per year of copper and 3500 kilograms per year of gold. The Paranapanema Group produced 25 000 tonnes of copper and the Chapada copper–gold mine in Goiás State, owned by the Yamana Gold Inc., produced 48 000 tonnes of copper in 2007.

Vale is developing other IOCG deposits. The Salobo copper–gold project commissioning was postponed until the beginning of 2010. Initial production capacity will be about 37 000 tonnes per year copper; which will be ramped up to 100 000 tonnes per year. Others include the Cristalino copper–gold deposit, Alemão copper–gold–rare earths–uranium deposit and Igarapé Bahia copper–gold–rare earths–uranium deposit. Cristalino could produce 150 000 tonnes per year of copper whilst Alemão and Igarapé would have a projected combined production of 186 000 tonnes per year of copper. Total Vale production is expected to reach 368 000 tonnes of copper in 2010.

Brazil also has new gold mines and expansions which are expected to come on stream between 2009 and 2013. AngloGold-Ashanti's Cuiaba, Corrego do Sitio and Queiroz mines in Minas Gerais State together produced 9953 kilograms in 2008. Most of this output came from the Cuiaba deposit which has proven reserves of more than 200 000 kilograms of gold. The Corrego do Sitio project will produce 43 500 kilograms of gold over 14 years. Mining started in mid 2007 with full production of 2800 kilograms per year to begin in 2012. The Serra Grande mine complex in Goiás State, a 50:50 joint venture between AngloGold-Ashanti and the Kinross Gold Corporation, produced 2706 kilograms of gold in 2008.

AngloGold-Ashanti acquired the São Bento Mine from the Eldorado Gold Corp. in December 2008. The Lamego mine was commissioned in mid 2009 and is expected to produce 10 730 kilograms over nine years. Raposos mine, which was mothballed in 1998, is to undergo development during 2009–2010 and production is expected to begin in 2011. Kinross concluded an expansion project at the Paracutu mine in Minas Gerais State in November 2008 to start producing 13 000–18 000 kilograms per year of gold, up to three times its previous capacity of 5400 kilograms. It was expected to produce approximately 11 000 kilograms in 2009.

The Canadian Yamana Gold Corp. produced gold from the Fazaenda Brasileiro and Jacobina mines in Bahia State, the São Francisco mine in the Guapore Gold Belt and Chapada Gold and mine development at São Vincente providing total production of 12 293 kilograms for 2008. Commercial production started at São Vincente in mid 2009. The production target for Jacobina gold mine in 2009 is 3888 kilograms and, with expansion of plant capacity, this will increase to 4666 kilograms per year by 2011. The Santa Luz and Ernesto/Pau-a-Pique mines are expected to begin production in 2012 whilst a decision on the Pilar mine construction will be made in 2010.

The Canadian company Jaguar Mining Inc. is currently producing gold at its Sabara, Turmalina and Paciência mines. In 2008 combined production totalled 3587 kilograms of gold. Turmalina is expected to produce between 2332 and 2448 kilograms in 2009 rising to 5754 kilograms in 2013. Paciência is expected to produce 2800 kilograms per year in the years 2009–2011. Commissioning of the Caeté mine is expected to take place during the third quarter of 2010.

Bauxite, alumina and aluminium

Brazil has bauxite resources estimated at 4.3 billion tonnes and reserves estimated at 1.9 billion tonnes. Marketable output of bauxite in 2008 grew by an estimated 10 per cent to 28 million tonnes. Between 1999 and 2008 Brazil's production of bauxite increased by 122 per cent (Figure 8). Exports in 2008 increased by 7.6 per cent by volume compared to 2007 to 6.2 million tonnes. Alumina production has also increased significantly in Brazil, by 11 per cent in 2008 compared to 2007 and by 123 per cent between 1999 and 2008 (Figure 8).

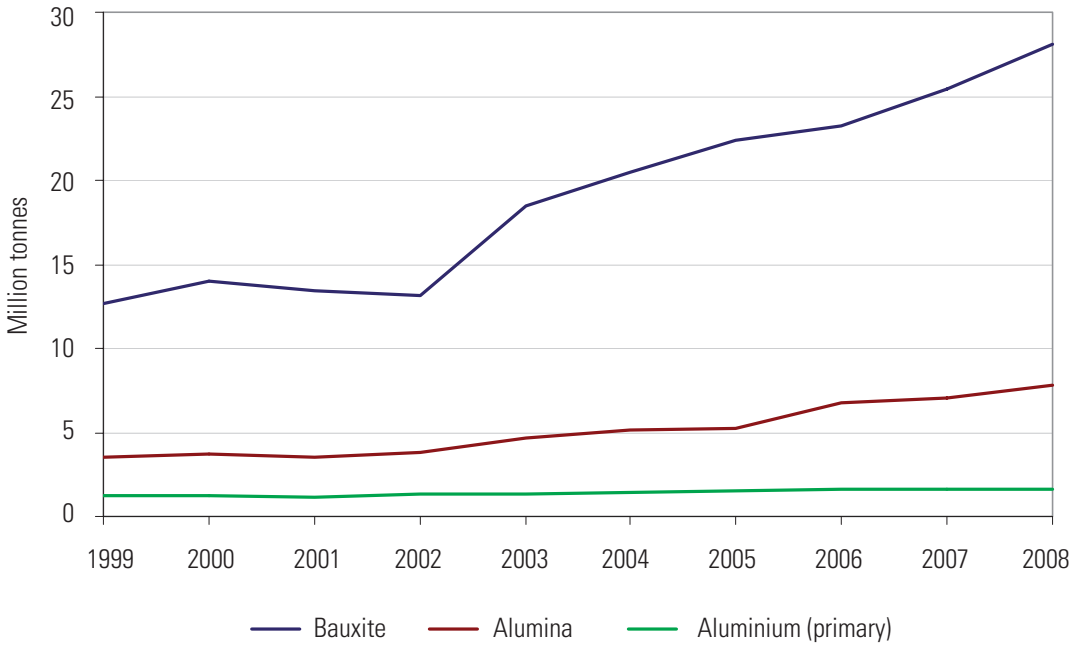

Figure 8 Brazil's production of bauxite, alumina and primary aluminium between 1999 and 2008.

Mineração Rio Do Norte (MRN) produced 12.3 million tonnes of bauxite for the domestic market and six million tonnes for export in 2008. The main deposits are Trombetas-Oriximiná and Paragominas mainly in Para State. Paragominas expanded production to 9.9 million tonnes per year in April 2008 and refinery output is to be increased to 6.3 million tonnes per year of alumina. Mirai mine, which is wholly owned by Companhia Brasileria de Aluminio (CBA), has an annual capacity of three million tonnes per year bauxite and 470 000 tonnes per year of primary aluminium.

Alcoa commissioned the Juruti bauxite mine in September 2009. Initial output will be 2.6 million tonnes per year. The expected mine life is 40–60 years. The bauxite will be shipped to the Alumar alumina refinery at São Luis, Maranhão State which is being expanded from 2.1 million tonnes per year to 3.5 million tonnes per year capacity.

Vanadium

Canada's Largo Resources Ltd is currently developing the Maracas Vanadium–PGM deposit in Bahia State with 155 million pounds of potential ferro-vanadium resources. Target production is set for the first quarter of 2011 with a minimum annual production of 4500 tonnes of ferro-vanadium, equivalent to about six per cent of projected world production. In May 2009 Largo purchased the Campo Alegre de Lourdes, the largest and richest known vanadium deposit outside China.

Crude petroleum and natural gas

Brazil is one of the fastest growing oil producers with the discovery in 2007/08 of vast offshore resources. Production in 2008 increased by four per cent compared to the previous year continuing an upward trend amounting to a 69 per cent increase in output between 1999 and 2008 (Figure 9).

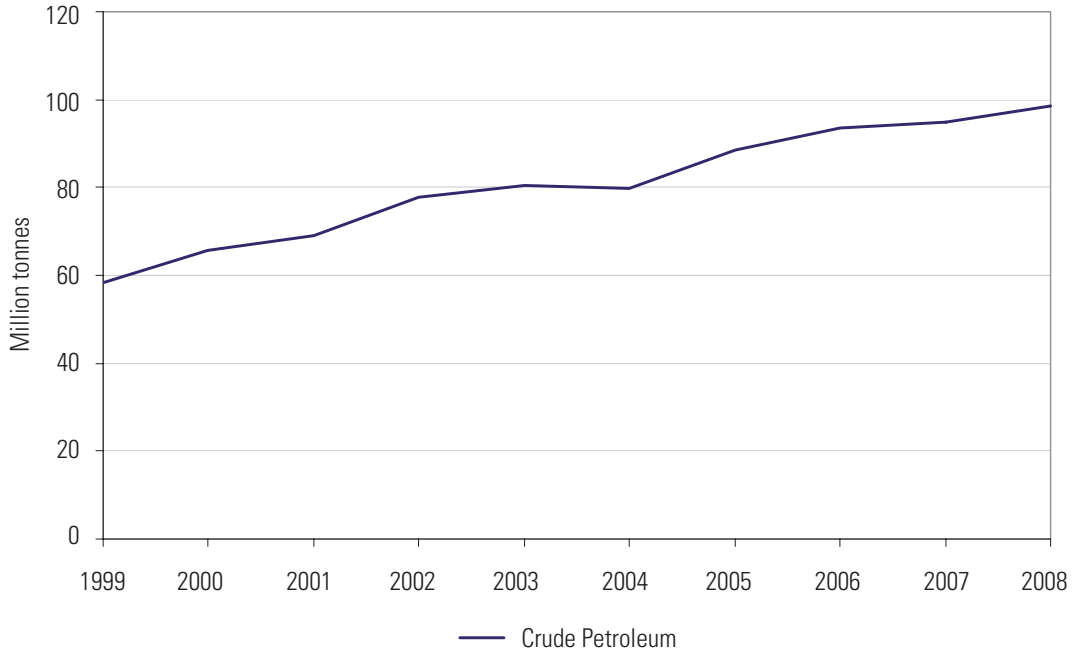

Figure 9 Brazil's production of crude petroleum between 1999 and 2008.

Estimates for the Tupi and Lara fields equate to 12.2 billion barrels. The Jupiter natural gas and condensate field in the Santos Basin may equal the Tupi field in size. Current production of oil (two million barrels per day) and gas (52 million cubic metres per day) is mostly derived from two major oil fields in the Campos Basin with confirmed reserves of 7.2 billion barrels of oil and condensate and 101.5 cubic kilometres of natural gas. In November 2009 Petrobas announced additional reserves of up to 25 million barrels from where extraction is expected to commence by August 2010.

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Brazil

Production

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Bauxite (a)	tonnes	12 661 746	13 974 480	13 388 100	13 147 900	18 456 800	20 511 800	22 364 600	23 236 300	25 460 700	28 087 500
Alumina	tonnes (Al_2O_3 content)	3 515 100	3 754 100	3 519 700	3 855 400	4 713 800	5 126 500	5 191 100	6 735 000	7 077 600	7 822 300
Primary Aluminium	tonnes	1 249 600	1 271 400	1 132 000	1 318 400	1 380 600	1 457 400	1 497 600	1 604 500	1 654 800	1 661 000
Asbestos	tonnes	188 386	209 332	172 695	194 732	231 115	252 067	236 047	227 304	254 204	287 673
Barytes (a)	tonnes	40 824	54 100	54 790	53 098	57 452	50 430	42 924	47 611	37 000	42 000
Bentonite & fuller's earth											
Bentonite	tonnes	296 489	317 621	260 282	304 782	392 422	432 224	459 679	419 214	329 647	* 400 000
Beryl	tonnes	11	13	—	* 4	* 4	* 4	* 4	* 4	* 4	* 4
Cadmium	tonnes	* 130	* 135	* 140	151	189	187	200	* 200	* 200	* 200
Chromium ores & concentrates	tonnes	357 141	600 000	419 049	283 991	376 862	593 476	616 534	562 739	627 772	* 700 000
Coal											
Bituminous & lignite (a)	tonnes	6 062 963	6 797 294	5 645 578	5 143 488	4 643 319	5 408 278	6 048 105	6 215 258	5 998 354	6 518 733
Cobalt, mine	tonnes (metal content)	2 900	4 100	4 400	4 300	4 200	4 300	* 4 300	* 4 300	* 4 300	* 4 300
Cobalt metal	tonnes	630	792	889	960	1 097	1 155	1 136	902	1 148	994
Copper, mine	tonnes (metal content)	31 371	31 786	32 734	32 711	26 275	103 153	133 325	147 836	205 728	216 000
Copper, smelter	tonnes	193 014	184 257	212 243	187 605	173 378	208 020	199 043	219 684	218 000	227 800
Copper, refined	tonnes	193 014	184 257	212 243	187 605	173 378	208 020	199 043	219 684	218 000	227 800
Diamond	carats	* 900 000	* 1 000 000	* 700 000	* 500 000	* 400 000	* 300 000	207 836	181 350	182 031	* 150 000
Diatomite	tonnes	9 223	10 164	10 010	5 835	6 920	7 200	7 670	8 968	5 555	...
Feldspar	tonnes	150 492	227 215	139 644	97 742	102 077	280 293	196 419	166 418	182 168	* 190 000
Fluorspar (a)	tonnes	44 926	44 046	43 734	47 899	56 346	57 772	66 512	63 604	65 526	63 573
Gold, mine	kilograms (metal content)	51 422	50 393	42 884	41 662	40 416	47 596	38 293	40 075	49 600	* 54 000
Graphite (a)	tonnes	53 503	71 208	60 666	60 922	70 739	76 332	75 515	76 194	77 163	80 500
Gypsum	tonnes	1 496 936	1 497 790	1 506 619	1 633 311	1 529 015	1 474 911	1 582 248	1 711 671	1 923 119	* 2 000 000
Iron ore	tonnes	(a) 194 485 974	210 000 000	201 400 000	214 560 000	234 478 000	261 696 128	281 462 088	317 800 229	354 674 378	368 800 000
Pig Iron	tonnes	24 948 500	28 135 000	27 731 000	30 055 000	32 449 000	34 558 000	33 884 000	32 452 000	35 571 000	34 871 000
Crude steel	tonnes	24 996 200	27 865 000	26 717 000	29 604 000	31 147 000	32 909 000	31 610 000	30 901 000	33 782 000	33 716 000
Ferro-alloys											
Ferro-chrome	tonnes	78 874	134 562	84 428	159 658	196 032	204 626	185 533	158 585	177 656	209 273
Ferro-silico-chrome	tonnes	11 910	7 790	5 899	10 522	8 151	11 560	16 683	8 221	12 943	13 674
Ferro-silico-magnesium	tonnes	9 882	9 658	11 032	14 552	14 040	37 031	43 980	31 314	30 221	30 800
Ferro-manganese	tonnes	85 260	121 277	96 016	156 435	176 735	179 971	257 083	61 434	135 757	149 900
Ferro-silico-manganese	tonnes	148 384	171 304	180 235	182 731	261 658	285 629	341 565	198 753	225 373	238 000
Ferro-nickel	tonnes	19 807	19 315	17 966	19 874	19 378	20 338	21 200	27 600	28 900	26 300
Ferro-niobium	tonnes	28 557	27 359	37 411	36 450	37 303	35 863	58 616	60 826	71 676	81 600
Ferro-silicon	tonnes	200 833	189 935	159 345	145 910	156 824	177 245	199 856	196 814	196 403	183 000
Other ferro-alloys	tonnes	...	35 190	16 623	25 300	38 559	45 868	42 588	44 280	45 330	47 800
Silicon metal	tonnes	136 572	166 344	112 123	133 390	180 937	219 813	229 294	226 380	225 120	219 600
Kaolin (b)	tonnes	1 652 997	1 639 673	1 817 419	1 757 488	2 081 000	2 381 000	2 410 000	2 455 000	2 480 000	2 670 000

Table 2 Mineral production in Brazil from 1999 to 2008 *(continued)*.

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Lead, mine	tonnes (metal content)	10 281	8 832	10 725	9 253	10 652	14 737	16 063	16 007	15 522	16 000
Lead, refined (c)	tonnes	52 000	50 000	47 000	50 000	128 610	137 121	104 904	142 653	142 540	143 000
Lithium minerals											
Petalite	tonnes	442	1 077	187	...	...	...	...	...	...	...
Spodumene	tonnes	10 629	9 796	8 897	12 046	9 755	9 064	8 924	8 585	7 991	* 7 500
Magnesite (a)	tonnes	282 145	279 876	308 809	302 230	306 444	366 174	386 759	382 718	399 314	387 000
Primary magnesium metal	tonnes	7 968	5 723	5 500	4 500	4 000	3 000	3 000	5 000	5 000	5 000
Manganese ore	tonnes	1 656 000	2 192 000	1 970 000	2 529 000	2 544 000	3 143 000	3 200 000	3 128 000	1 866 000	3 210 000
Mica	tonnes	*5 000	*4 000	*4 000	*4 000	*4 000	* 4 000	* 4 000	* 4 000	* 4 000	* 4 000
Nickel, mine	tonnes (metal content)	43 784	45 317	45 456	44 928	45 456	44 928	74 198	82 492	58 317	58 500
Nickel, smelter/refinery	tonnes	32 237	31 751	33 680	29 961	30 514	32 101	36 315	36 569	34 954	36 000
Crude petroleum	tonnes	58 310 277	65 720 000	68 950 000	77 600 000	80 300 000	79 820 000	88 600 000	93 600 000	94 800 000	98 500 000
Natural gas	million m^3	6 700	8 200	8 400	10 000	10 900	11 900	12 200	12 700	12 710	15 510
Phosphate rock (a)	tonnes	4 343 638	4 725 106	4 684 546	5 083 703	5 583 778	5 689 000	5 631 000	5 932 000	6 185 000	6 343 000
Potash											
Chloride	tonnes (K_20 content)	336 623	351 748	318 585	337 266	415 549	403 080	404 871	403 080	471 333	383 000
Rare earth minerals											
Monazite	tonnes	—	—	—	—	—	731	958	958	1 173	* 1 200
Salt											
Rock salt	tonnes	1 430 041	1 448 000	1 208 000	1 274 000	1 420 000	1 442 000	1 559 000	1 622 000	1 621 000	* 1 600 000
Sea salt	tonnes	4 528 000	4 626 000	4 370 000	4 835 000	5 144 000	5 205 968	5 519 618	5 122 197	5 365 091	* 5 400 000
Silliminite minerals											
Kyanite (a)	tonnes	171	* 200	* 200	* 200	*200	* 200	* 200	* 200	* 200	* 200
Silver, mine	kilograms (metal content)	10 000	10 000	10 000	10 000	6 496	6 192	6 672	10 000	18 620	19 000
Sulphur and pyrites											
Pyrites	tonnes (sulphur content)	23 232	23 720	24 468	22 620	19 246	24 174	19 618	20 954	22 336	* 25 000
Recovered (d)	tonnes (sulphur content)	217 119	217 238	280 079	284 184	285 824	279 631	266 817	297 539	321 707	366 000
Recovered (e)	tonnes (sulphur content)	57 962	81 762	80 125	77 185	90 332	91 804	112 093	117 203	135 623	157 000
Talc (f)	tonnes	333 211	450 000	397 000	348 000	369 000	409 946	413 340	389 391	401 204	* 405 000
Tantalum and niobium minerals											
Pyrochlore	tonnes	(i) 42 100	63 117	* 70 000	* 60 000	* 66 000	* 79 000	* 146 000	* 175 000	* 215 000	* 250 000
Columbite- tantalite	tonnes	5 400	6 400	7 300	* 5 800	* 6 200	* 6 500	* 6 600	* 5 400	* 5 000	* 5 000
Djalmaite	tonnes	23	84	...	...	...	...	...	...	...	...
Tin, mine	tonnes (metal content)	13 200	14 200	13 016	12 023	12 217	12 202	11 739	9 528	11 835	13 000
Tin, smelter	tonnes	12 787	13 823	12 109	11 538	10 761	11 512	8 986	8 780	9 987	11 000
Titanium minerals											
Ilmenite	tonnes	234 209	123 000	* 162 000	174 382	120 160	133 000	127 142	* 130 000	* 130 000	* 130 000
Rutile	tonnes	3 388	3 162	* 2 500	2 645	* 2 500	3 000	2 782	* 3 000	3 000	* 3 000
Tungsten, mine (g)	tonnes (metal content)	13	18	22	24	30	293	557	525	537	* 550
Uranium, mine	tonnes (metal content)	—	50	58	270	310	300	110	190	299	330
Vermiculite	tonnes	(a) 40 045	31 676	21 000	23 000	26 000	26 000	24 191	19 279	18 952	20 000

Table 2 Mineral production in Brazil from 1999 to 2008 *(continued)*.

Brazil production continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Zinc, mine	tonnes (metal content)	98 590	100 254	111 432	136 339	152 822	158 962	170 659	185 211	193 899	173 933
Slab zinc	tonnes	194 010	198 777	204 037	254 700	270 000	273 000	274 000	279 000	265 126	260 000
Zirconium minerals (h)	tonnes	27 048	28 335	17 031	20 000	27 198	25 263	25 657	25 120	26 739	* 27 000

Note(s):-
(a) Including beneficiated and directly shipped material
(b) Beneficiated
(c) Including scrap for direct use
(d) From metal sulphide processing
(e) From petroleum refining and/or natural gas
(f) Including talc, agalmatolite and pyrophyllite
(g) Mainly scheelite
(h) Including caldasite rock containing zircon and baddeleyite
(i) Data for Minas Gerais only

Table 2 Mineral production in Brazil from 1999 to 2008.

Exports

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Primary aggregates	tonnes	873	9 537	11 806	5 038	(a)* 2 159	7 256	7 656	8 600	25 340	17 030
Bauxite, alumina & aluminium											
Bauxite	tonnes	4 511 896	4 166 202	3 426 658	3 368 055	4 705 826	7 290 491	7 508 688	5 309 470	5 783 947	6 220 737
Alumina	tonnes	972 515	1 120 419	1 084 719	1 125 983	1 833 258	1 921 446	2 327 069	3 380 624	3 837 647	4 559 916
Alumina hydrate	tonnes	105 611	120 710	86 744	78 531	115 352	97 473	69 456	84 143	33 433	50 943
Unwrought	tonnes	658 994	615 903	467 051	614 770	656 312	582 943	561 400	613 887	581 490	547 230
Unwrought alloys	tonnes	129 588	144 051	120 872	134 621	142 485	235 475	191 710	228 173	241 777	200 691
Scrap	tonnes	13 375	2 975	420	1 006	115	708	1 684	1 001	166	1 793
Asbestos											
Unmanufactured	tonnes	49 419	63 134	53 918	99 341	144 343	163 620	143 619	132 196	172 662	177 909
Barytes	tonnes	17	107	50	30	45	882	64	45	53	110
Bentonite & fuller's earth											
Bentonite	tonnes	96	220	340	311	2 441	3 388	4 308	5 534	9 451	9 740
Cement											
Cement clinkers	tonnes	106 000	55 000	54 000	189 935	162 920	348 338	428 772	538 901	604 242	384 754
Portland cement	tonnes	118 309	162 043	102 095	101 650	423 498	600 136	890 621	935 549	1 245 131	602 032
Chromium											
Ores & concentrates	tonnes	194 486	142 605	78 588	22 883	32	37 340	139 327	75 803	111 000	54 308
Coal											
Hard coal (a)	tonnes	316	660	2 432	870	765	413	546	360	5 308	7 578
Cobalt											
Metal	tonnes	549	627	777	805	849	919	905	686	953	833
Copper											
Ores & concentrates	tonnes	627	…	...	…	…	229 272	387 827	364 040	573 241	637 908
Matte & cement	tonnes	...	...	...	…	…	447 661	467 723	414 006	532 808	...
Unwrought	tonnes	21 337	13 483	15 011	51 302	24 438	22 479	33 044	58 135	102 255	96 349
Scrap	tonnes	8 268	5 965	5 847	6 083	3 375	1 954	2 636	10 584	4 948	1 995
Diamond											
Unsorted	carats	...	63 710	29 787	175 395	67 444	188 329	66 182	18 120	207 319	110 554
Gem, rough	carats	...	525 688	496 723	409 211	123 254	7 135	5 072	3 504	32 290	57
Gem, cut	carats	...	72 605	11 244	5 204	4 657	1 779	6 577	3 133	3 911	144
Industrial	carats	...	3 229	5 411	14 970	55 264	47 835	204 847	12 687	1 283	...
Dust	carats	...	76 204	84 917	257 645	246 442	160 000	240 000	70 000	103 709	4 726
Feldspar	tonnes	3 081	61	2 865	2 308	56	138	1 151	8 501	5 424	7 206
Gold											
Metal	kilograms	39 026	41 543	37 329	35 356	28 282	31 495	30 406	32 857	35 853	37 024
Graphite	tonnes	11 308	17 993	12 788	12 778	13 291	13 301	15 685	16 188	16 391	17 692
Gypsum											
Calcined	tonnes	1 884	2 674	3 017	2 680	5 422	3 812	7 442	8 247	8 288	7 178
Iodine	kilograms	4 301	43 026	24 061	27 152	35 166	13 550	73 991	62 791	145 084	16 642
Iron ore	tonnes	139 801 476	156 892 908	155 746 254	166 527 499	174 846 053	218 546 375	224 162 139	242 526 743	269 448 032	281 683 752

Table 3 Mineral exports from Brazil between 1999 and 2008 *(continued)*.

Brazil exports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Iron, steel & ferro-alloys											
Pig iron	tonnes	3 030 491	3 808 762	4 135 297	4 401 292	4 458 261	6 188 705	7 085 883	6 251 419	5 953 495	6 299 600
Sponge & powder	tonnes	1 540	1 777	1 636	18 587	1 930	3 568	22 428	6 463	6 780	12 360
Ferro-chrome	tonnes	228	135	144	426	155	659	142	238	7 159	34 825
Ferro-manganese	tonnes	23 279	52 613	22 201	68 740	51 463	53 441	60 115	58 006	34 880	43 135
Ferro-silico-manganese	tonnes	58 680	80 803	65 633	77 903	124 213	101 519	115 221	68 509	67 236	60 366
Ferro-molybdenum	tonnes	1	1	3	12	7	6	5	61	341	760
Ferro-nickel	tonnes	4 431	6 656	2 518	3 401	3 332	3 193	3 799	4 301	6 101	3 172
Ferro-niobium	tonnes	26 588	27 927	28 429	31 256	33 689	35 767	51 672	59 345	71 856	72 771
Ferro-silicon	tonnes	160 061	182 197	110 231	103 817	115 259	119 376	113 143	127 003	116 279	100 931
Ferro-titanium & ferro-silico-titanium	tonnes	34	...	52	52	10	7	896	1 265	4 988	4 002
Other ferro-alloys	tonnes	29 415	29 127	26 916	22 879	34 422	37 085	32 066	30 809	32 109	38 266
Silicon metal	tonnes	123 218	154 009	104 538	148 040	182 943	202 372	194 644	196 033	203 876	183 148
Ingots, blooms, billets	tonnes	6 378 978	6 213 425	6 364 730	7 780 000	7 238 843	6 339 131	5 956 752	5 737 706	5 098 908	5 664 821
Scrap	tonnes	19 364	734	12 505	13 230	10 162	13 085	12 370	34 098	94 833	119 051
Kaolin	tonnes	1 156 593	1 390 636	1 437 400	1 444 160	1 852 376	2 147 980	2 071 563	2 404 117	2 363 952	2 753 037
Lead											
Ores & concentrates	tonnes	9 723	20 677	11 225	11 230	11 191	22 211	33 121	13 945	29 083	25 695
Magnesite & magnesia											
Magnesia	tonnes	67 173	79 930	56 657	67 725	37 954	98 440	63 624	88 168	98 838	124 031
Manganese											
Ores & concentrates	tonnes	506 640	1 026 253	1 222 154	903 028	1 057 808	1 862 314	1 825 723	1 134 687	1 288 020	2 033 636
Metal	tonnes	28	95	212	182	475	372	365	692	1 278	2 110
Mercury	kilograms	17 298	7 268	60	...	1	1	345	...	...	3 795
Mica	tonnes	1 009	1 205	1 404	1 255	1 141	711	163	183	1 719	3 037
Nickel											
Mattes, sinters etc.	tonnes	19 015	16 330	20 038	13 832	11 556	12 182	13 711	13 056	14 294	14 971
Unwrought	tonnes	13 008	11 927	9 614	11 227	10 905	12 926	11 979	10 211	13 266	10 292
Scrap	tonnes	33	2	17	198	255	553	339	561	341	189
Oxides	tonnes	202	60	42	36	38	221	302	197	327	113
Crude petroleum	tonnes	28 822	964 852	5 721 476	12 135 264	12 606 965	12 036 275	14 313 622	19 191 542	21 973 801	22 587 813
Phosphate rock	tonnes	...	...	455	629	4 210	621	162	462	1 026	864
Platinum group metals											
Platinum & platinum metals	kilograms	—	11 548	7 246	22 536	11	142	311	1 004	18	4 296
Waste & scrap	kilograms	...	...	...	28 852	1 971	...	65 711	...	...	20 915
Potash											
Chloride	tonnes	751	939	1 329	1 885	3 525	4 492	3 233	5 896	13 974	17 193
Other potassic fertilisers	tonnes	146	137	162	197	132	141	134	276	269	752
Salt	tonnes	516 331	760 770	770 615	694 187	666 477	486 561	804 147	750 762	704 197	302 443
Silliminite minerals	tonnes	118	9	41	31	41	55	59	81	144	46
Silver											
Ores & concentrates	kilograms	894 812	717 162	1 087 518	807 682	886 042	835 371	716 980	1 007 044	1 008 000	800 200
Metal	kilograms	35 385	37 274	117 856	223 548	256 377	125 843	113 485	137 976	111 525	94 969
Sulphur & pyrites											
Pyrites	tonnes	2	356	357	514	370	1 849	11 032	754	751	807
Sulphur	tonnes	15	3	1	281	47	18	40	101	97	177
Talc	tonnes	6 028	7 074	6 299	5 617	5 605	6 552	6 981	11 216	18 468	9 624

Table 3 Mineral exports from Brazil between 1999 and 2008 *(continued)*.

Brazil exports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Tantalum & niobium											
Tantalum	tonnes	...	...	6	9	—	764	1 658	23	22	28
Tin											
Unwrought (b)	tonnes	6 469	7 544	6 417	6 027	3 861	5 774	5 453	4 538	5 712	6 192
Titanium											
Titanium minerals	tonnes	252	(c)* 18	(c)* 1	102	(c)* 700	(c)* 200	19 801	21 894	9 108	19 281
Oxides	tonnes	8 095	8 332	7 128	10 899	7 983	9 658	12 256	18 019	12 767	10 992
Tungsten											
Tungsten ores & concentrates	tonnes	...	...	23	...	8	459	802	660	625	519
Metal	tonnes	11	10	79	10	6	21	39	69	53	30
Zinc											
Unwrought	tonnes	26 244	24 325	23 339	50 492	67 883	59 015	70 826	73 636	49 517	38 516
Unwrought alloys	tonnes	...	...	1 055	9 038	2 008	1 136	826	1 357	1 805	1 678
Zirconium											
Ores & concentrates	tonnes	…	…	50	84	...	12	52	52	50	12

Note(s):-
(a) Including anthracite
(b) Including alloys
(c) BGS estimates, based on known imports into certain countries

Table 3 Mineral exports from Brazil between 1999 and 2008.

Imports

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Primary aggregates	tonnes	2 351	2 989	2 554	2 465	7 249	26 134	3 739	69 739	58 979	120 729
Bauxite, alumina & aluminium											
Bauxite	tonnes	5 882	8 387	8 547	8 735	17 683	36 498	46 619	77 587	416 251	17 837
Alumina hydrate	tonnes	1 266	1 695	1 009	953	804	923	1 113	1 602	1 102	1 226
Unwrought	tonnes	1 056	1 621	7 744	7 904	5 641	3 948	5 308	1 713	8 693	10 760
Unwrought alloys	tonnes	1 051	708	988	979	1 116	8 070	13 271	9 917	13 714	7 726
Scrap	tonnes	4 400	4 230	12 182	13 535	8 035	19 415	43 119	54 557	103 487	92 740
Antimony											
Metal	tonnes	1 062	1 258	1 200	1 131	1 065	893	812	822	1 083	1 118
Oxide	tonnes	158	345	536	334	394	564	469	559	523	566
Arsenic											
Metallic arsenic	tonnes	18	62	29	56	76	53	60	24	12	95
Asbestos											
Unmanufactured	tonnes	24 049	35 491	33 136	23 187	21 902	31 673	36 988	39 218	36 441	21 542
Barytes	tonnes	288	179	12 953	342	981	1 152	7 048	7 164	20 192	5 383
Bentonite & fuller's earth											
Bentonite	tonnes	53 900	82 963	73 246	92 956	93 081	114 139	168 444	137 737	221 069	215 769
Fuller's earth	tonnes	...	200	277	1 399	1 200	1 369	1 574	1 910	...	...
Bismuth											
Metal	tonnes	84	128	104	115	105	99	164	114	126	145
Bromine (a)	kilograms	9 592	35 560	51 542	43 369	30 760	67 166	98 335	46 646	27 783	32 463
Cadmium											
Metal	tonnes	83	13	62	37	245	176	29	45	150	113
Cement											
Cement clinkers	tonnes	93 952	5 570	122 237	262 592	386 271	183 747	95 262	58 227	139 761	169 570
Portland cement	tonnes	138 314	157 389	134 364	145 792	223 072	252 896	223 735	203 288	280 280	280 195
Chromium											
Ores & concentrates	tonnes	8 482	48 347	10 295	7 596	71 433	44 349	18 038	22 148	28 533	23 481
Metal	tonnes	239	257	250	336	407	525	607	620	698	826
Coal											
Anthracite	tonnes	487 980	945 853	999 385	1 323 418	1 399 411	1 565 289	1 561 473	1 489 882	1 636 531	1 593 581
Other	tonnes	12 941 936	13 928 271	13 791 919	11 688 779	13 432 347	14 853 221	14 188 928	13 072 802	15 112 889	16 873 286
Cobalt											
Ores & concentrates	tonnes	59	84	169	140	94	8	145	100	71	228
Metal	tonnes	185	325	332	301	299	256	334	399	457	407
Oxides	tonnes	149	135	173	110	428	289	347	262	213	475
Copper											
Ores & concentrates	tonnes	582 104	495 790	635 410	462 934	412 629	541 196	403 012	536 043	482 940	473 753
Unwrought	tonnes	115 844	160 772	147 717	103 181	152 553	154 657	169 392	176 092	218 362	252 796
Scrap	tonnes	1 129	4 120	3 544	852	167	1 275	1 566	720	2 919	4 300
Diamond											
Gem, cut	carats	...	...	...	5 807	4 575	5 454	3 206	5 385	11 232	52 370
Industrial	carats	...	253 027	238 253	302 544	45 980	51 621	65 961	44 032	10 775	32 929
Dust	carats	...	11 126 909	23 276 018	16 725 494	22 544 341	27 410 000	30 160 000	35 305 000	40 395 847	42 457 833
Diatomite	tonnes	2 840	3 182	3 985	4 107	4 257	6 914	7 030	8 184	8 562	10 074

Table 4 Mineral imports to Brazil between 1999 and 2008 *(continued)*.

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Feldspar	tonnes	1 711	1 547	735	1 220	932	478	20	14	13	2 087
Fluorspar	tonnes	7 215	31 872	18 315	32 645	21 910	13 450	25 865	32 966	26 586	40 395
Gold											
Metal	kilograms	£68 100	£141 900	£53 900	£72 600	£84 800	£108 500	£69 300	£111 800	£180 300	£451 200
Graphite	tonnes	78	227	185	866	936	1 404	1 965	849	868	434
Gypsum											
Crude & calcined	tonnes	1 229	61 916	1 057	696	330	1 484	1 065	646	5 129	6 749
Iodine	kilograms	527 000	883 072	1 108 799	1 340 171	1 820 893	1 324 962	1 583 517	1 712 952	1 521 721	1 471 034
Iron ore (b)	tonnes	94	44 956	53	0	77 281	59 875	78	41	79	66 029
Iron, steel & ferro-alloys											
Pig iron	tonnes	—	—	5	75	—	1	437	366	820	1 199
Sponge & powder	tonnes	4 463	29 208	5 903	7 757	11 133	39 496	41 753	18 948	26 120	25 679
Ferro-chrome	tonnes	4 970	10 629	7 182	8 921	10 587	13 366	11 194	23 423	24 889	11 064
Ferro-manganese	tonnes	28 453	8 053	27 918	14 012	15 423	17 754	20 626	24 756	36 183	29 079
Ferro-silico-manganese	tonnes	524	7	78	65	625	1 175	1 469	1 457	3 270	7 558
Ferro-molybdenum	tonnes	117	862	851	855	1 031	1 382	1 164	1 440	1 298	896
Ferro-nickel	tonnes	161	120	81	195	317	17	33	661	2 466	5 644
Ferro-silicon	tonnes	147	585	2 495	1 026	2 335	10 565	11 420	9 811	14 241	30 410
Ferro-titanium & ferro-silico-titanium	tonnes	1 539	1 996	2 186	2 134	2 300	2 009	1 897	655	766	631
Ferro-tungsten & ferro-silico-tungsten	tonnes	419	448	322	339	424	475	425	336	603	377
Ferro-vanadium	tonnes	748	1 192	1 503	1 120	1 326	1 346	1 402	1 632	1 711	1 899
Other ferro-alloys	tonnes	941	610	794	1 044	1 575	2 129	1 789	2 740	4 470	3 368
Silicon metal	tonnes	...	...	1 431	2 623	2 427	6 944	6 694	10 316	12 168	20 109
Ingots, blooms, billets	tonnes	2 476	111 778	74 247	3 641	12 477	11 766	23 641	806 474	52 746	149 717
Scrap	tonnes	17 473	23 293	11 267	13 309	50 121	68 968	92 521	56 895	45 985	44 273
Kaolin	tonnes	3 746	5 367	5 686	5 079	6 062	6 573	7 056	9 493	14 389	15 960
Lead											
Unwrought	tonnes	56 013	70 723	73 454	71 025	56 524	69 232	75 032	79 466	62 776	86 781
Magnesite & magnesia											
Magnesia	tonnes	46 717	7 690	7 610	7 437	9 330	8 013	13 294	12 726	9 063	11 851
Manganese											
Ores & concentrates	tonnes	6	3	32	17 561	2 336	28 280	2 054	25 299	142 920	135 344
Metal	tonnes	2 161	3 075	3 823	3 427	5 969	7 313	6 693	8 935	11 220	10 816
Mercury	kilograms	49 720	40 537	62 545	66 885	80 806	37 788	43 260	44 219	35 775	23 895
Mica	tonnes	170	303	387	585	721	1 427	1 342	1 123	1 325	1 879
Molybdenum											
Ores & concentrates	tonnes	3 932	4 384	4 598	4 504	5 257	5 384	4 963	6 508	8 335	8 080
Metal	tonnes	199	135	116	121	137	144	163	164	262	322
Oxides	tonnes	42	414	65	853	394	148	28	120	405	242
Natural gas	tonnes	225 402	1 493 470	2 444 941	4 294 562	4 425 862	5 997 311	6 747 238	7 475 397	7 738 108	8 850 902
Nickel											
Mattes, sinters etc.	tonnes	634	1 108	1 051	1 452	1 025	2 226	1 806	168	0	—
Unwrought (c)	tonnes	8 870	10 524	7 829	11 483	14 042	10 520	6 570	4 591	4 529	3 996
Oxides	tonnes	77	356	311	88	100	211	168	201	1 794	165
Crude petroleum	tonnes	18 207 522	15 123 678	17 070 639	17 918 759	16 898 629	23 033 904	18 812 403	17 889 463	21 718 624	20 301 441
Phosphate rock	tonnes	619 379	745 519	743 130	866 826	1 095 132	1 563 891	1 215 086	1 404 577	1 749 388	1 615 725

Table 4 Mineral imports to Brazil between 1999 and 2008 *(continued)*.

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Platinum group metals											
Platinum	kilograms	2 717	6 645	13 327	2 850	8 461	2 544	1 973	2 566	2 348	3 012
Palladium	kilograms	3 446	3 451	3 047	2 542	2 647	2 973	4 098	3 435	3 304	3 557
Other platinum metals	kilograms	629	854	731	650	372	506	492	417	437	566
Waste & scrap	kilograms	...	...	...	176	165	241	147	288	234	126
Potash											
Sulphate	tonnes	42 979	29 240	23 980	78 553	59 959	83 888	50 520	54 291	34 538	34 657
Chloride	tonnes	3 190 826	4 342 672	4 076 997	4 371 994	5 228 753	6 816 704	5 012 876	5 403 470	6 762 112	6 750 586
Other potassic fertilisers	tonnes	76	102	42	40	3 117	5 444	6 083	8 099	7 631	8 890
Rare earths											
Cerium compounds	tonnes	360	355	239	326	283	276	312	294	288	197
Other rare earth compounds	tonnes	859	1 537	2 858	1 345	1 954	1 281	2 355	1 699	2 509	2 083
Metals	tonnes	703	958	801	561	760	679	434	437	574	548
Salt	tonnes	215 593	191 348	108 097	218 031	312 458	384 447	370 916	437 140	418 278	570 376
Silliminite minerals	tonnes	479	2 060	3 141	1 423	1 231	3 333	3 242	3 543	6 533	4 652
Silver											
Metal	kilograms	193 437	218 466	300 980	418 944	459 341	376 195	397 943	298 121	381 590	334 305
Sulphur & pyrites											
Pyrites	tonnes	201	297	303	286	317	449	453	656	627	633
Sulphur	tonnes	1 419 409	1 583 840	1 482 888	1 692 738	1 752 300	2 020 899	1 647 252	2 990 962	2 072 869	2 159 137
Talc	tonnes	10 763	10 096	8 065	4 599	5 006	6 908	4 625	5 370	7 159	11 147
Tin											
Unwrought (c)	tonnes	669	487	116	466	858	1 822	2 136	1 917	1 632	744
Titanium											
Titanium minerals	tonnes	220	1 508	17 174	2 886	2 211	2 067	2 043	2 559	3 621	24 509
Metal	tonnes	26 283	21 249	1 663	2 337	2 491	8 268	15 226	15 248	15 447	17 453
Oxides	tonnes	74 482	70 754	73 652	68 593	67 162	80 052	87 176	93 245	99 914	124 140
Tungsten											
Metal	tonnes	219	294	244	188	280	265	241	366	281	293
Vanadium											
Pentoxide	tonnes	84	200	105	177	244	149	131	139	512	301
Metal	tonnes	...	...	2	6	10	9	11	10	...	...
Zinc											
Ores & concentrates	tonnes	216 288	186 877	183 792	236 735	260 548	261 860	234 933	215 858	185 267	221 193
Unwrought (c)	tonnes	17 853	23 228	34 311	17 611	23 390	32 038	24 683	28 893	34 946	38 561
Scrap	tonnes	96	1 026	...	...	112	471	2 532	101	23	...
Zirconium											
Ores & concentrates	tonnes	5 504	15 012	12 288	10 631	11 782	17 218	14 131	12 572	9 944	16 267
Metal	tonnes	42	62	69	83	89	125	111	84	81	91

Note(s):-
(a) May include some fluorine
(b) Including burnt pyrites
(c) Including alloys

Table 4 Mineral imports to Brazil between 1999 and 2008.

Russia

Key facts

- *The world's largest country, with a land area of more than 17 million square kilometres or more than one eighth of the total land surface.*
- *The ninth most populous nation in the world, totalling 140 million.*
- *The world's seventh largest economy on a GDP (PPP) basis.*
- *The Russian economy fell by nearly eight per cent in 2009 as a result of the global recession, but previously had averaged a growth rate of seven per cent for a decade.*
- *The world's largest producer of nickel, natural gas and vanadium; also the world's second largest producer of crude petroleum, platinum group metals and primary aluminium.*
- *The world's fifth largest iron ore producer, with production increasing by 22 per cent between 1999 and 2008.*
- *Production of bauxite and primary aluminium have both increased by 33 per cent in 10 years, with Russia now the eighth largest bauxite producer in the world.*
- *Nickel output has fallen slightly in recent years, and has risen by less than 10 per cent since 1999, but Russia still produces nearly 20 per cent of the world's total.*
- *The world's third largest reserves of gold, with production increasing by 37 per cent in 10 years.*
- *Supplies 70 per cent of the world's palladium, despite output falling by 49 per cent over 10 years; also 20 per cent of the world's platinum, with an increase of 79 per cent in the same period.*
- *The world's largest producer of diamonds if measured by volume and second largest if measured by value.*
- *Production of crude petroleum has increased by 60 per cent between 1999 and 2008, with natural gas output increasing by 18 per cent and coal by 31 per cent over the same period.*

The Russian Federation comprises the northern part of the Eurasian landmass and is the largest country in the world with a total area of 17 098 000 square kilometres covering more than one eighth of the Earth's land area. The country comprises two vast plains: the eastern European plain and west Siberian plain, separated by the Ural Mountains. The land rises to the Caucasus Mountains in the south-west and Sayan Mountains along the Mongolian border. It is the largest of 12 republics that make up the Commonwealth of Independent States (CIS) (Figure 10).

Figure 10 Russia geography.

Republics, regions, districts & territories of the Russian Federation

Southern Federal District

1. Republic of Dagestan
2. Republic of Chechnya
3. Republic of Ingushetia
4. Republic of North Osetia
5. Republic of Kabardino-Balkaria
6. Republic of Karachaevo-Cherkessia
7. Krasnodarsky krai
8. Republic of Adygeya
9. Republic of Kalmykia
10. Stavropolsky krai
11. Astrakhanskaya oblast
12. Volgogradskaya oblast
13. Rostovskaya oblast

Central Federal District

14. Belgorodskaya oblast
15. Kurskaya oblast
16. Voronezhskaya oblast
17. Bryanskaya oblast
18. Tambovskaya oblast
19. Lipetskaya oblast
20. Orlovskaya oblast
21. Tulskaya oblast
22. Ryazanskaya oblast
23. Kaluzhskaya oblast
24. Moskovskaya oblast
25. Smolenskaya oblast
26. Tverskaya oblast
27. Ivannovskaya oblast
28. Yaroslavskaya oblast
29. Vladimirskaya oblast
30. Kostromskaya oblast

Volga Federal District

31. Nizhegorodskaya oblast
32. Republic of Mordovia
33. Penzenskaya oblast
34. Ulyanovskaya oblast
35. Samarskaya oblast
36. Saratovskaya oblast
37. Orenburgskaya oblast
38. Republic of Tatarstan
39. Republic of Bashkortostan
40. Permskaya oblast
41. Republic of Udmurtia
42. Kirovskaya oblast
43. Permsky krai

Northwestern Federal District

44. Pskovskaya oblast
45. Novgorodskaya oblast
46. Leningradskaya oblast
47. Vologodskaya oblast
48. Arkhangelskaya oblast
49. Republic of Komi
50. Republic of Karelia
51. Murmaskaya oblast
52. Nenetsky AO
85. Kaliningradskaya oblast

Urals Federal District

53. Khanty-Mansiysky AO
54. Chelyabinskaya oblast
55. Kurganskaya oblast
56. Sverdkovskaya oblast
57. Tumenskaya oblast
58. Yamato-Nenetsky AO

Siberian Federal District

59. Omskaya oblast
60. Tomoskaya oblast
61. Novosibiriskaya oblast
62. Altaisky krai
63. Kemerovskaya oblast
64. Republic of Altay
65. Republic of Khakasia
66. Krasnoyarsky krai
67. Republic of Tyva
68. Ust-Ordynsky AO
69. Aginsky Buryotsky AO
70. Chitinskaya oblast
71. Republic of Buryatia
72. Irkutskaya oblast
73. Evenksky AO
74. Tamyrsky AO

Far Eastern Federal District

75. Republic of Sakha
76. Magadanskaya oblast
77. Amurskaya oblast
78. Khabarovsky krai
79. Jewish AO
80. Primorsky krai
81. Sakhalinskaya oblast
82. Kamchatka oblast
83. Koryansky AO
84. Chukotsky AO

oblast = region AO = administrative district krai = territory

Figure 10 Russia geography *(continued)*.

The population is estimated at 140 041 000 (July 2009), making it the ninth most populous nation in the world. In 2008 it was ranked as the eighth largest economy by nominal gross domestic product (GDP) and seventh largest in terms of GDP on a purchasing power parity (PPP) basis. With the global financial crisis the Russian economy slumped by 7.9 per cent in 2009 but is expected to recover to 3.2 per cent growth in 2010. This compares to 5.6 per cent growth in 2008 and an average of seven per cent over the past decade.

Russia has the world's largest natural gas reserves, eighth largest oil reserves and second largest coal reserves and is considered to be an energy superpower. It is the world's largest natural gas producer and exporter, and the second largest oil producer and exporter after Saudi Arabia. Natural gas, oil, metals and timber account for over 80 per cent of Russian exports and contribute more than 60 per cent to its GDP. Other important minerals are shown in Table 5.

The locations of selected major mines and important deposits are shown in Figure 11 (metallics) and Figure 12 (non-metallics).

Commodity	World rank	Percent of total world production	Commodity	World rank	Percent of total world production
Asbestos	1	46	Copper (smelter)	5	5
Vanadium	1	40	Chromium ores & concentrates	5	4
Diamond	1	22	Fluorspar	5	4
Natural gas	1	21	Iron ore	5	4
Nickel (smelter/ refinery)	1	19	Antimony (mine)	5	1
Nickel (mine)	1	18	Gold (mine)	6	8
Platinum group metals	2	28	Silver (mine)	6	6
Potash	2	18	Copper (mine)	6	5
Petroleum (crude)	2	12	Alumina	6	4
Aluminium (primary)	2	11	Bentonite	6	3
Magnesite	2	11	Graphite	6	1
Tungsten (mine)	2	6	Cadmium	7	4
Phosphate rock	4	6	Cobalt (mine)	7	4
Vermiculite	4	6	Mica	7	3
Steel (crude)	4	5	Molybdenum (mine)	7	2
Mercury	4	5	Iodine	7	0.4
Pig iron	4	5	Cobalt (metal)	8	4
Magnesium metal (primary)	4	4	Bauxite	8	3
Arsenic (white)	4	3	Bismuth (mine)	9	1
Uranium	5	8	Bromine	9	0.01
Borates	5	7	Gypsum	10	2
Selenium metal	5	6	Perlite	10	1
Coal	5	5	Tin (smelter)	10	1
Copper (refined)	5	5	Zirconium minerals	10	1

Table 5 Russia's top 10 world rankings by commodity, with proportion of world total produced.

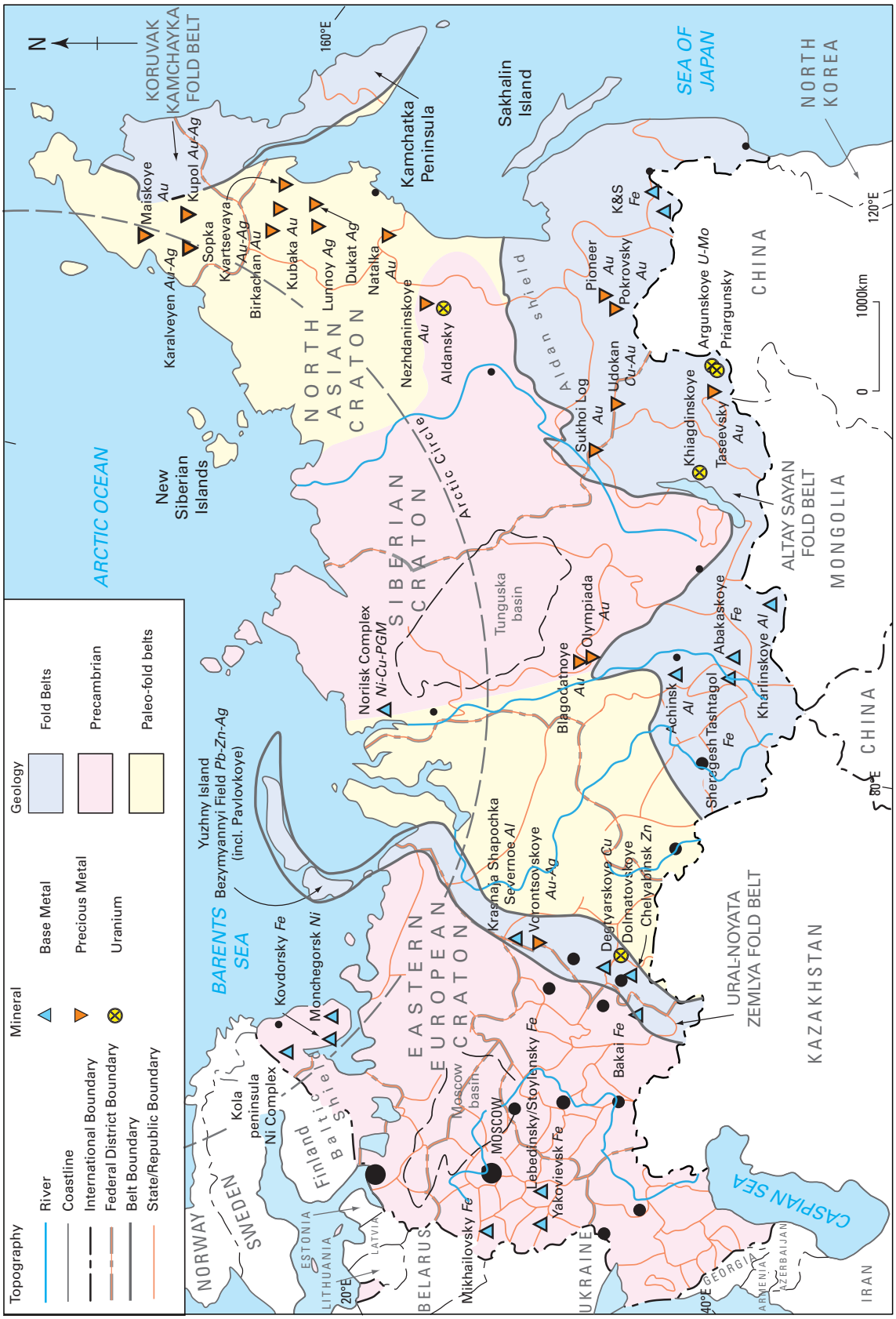

Figure 11 Selected major mines and important deposits in Russia (metallics).

Notes: Certain mines and/or deposits mentioned in the text have been omitted for clarity.
Fe = iron ore, Au = gold, Cu = copper, Ni = nickel, PGM = platinum group metals, Al = aluminium, U = uranium, Zn = zinc, Pb = lead, Ag = silver, Mo = molybdenum

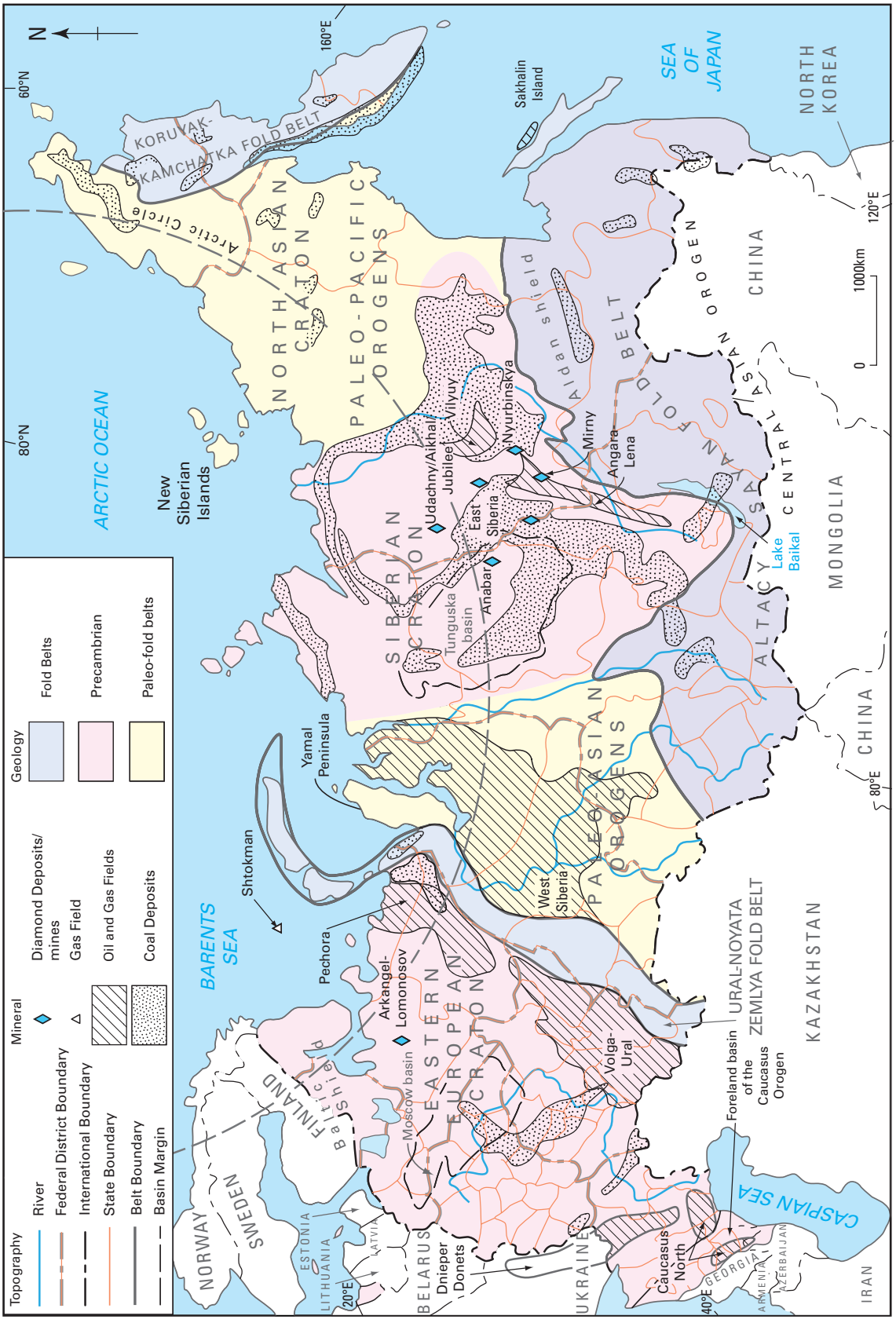

Figure 12 Selected major mines and important deposits in Russia (non-metallics).

Note: Certain mines and/or deposits mentioned in the text have been omitted for clarity.

Iron ore

Russia has about 17 per cent of the world's iron ore reserves. It is the fifth largest iron ore miner and accounts for about four per cent of global production. Total iron ore production in 2008 was 99.9 million tonnes, five per cent down on 2007 although this was still 22 per cent higher than output in 1999 (Figure 13).

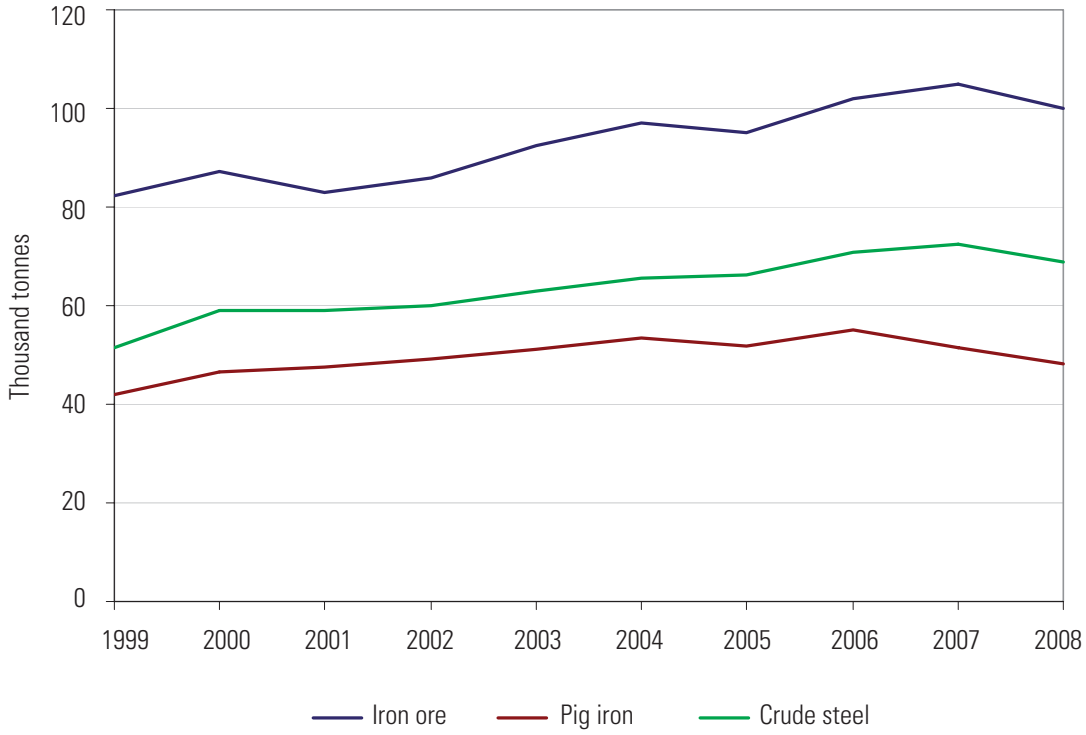

Figure 13 Russia's production of iron ore, pig iron and crude steel from 1999 to 2008.

The biggest iron ore mines and beneficiation plants (known as GOK's) are in the Central District (Kursk and Belgorod regions), in the Northwest District and the Urals. Ore from Lebedinsky, Mikhailovsky, Stoylensky and KMA GOKs account for about 55 per cent of all Russian supply. The Lebedinsky GOK, Russia's largest producer at 20 million tonnes per year, exploits ferruginous quartzites of the Kursk Magnetic Anomaly with over six billion tonnes of reserves. The Mikhailovsky GOK at more than 11 billion tonnes has the world's largest iron ore reserves and is currently Russia's second largest producer at 19 million tonnes per year.

Over 77 per cent of Russian iron ore is consumed domestically but these GOKs, amongst others, have sufficient reserves in the ground to expand their operations and increase output. China's steel makers are considering taking more iron ore by rail from Russia, due to escalating demand and increasing haulage costs from Australia, Brazil and India. In September 2009 the Petropavlovsk Group started construction of its Kimkan and Sutara iron ore project in the Russian Far East and a rail bridge across the Amur River to link Russia and China. This project will have an annual capacity of 4.18 million tonnes of iron ore concentrates and 2.5 million tonnes of granulated direct reduced iron. Full production of the concentrates is scheduled for 2012 and the granulated iron in 2014.

Crude steel

In 2008 Russia produced 68.7 million tonnes of steel and remains the fourth largest producer accounting for five per cent of world output. Although output was down by five per cent in 2008 compared to 2007, this was still 33 per cent higher than the production in 1999 (Figure 13).

Russia's largest producer, Severstal, produced 11 million tonnes of steel, equivalent to 16 per cent of Russia's total. With the onset of the world economic crisis, Severstal cut production amounting to a five per cent decrease for the fourth quarter of 2008 compared to 2007. The Evraz Group SA, which was also adversely affected, produced 17.7 million tonnes of steel in 2008. Prior to the crisis the Evraz Group acquired Claymont Steel (USA), IPSCO (Canada) and selected Ukrainian assets.

Magnitogorsk Metallurgical Co. (MMC), which produced 12 million tonnes of crude steel in 2008, halved production in the last quarter of 2009. Metalloinvest, a subsidiary of Gazprom, owns the Mikhailovsky and Lebedinsky GOK's which together produced 41.3 million tonnes in 2008.

Novolipetsk or NLMK is the fourth largest steel producer in Russia, accounting for 15 per cent of domestic crude steel output. It is self-sufficient in iron ore through its 97 per cent stake in Stoylensky GOK, and is Russia's third largest iron ore producer. Mechel produced 5.9 million tonnes of steel but was hit severely by the crisis due to heavy borrowings to finance acquisitions of Ductil Steel (Romania), Bluestone Industries Inc. (USA) and Oriel Resources (UK).

Consolidation of the Russian steel sector over recent years via acquisitions have added scale and geographical diversity but resulted in the high levels of debt. Nevertheless, Russian steel companies have a high degree of self-sufficiency in key raw materials enabling them to remain competitive despite the economic downturn. Capacity utilisation was around 80–90 per cent in March 2009 and neared 100 per cent in September 2009 driven by strong increases in export sales.

Bauxite, alumina and aluminium

Russia is the eighth largest bauxite producer in the world with an output of six million tonnes in 2008 and sixth largest producer of alumina in 2008. It is also second only to China in primary aluminium production which grew to 4.2 million tonnes in 2008, an increase of six per cent compared to 2007 and 33 per cent compared to 1999 (Figure 14). Known bauxite reserves are mainly in the Komi Republic (52 per cent of the total) and in the Urals (27 per cent). Crude bauxite comprises 60 per cent of the alumina production, while the rest is produced from nepheline ore.

United Company Rusal, one of the world's largest aluminium and alumina producers, controls all Russian bauxite, alumina and aluminium production and accounts for 13–15 per cent of the global alumina and 11–12 per cent of the global aluminium markets respectively. It also has operations in 19 countries in five continents. Rusal has the largest debt among Russian companies (estimated at US$16.6 billion in June 2009). As a result of the economic recession, it reduced aluminium production by 10 per cent (to 1.98 million tonnes) and alumina by 34 per cent (to 3.7 million tonnes) in the first half of 2009.

The principal alumina plants in Russia are Bogolavsky (one million tonnes) and Achinsk (one million tonnes) in Siberia. Eighty per cent of Rusal's production facilities are located in Asia and its key smelters are just 500 kilometres from the

Chinese border which makes Rusal a natural aluminium supplier and trading partner for China. Rusal is constructing a new 0.75 million tonnes aluminium smelter at Taishet in the Irkutsk region which is scheduled for completion in 2011. The Krasnoyarsk and Sayanogorsk smelters are also being modernised.

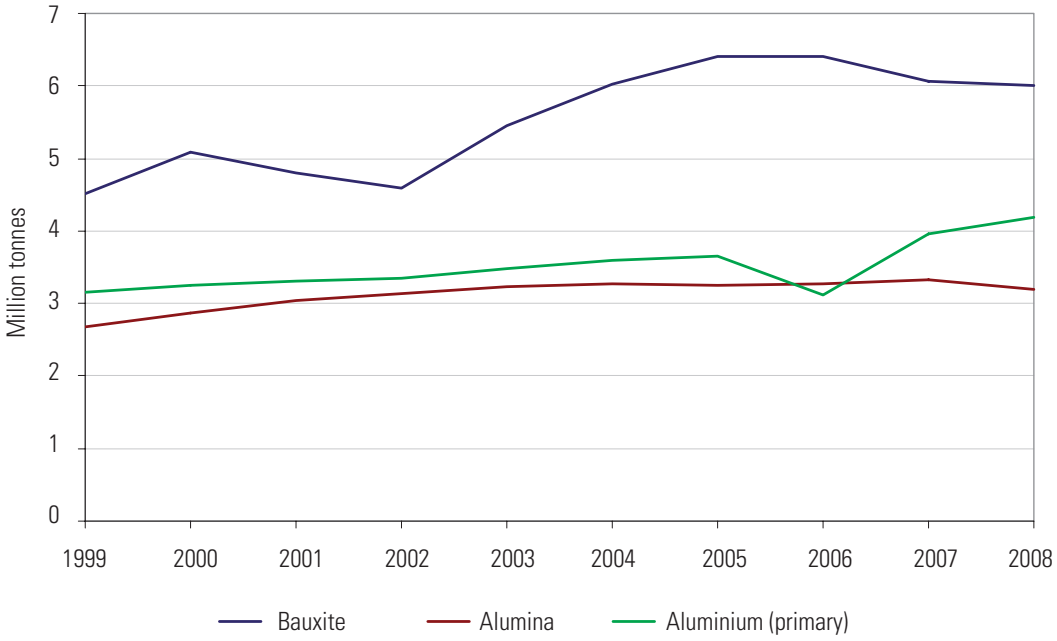

Figure 14 Russia's production of bauxite, alumina and primary aluminium from 1999 to 2008.

Nickel

Russia is the world's leading nickel producer with an output of 277 000 tonnes of mined ore and 256 500 tonnes of refined metal in 2008. This represents a drop of one per cent and five per cent respectively on 2007 and a significant decline from the peak production recorded in 2006 (Figure 15). Russia has nickel reserves of 6.6 million tonnes; significantly less than Australia and New Caledonia.

Main Russian production units include the Polar Division in the Krasnoyarsky region and the Kola Mining and Metallurgical Company (Kola MMC), the largest industrial producer in the Murmansk region. Norilsk Nickel is responsible for 92 per cent of production, while the rest of the market is served by Yuzhuralnikel (part of Mechel) and Ufaleinikel, exploiting lateritic nickel deposits in the Urals. Norilsk Nickel is Russia's largest diversified mining and metals company, the world's largest producer of nickel and palladium and one of the world's largest producers of platinum, rhodium, copper and cobalt. However, Norilsk Nickel's revenue in 2008 dropped sharply due largely to the lower nickel and copper prices.

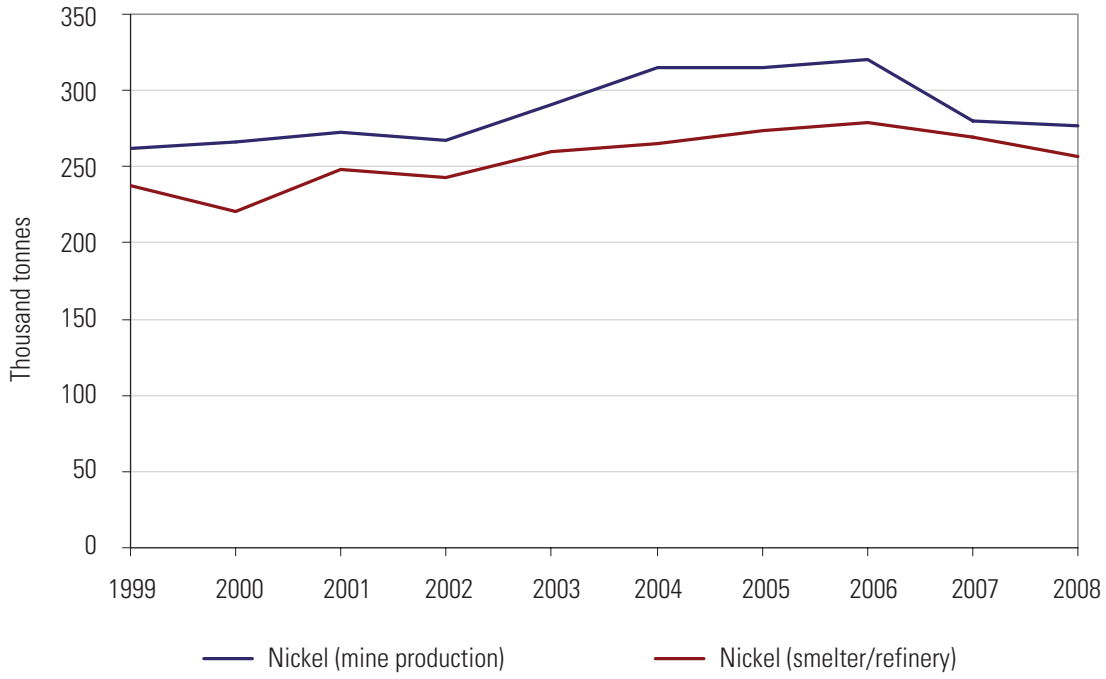

Figure 15 Russia's production of nickel from 1999 to 2008.

Copper

Russia has an estimated 3.6 per cent of the world's copper reserves and about one per cent of total land-based copper resources. Russia's mined copper production reached 705 000 tonnes in 2008, an increase of two per cent compared to 2007. Smelter copper production, by contrast, has been declining since 2005 and refined copper output in 2008 was 862 000 tonnes, a drop of 10 per cent on 2007 (Figure 16).

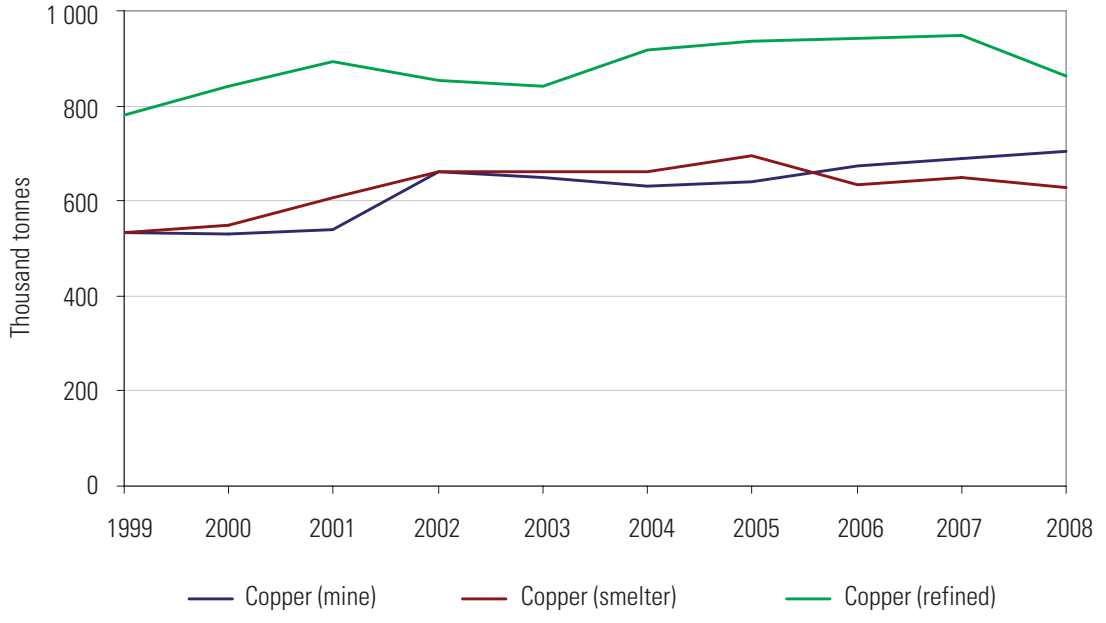

Figure 16 Russia's production of copper from 1999 to 2008.

The leading producers are Norilsk Nickel, Urals Mining and Metallurgical Co (UMMC) and the Russian Copper Co (RMK). Norilsk Nickel's copper production was 400 344 tonnes in 2008 representing 46.4 per cent of domestic production. The UMMC accounted for 39 per cent of domestic copper production.

LLC Lunsin, a Russian subsidiary of Zijing Mining, established a Chinese–Russian joint venture to develop the Kyzyl-Tashtyg copper–lead–zinc volcanogenic massive sulphide (VMS) deposit at Tuva. Overall resources amount to 12.9 million tonnes. The mine complex, with a design capacity of one million tonnes per year, is planned to be on-stream by 2012.

The sediment-hosted copper deposit of Udokan in the Chita region of Siberia is one of the world's largest undeveloped copper resources. Economic reserves stand at 1375 million tonnes of ore containing 20 million tonnes of copper and 11 900 tonnes of silver. The deposit could produce 187 000 tonnes of copper annually, equivalent to 15 per cent of Russian current output. In 2008 Metalloinvest won an investment tender to develop Udokan in partnership with Rostkhnologii.

Lead and zinc

Russia has about eight per cent and 17 per cent respectively of the world's lead and zinc reserves. The Russian Federation produced 60 000 tonnes of mined lead in 2008 and 123 000 tonnes of refined lead, representing increases compared to 2007 of 25 per cent and 19 per cent respectively. Over the ten-year period from 1999 to 2008 mine production of lead has increased by more than 300 per cent, and refined lead by 123 per cent (Figure 17). In 2008, Russia also produced 205 000 tonnes of mined zinc and 263 000 tonnes of slab zinc, representing an increase of 16 per cent in mined output but no change in the output of the refined metal (Figure 17).

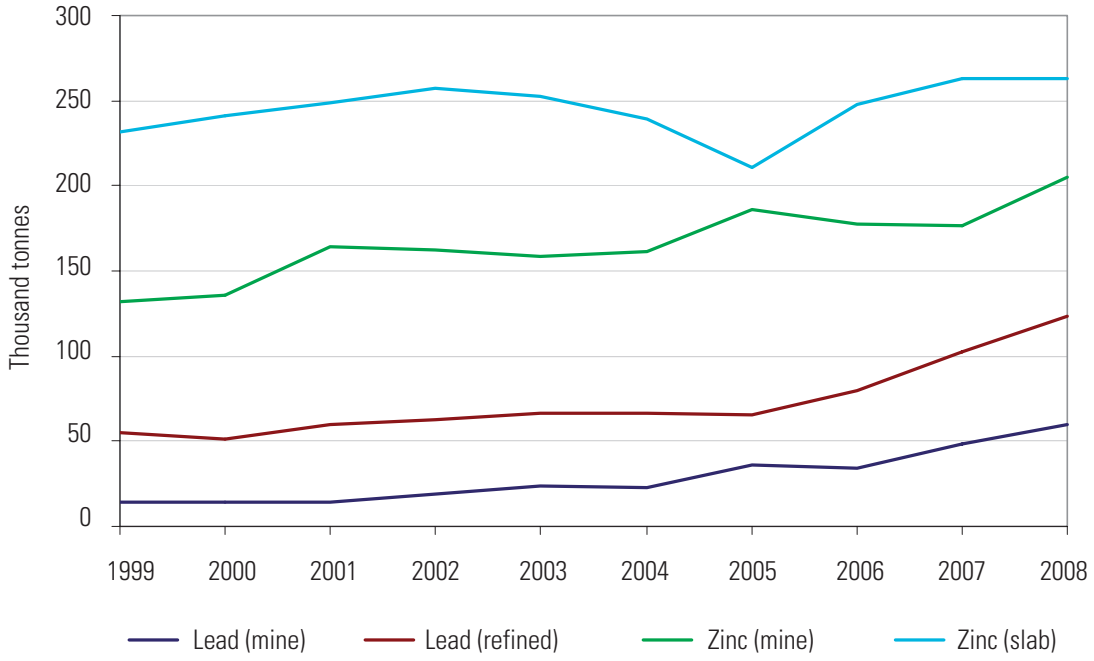

Figure 17 Russia's production of lead and zinc from 1999 to 2008.

The largest Russian producer is the Urals Mining and Metallurgical Co. (UMMC) and its Chelyabinsk zinc plant (CZP). Chelyabinsk Zinc produced 165 000 tonnes zinc in 2008 but with commodity prices falling sharply in the fourth quarter of 2008 produced only 83 200 tonnes in the first nine months of 2009.

There are a number of undeveloped deposits in the country, including Ozernoye and Kholodninskoye in Buryatia which are controlled by Metropol. Ozernoye has a resource of 157 million tonnes at 5.2 per cent zinc and 1.25 per cent lead with a total of 4500 tonnes silver and 25 tonnes gold. The mine is to be commissioned in 2012 with a capacity to produce 740 000 tonnes of zinc and 110 000 tonnes of lead concentrates annually. Kholodninskoye has an estimated 13.3 million tonnes and two million tonnes of contained zinc and lead respectively, equivalent to 20 per cent of Russia's zinc reserves. It is the world's third largest known deposit but there are concerns that its development would have adverse environmental impacts on Lake Baikal.

OJSC Pervaya Gornorudnaya Co. has applied for a mining licence on the Pavlovskoye deposit on Yuzhniy Island, Novaya Zemlya Archipelago with estimated contained metal resources of 1.9 million tonnes zinc, 0.45 million tonnes lead and 672 tonnes silver. The total resource potential of the Bezymyannyi Orefield (including Pavlovskoye) is 21.4 million tonnes of lead and zinc.

Gold

Russia has 10.6 per cent of the world's gold reserves (ranked third). In 2008 Russia produced 172 600 kilograms of gold, up by 10 per cent from 2007 (Figure 18). Gold output rose by a further 12.2 per cent in the first ten months of 2009 compared with the same period in 2008 spurred on by the surging gold price. The 2009 forecast production is expected to exceed 190 000 kilograms.

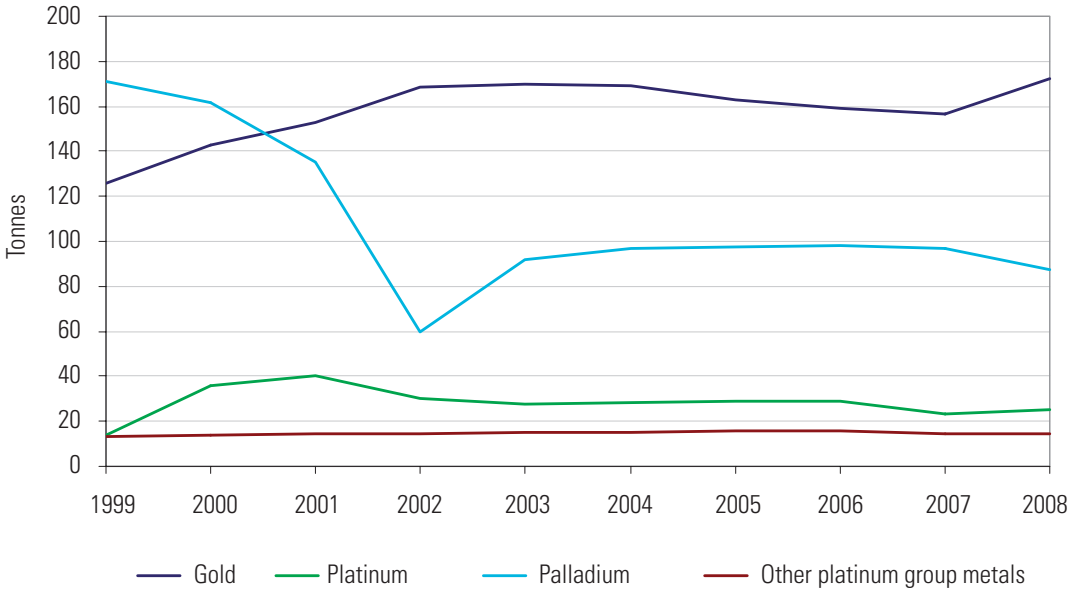

Figure 18 Russia's production of gold and platinum group metals between 1999 and 2008.

The latest increase is partly attributed to output from Kinross Gold's Kupol and Karalveyem mines in the Chukotka region and also to an increase in gold produced as a by-product which rose to 13 000 kilograms in the first three quarters of 2009. Krasnoyarsk was the biggest gold producing region, and the Olympiada mine in Krasnoyarsk the biggest producer, followed by the regions of Chukotka, Amur, Sakha-Yakutia and Khabarovsk. Placer deposits currently contribute about 40 per cent of annual production. They contain 18 per cent of the country's gold reserves but have been significantly depleted, and most placer operations are unlikely to survive beyond 2011. More than half of Russia's hard rock gold resources occur in the Maiskoye, Natalkinskoe, Nezhdaninskoe, Olympiada, and Sukhoi Log deposits in Siberia and the Russian Far East.

Polyus Zoloto, the largest gold producer which owns Olympiada amongst other mines, produced 37 320 kilograms of refined gold in 2008. Output has remained virtually unchanged for many years but with the commissioning of the six million tonnes per year Blagodatnoye mine Polyus expects to raise output to 46 655 kilograms in 2010 from the 40 434 kilograms planned in 2009. Further projected output increases to 56 000 kilograms in 2011 and 59 000 kilograms in 2012 will be followed by a significant jump to 71 540 kilograms of gold in 2013 with the start-up of the 10 million tonnes per year Natalka mine in the Magadan region. Natalka has proven and probable reserves of 12 440 kilograms of gold. Polyus Zoloto plans to increase production at this mine to 29 million tonnes per year by 2017 and 40 million tonnes per year, with a gold output of 40 430 kilograms, by 2022.

In 2008 Polyus signed a 51:49 joint venture agreement with Kinross Gold to develop its Nezhdaninskoye gold deposit in Yakutia. This is one of the largest deposits in Russia with a resource of about 681 000 kilograms of gold. Kinross Gold's Kupol gold–silver mine in Chukotka started production in 2008 with a yield of 16 702 kilograms of gold and 171 000 kilograms of silver.

Petropavlovsk increased gold production in 2008 to 12 242 kilograms mostly from the Pokrovsky and newly commissioned Pioneer deposits in the Amur region. Petropavlovsk gold production increased to 9377 kilograms for the first nine months of 2009 (a 29 per cent increase on a similar period in 2008), largely due to a doubling of production at the Pioneer mine. The Malomir Project is on track for commissioning in the second half of 2010 and Albyn is expected to start at the end of 2011. Highland Gold (Barrick Gold Corp), which produced 5120 kilograms in 2008, increased its reserves at the Taseeevsky deposit in Transbaikalia to 110 900 kilograms gold.

Platinum group metals

Russia has 8.7 per cent of the world's reserves of platinum group metals (PGMs). It is one of the world's largest producers of PGMs and supplies 70 per cent of the global palladium, 20 per cent of platinum and a substantial amount of rhodium. In 2008 Russia produced 25 000 kilograms platinum, up nine per cent on 2007, and 87 700 kilograms of palladium, down nine per cent on the previous year (Figure 18). Compared to 1999, Russia's production of platinum in 2008 was 79 per cent higher, while its output of palladium was 49 per cent lower (Figure 18).

There are three producers of platinum group metals in Russia: Norilsk Nickel, Koryakgeoldobycha and Artel Amur. Norilsk Nickel accounts for more than 97 per cent of palladium output and more than 80 per cent of the platinum production. Its mines produced 84 000 kilograms of palladium and nearly 20 000 kilograms of platinum in 2008.

Barrick Gold (who own 79 per cent) and OJSC Pana (21 per cent) are to develop the Fyodorova Tundra deposit in the Murmansk region which contains 100 million tonnes at 0.35 grams per tonne platinum, 1.4 grams per tonne palladium, 0.09 grams per tonne gold, 0.078 per cent nickel and 0.126 per cent copper. Measured and indicated resources stand at 35 000 kilograms of platinum and 159 000 kilograms of palladium. PGM production was planned to commence in 2012 but in August 2009 Barrick announced temporary suspension of this plan.

Silver

Russia has the largest silver reserves in the world, located in the Far East, in the Urals, at Rudnyi Altai, in the Norilsk mining district and newly emerging silver province in Verkhoyansk in Yakutia. Silver is largely produced as a by-product from gold, copper and nickel operations. Mined production of silver stood at 1 300 000 kilograms in 2008 with little variation over the past five years. Exports of silver rose 62 per cent to 2 103 000 kilograms compared with 2007.

Polymetal JSC is the largest silver producer in Russia at 535 000 kilograms of silver in 2008 and ranks as fourth largest silver producing company in the world. Polymetal has mining operations based on deposits at the Vorontsovskoye gold mine in Sverdlovsk, at Dukat, Arylakh and the Lunnoye silver deposit in Magaden and the Khakandzha gold–silver deposit in Khabarovsk. The largest silver deposits are Dukat and Arylakh epithermal deposits which contain around 20 per cent of Russia's total reserves. In 2008 Polymetal acquired the Kubaka-Birkachan and Degtyarskoye gold deposits and is to acquire the Goltsovoye silver deposit in Magaden. In 2009 it acquired the Sopka Kvartsevaya–Oroch gold deposits. These new deposits are expected to be brought on line in 2010.

Diamonds

Russia currently has an estimated 6.9 per cent of the global diamond reserves but remains the world's largest diamond producer by volume, and second largest by value after Botswana (with about 25 per cent of world's rough diamond supply by value). Russia's diamond production for 2008 was 36.9 million carats valued at about US$2.5 billion. This compares with 38.4 million carats in 2007 and represents a decline of 3.6 per cent by volume and 4.8 per cent by value. Output fell due to shrinking demand and a 30–50 per cent drop in prices. Prior to this, output had remained fairly constant since 2004 but had increased significantly since 1999 (Figure 19). Rough diamond exports totalled 24.5 million carats, a decline of 15 per cent by volume and 21 per cent by value compared to 2007. During the first half of 2009, diamond production increased by nearly 18.5 million carats or 4.6 per cent in terms of both carats and value compared 2008.

Alrosa (Almazy-Rossii-Sakha) accounts for 97 per cent of all Russia's rough diamond production and is also active in diamond mining in Angola and Namibia. Alrosa's Russian diamond mining operations include Anabar (placer deposits), Mirny, Mirna, Jubilee and Udachny (or Udachnaya) in the Malaya-Botuobiya and Daldyn kimberlite fields in the Sakha Republic of East Siberia.

Alrosa is constructing three underground diamond mines at Mir, Aikhal and Udachny with an aggregate capacity of six million tonnes per year. Their construction was necessitated with the closure of surface operations at Mir mine in 2001 and the near-end life of the other open pit operations. The Mir underground operation in Mirny, Yakutia, was officially commissioned in August 2009. Aikhal underground mine will reach full production capacity of 500 000 tonnes per year in 2012. Udachny, the largest diamond deposit in Russia and one of the largest in the world will switch to underground

operations in 2010. In 2011 the first start-up facility with a design capacity of 500 000 tonnes per year is scheduled to commence operation and in 2014 the mine will be producing at design capacity of four million tonnes per year.

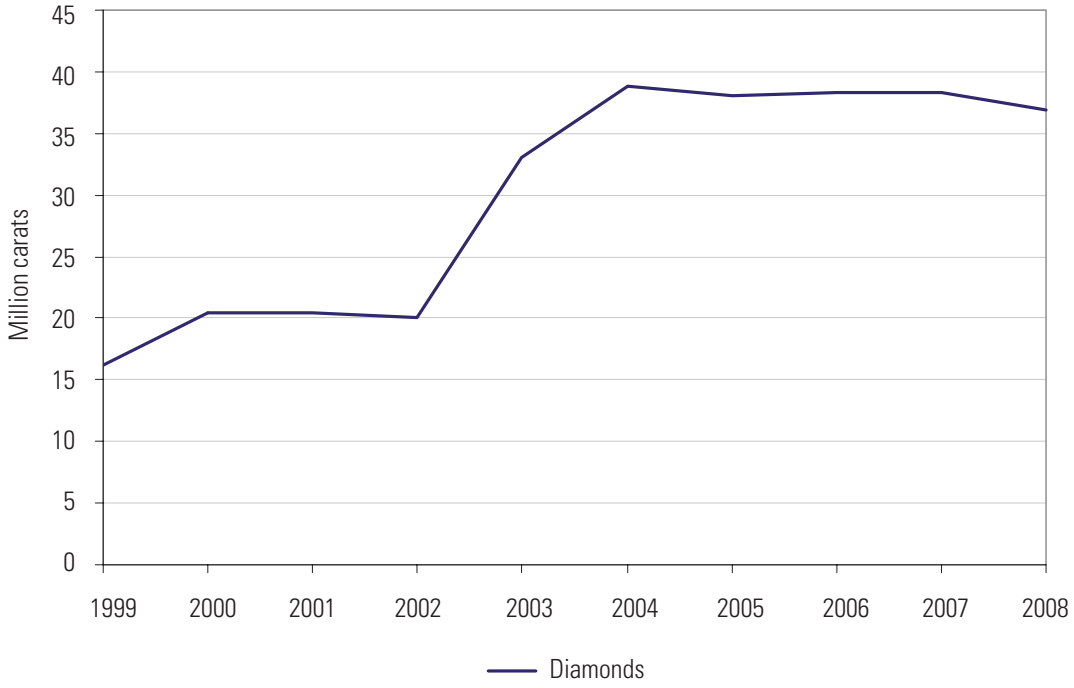

Figure 19 Russia's production of diamonds between 1999 and 2008.

Exploration and feasibility studies are being conducted by Alrosa on five kimberlite pipes at the Lomonosov deposit near Arkhangelskgeoldobycha and by Archangel Diamond Corporation (ADC) of Canada on diamondiferous kimberlites in the Verkhotina area in the Arkhangelsk region.

Uranium

Russia produced 3521 tonnes of mined uranium in 2008, an increase of three per cent compared to 2007. It is ranked as the fifth largest producer and accounts for eight per cent of annual world production. In 2007 the country was known to have 546 000 tonnes of uranium reserves, equivalent to 10 per cent of the world total.

Uranium mining in Russia is conducted entirely by the corporation JSC TVEL's ore mining enterprises. Current production is from open pit mining at Priargunsky in the Chita region and by in situ underground leaching (ISR mines) at Dalur (Dolmatovskoye) in the Kurgan region and Khiagda in Buryatia. The annual output of Priargunsky for the last five years amounts to 3000 tonnes or more than 90 per cent of total production. Construction of Mine No. 6 at the Priargunsky deposit has been started to increase ore production. The Dalur and Khiagda enterprises have planned to increase capacity by 15–20 per cent annually to produce 1000 tonnes by 2010 and 2012 respectively.

The 'TVEL Uranium' programme includes planned exploitation of the Argunskoye uranium–molybdenum deposit with the objective of increasing total production to 4300 tonnes of uranium in 2010. The Khiagda enterprise is developing the Khiagdinskoye deposit in Buryatiya using in situ leaching.

To meet the growing domestic demand Russia plans to raise imports to 7000–8000 tonnes annually by 2010. At the same time it intends to expand its uranium resource base and increase annual production sixfold by 2020. One target is the Aldansky ore district in South Yakutia with resources of more than 200 000 tonnes of uranium.

Coal

Russia has the second largest recoverable reserves of coal behind the USA, estimated at up to 200 billion tonnes. It is the fifth largest coal producer in the world and the main producer of steam coal. In 2008 Russia produced 326 million tonnes of coal and has seen a steady increase since 1999, averaging just over three per cent per year (Figure 20).

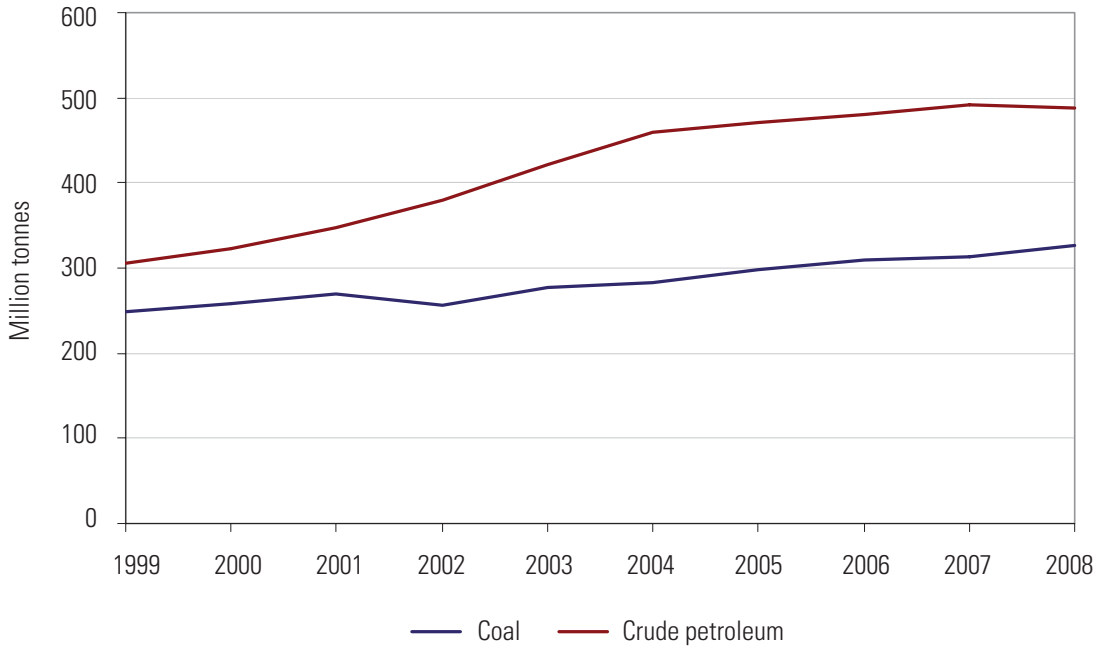

Figure 20 Russia's production of coal and oil between 1999 and 2008.

According to the government Russia should produce between 441 million tonnes and 496 million tonnes of coal per year by 2020. However, at current rates of investment coal production capacity by the year 2020 would be around 375 million tonnes per year.

SIbUgleMet, which owns Mezhdurechye, Polosukhinskaya, Antonovskaya, Bolshevik coal mines, currently has two mines (Yuzhnaya and Sibirskaya) under construction that are expected to be commissioned in 2010.

Crude petroleum

Russian crude oil production amounted to 488 million tonnes in 2008, comparable to 2007, although this is still an increase of 60 per cent compared to 1999 (Figure 20). Of this output 221.6 million tonnes was exported. Proven oil reserves stood at nearly 11 billion tonnes in January 2008.

Lukoil is Russia's largest oil producer. As of January 2009 it had proven reserves of two billion tonnes of oil, equivalent to 1.3 per cent of global reserves, and 821 billion cubic metres of gas. Oil production and growth is centred in the traditional oil-producing regions of West Siberia, the North Caucasus, and the Volga region and in new oil and gas provinces in the north European Timan–Pechora region, in eastern Siberia, the Russian Far East and in the North Caspian region.

New field developments of the Middle Caspian project at Kurmangazy (Lukoil Co); the Komsomolskoye and the Vankorskoye projects (Rosneft Oil Co.); the Prirazlomnoye project (Gazprom); the Sakhalin Island projects: the West Salymskoye project (Shell JV); and the Timan Pechora project (Lukoil and ConocoPhillips) should compensate for production decreases at older fields.

Russia's majority state-owned Transneft, which transports 93 per cent of all crude oil extracted from Russia, completed the East Siberian–Pacific Ocean (ESPO) pipeline to the Chinese border in 2009 which will enable Russia to send 15 million tonnes per year of crude oil directly to China.

Natural gas

Russia is estimated to have between 27 and 35 per cent of the global reserves of natural gas. It is the world's largest natural gas producer accounting for 21 per cent of the world's total output. Its natural gas production in 2008 reached 664 000 million cubic metres, an increase of two per cent on 2007 and 18 per cent compared to 1999. Output is expected to reach between 680 000 million cubic metres and 730 000 million cubic metres by 2020. These gas production goals are to be achieved by development in the traditional gas-producing regions in East Siberia, in the Russian Far East, in the European North, in the Arctic Sea and on the Yamal Peninsula.

Natural gas accounts for 55 per cent of Russia's domestic energy consumption and almost all the country's natural gas production is under state-owned Gazprom. Three major fields in Western Siberia–Medvezh'ye, Urengoy and Yamburg–account for 70 per cent of Gazprom's production, but these fields are in decline. Much of Russia's natural gas production growth is expected to come from independent gas companies such as Itera, Northgaz and Novatek.

The Yamal Pensinsula in North West Siberia has ample natural gas resources and is expected to provide an annual production increase of 360 000 million cubic metres by 2030, sufficient to meet domestic demand and to double the size of its exports from current levels. In 2008 Gazprom began construction of a pipeline to connect the Bovanenkovo field, the largest on the Yamal Peninsula to the existing pipeline infrastructure.

Two other major natural gas projects are also underway around Sakhalin Island and in the Shtokman field in the Barents Sea. The Sakhalin Island fields began producing in 2007; a second phase of development which will be exported as LNG is expected to reach its full capacity of 9.6 million tonnes per year in 2010. The Shtokman field is scheduled to begin producing 23 800 million cubic metres per year in 2013 with additional supplies of LNG anticipated in 2014.

In 2009 Russia signed contracts that will make China Gazprom's biggest customer for natural gas.

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Russia

Production

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Bauxite	tonnes	4 513 000	5 089 000	4 805 000	4 585 700	5 441 800	6 017 600	6 409 300	6 399 200	6 053 900	* 6 000 000
Alumina	tonnes (Al_2O_3 content)	2 687 000	2 865 000	3 046 400	3 130 884	3 230 478	3 269 416	3 259 216	3 265 216	3 332 308	* 3 200 000
Primary aluminium	tonnes	3 149 000	3 247 000	3 302 000	3 348 247	3 478 057	3 594 747	3 647 061	3 117 249	3 955 417	4 193 000
Antimony, mine	tonnes (metal content)	4 356	4 500	4 152	* 3 000	* 3 000	* 3 000	* 3 000	* 3 000	* 3 000	* 3 000
White arsenic	tonnes	* 1 500	* 1 500	* 1 500	* 1 500	* 1 500	1 500	* 1 500	* 1 500	* 1 500	* 1 500
Asbestos	tonnes	674 000	752 000	735 000	785 142	883 888	923 000	* 925 000	* 925 000	1 025 000	1 017 000
Barytes	tonnes	* 60 000	67 600	64 000	58 900	79 000	63 400	63 400	63 000	64 000	* 65 000
Bentonite & fuller's earth											
Bentonite	tonnes	* 500 000	* 500 000	* 500 000	* 500 000	* 500 000	* 500 000	* 500 000	456 000	* 460 000	* 460 000
Bismuth, mine	tonnes (metal content)	* 50	* 50	* 50	* 50	* 50	* 50	* 50	* 55	* 55	* 70
Borates	tonnes	* 1 000 000	* 1 000 000	* 1 000 000	* 1 000 000	* 1 000 000	* 500 000	* 400 000	* 400 000	* 400 000	* 400 000
Bromine	kilograms	* 60 000	* 60 000	* 60 000	* 60 000	* 60 000	* 60 000	* 60 000	* 60 000	* 60 000	* 60 000
Cadmium	tonnes	* 900	* 780	* 620	* 650	629	532	621	690	810	* 800
Chromium ores & concentrates	tonnes	48 047	79 000	117 700	71 000	169 200	447 300	772 000	966 095	776 681	913 000
Coal	tonnes	249 521 000	258 000 000	269 000 000	256 000 000	277 000 000	282 000 000	299 000 000	310 000 000	314 000 000	326 000 000
Cobalt, mine (e)	tonnes (metal content)	* 4 000	* 4 100	* 4 600	* 4 200	4 654	4 527	4 748	4 759	3 587	2 502
Cobalt metal	tonnes	4 000	4 100	4 600	4 200	4 654	4 524	4 748	4 759	3 587	2 502
Copper, mine	tonnes (metal content)	* 535 000	* 530 000	* 540 000	662 100	650 000	630 000	640 000	675 000	690 000	705 000
Copper, smelter	tonnes	535 000	550 000	608 000	660 300	662 000	661 900	695 500	635 000	650 000	627 000
Copper, refined	tonnes	780 000	842 000	894 500	855 100	842 000	919 000	934 900	943 200	949 000	862 000
Diamond	carats	16 200 000	20 500 000	20 500 000	* 20 000 000	33 020 000	38 865 770	38 000 990	38 360 810	38 291 200	36 925 150
Feldspar	tonnes	…	...	...	90 533	121 405	156 391	* 160 000	* 160 000	* 160 000	* 160 000
Fluorspar	tonnes	153 800	187 600	* 200 000	* 169 000	* 170 000	226 400	245 500	* 210 000	* 180 000	* 269 000
Gold, mine	kilograms (metal content)	125 870	142 500	152 641	168 393	170 068	169 297	163 186	159 340	156 912	172 600
Graphite	tonnes	15 670	20 125	16 563	14 241	12 780	13 550	* 14 000	* 14 000	* 14 000	* 14 000
Gypsum	tonnes	867 200	1 013 000	1 189 000	1 389 800	1 766 600	2 076 800	* 2 200 000	* 2 200 000	* 2 300 000	* 2 400 000
Iodine	kilograms	25 000	24 000	46 000	58 000	58 000	105 000	* 105 000	* 105 000	* 105 000	* 105 000
Iron ore	tonnes	82 200 000	87 100 000	82 800 000	85 964 300	92 604 600	97 100 000	95 100 000	102 000 000	105 000 000	99 900 000
Pig iron	tonnes	41 913 000	46 456 000	47 457 000	49 161 000	51 235 000	53 461 000	51 750 000	55 022 000	51 500 000	48 300 000
Crude steel	tonnes	51 518 000	59 136 000	58 970 000	59 882 574	62 839 334	65 582 851	66 300 000	70 800 000	72 400 000	68 700 000
Ferro-alloys											
Spiegeleisen	tonnes	* 7 000	* 7 000	* 7 000	* 7 000	* 7 000	* 7 000	* 7 000	* 7 000	* 7 000	* 7 000
Ferro-chrome	tonnes	266 904	274 000	211 000	231 790	351 729	453 639	511 600	500 837	564 474	475 686
Ferro-silico-chrome	tonnes	109 413	91 013	79 115	55 134	63 558	83 372	74 150	92 404	97 915	72 050
Ferro-manganese	tonnes	* 90 000	* 88 000	* 55 000	* 105 000	* 101 000	* 108 000	* 108 000	* 125 000	* 120 000	* 120 000
Ferro-silico-manganese	tonnes	...	...	...	* 127 000	* 83 000	* 50 000	* 70 000	* 70 000	* 70 000	* 70 000
Ferro-nickel	tonnes	* 33 000	* 35 000	* 30 000	* 45 000	* 17 000	* 36 000	* 36 000	* 20 795	* 49 000	* 50 000
Ferro-silicon	tonnes	601 413	652 000	707 000	707 000	702 000	720 000	* 742 000	* 750 000	* 750 000	* 750 000
Other ferro-alloys	tonnes	* 40 000	* 40 000	* 35 000	* 30 000	* 30 000	* 36 000	* 34 900	* 35 000	* 35 000	* 35 000
Silicon metal	tonnes	* 40 000	* 40 000	* 40 000	* 40 000	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000
Kaolin	tonnes	40 600	45 000	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000
Lead, mine	tonnes (metal content)	14 000	14 000	14 000	19 000	24 000	23 200	36 400	34 000	48 000	60 000
Lead, refined	tonnes	55 260	51 501	60 000	63 000	66 000	66 000	65 700	80 000	103 000	123 000

Table 6 Mineral production in Russia from 1999 to 2008 *(continued)*.

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Magnesite	tonnes	2 400 000	2 500 000	2 600 000	2 600 000	2 600 000	* 2 600 000	* 2 600 000	* 2 600 000	* 2 600 000	* 2 600 000
Primary magnesium metal	tonnes	35 200	35 500	* 35 000	* 35 000	* 30 000	* 35 000	* 38 000	* 35 000	* 33 000	* 30 000
Manganese ore	tonnes	...	...	...	...	44 400	44 400	* 44 000	* 44 000	* 44 000	* 44 000
Mercury	kilograms	...	* 50 000	* 50 000	* 50 000	* 50 000	* 50 000	* 50 000	* 50 000	* 50 000	* 50 000
Mica	tonnes	* 10 000	* 10 000	* 10 000	9 159	10 063	8 474	* 9 000	* 11 000	* 12 000	* 10 000
Molybdenum, mine	tonnes (metal content)	4 800	3 700	4 800	4 800	4 800	4 800	4 800	4 800	* 4 800	* 4 800
Nepheline syenite (g)	tonnes	859 000	814 000	960 000	1 021 576	1 014 279	1 023 257	* 1 000 000	* 1 000 000	* 1 000 000	* 1 000 000
Nickel, mine	tonnes (metal content)	261 800	266 000	272 800	267 300	291 000	315 000	315 000	320 000	279 800	277 000
Nickel, smelter/refinery	tonnes	238 000	221 000	248 000	243 000	260 000	265 500	273 700	278 600	269 800	256 500
Perlite	tonnes	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000	* 45 000
Crude Petroleum	tonnes	305 000 000	323 000 000	348 000 000	380 000 000	421 000 000	459 000 000	470 000 000	481 000 000	491 000 000	488 000 000
Natural gas	million m^3	563 000	555 000	551 000	561 000	581 000	633 000	641 000	656 000	653 000	664 000
Phosphate rock	tonnes	10 560 000	10 540 000	10 488 000	10 763 000	11 072 600	11 345 300	11 317 400	10 812 800	10 936 500	9 810 200
Platinum group metals											
Platinum	kilograms (metal content)	(a) 14 000	(a) 35 800	(a) 40 400	(a) 30 500	27 400	* 28 000	29 000	29 000	23 000	25 000
Palladium	kilograms (metal content)	(a) 171 100	(a) 161 700	(a) 135 000	(a) 60 000	92 000	97 000	97 400	98 400	96 800	87 700
Other	kilograms (metal content)	* 13 400	* 14 100	* 14 500	* 14 500	* 15 000	* 15 000	* 15 500	* 15 600	* 14 500	* 14 500
Potash	tonnes (K_2O content)	4 050 000	3 716 000	4 257 600	4 431 600	4 653 300	5 599 100	6 265 600	5 274 100	6 373 100	5 935 400
Salt	tonnes	3 180 000	3 170 000	* 2 800 000	* 2 800 000	* 2 800 000	2 900 000	2 700 000	2 800 000	2 200 000	1 800 000
Selenium metal	tonnes	40	41	48	60	81	85	100	110	110	* 110
Silver (b)	kilograms (metal content)	380 000	* 400 000	* 400 000	* 400 000	* 700 000	1 276 900	* 1 350 000	* 1 250 000	* 1 200 000	* 1 300 000
Sulphur and pyrites											
Pyrites	tonnes (sulphur content)	307 000	404 000	324 000	261 000	357 000	286 000	304 000	198 000	210 000	161 000
Recovered (c)	tonnes (sulphur content)	4 443 284	4 948 298	5 239 515	5 589 969	5 804 740	5 909 958	6 301 000	6 346 000	6 372 000	6 513 000
Recovered (d)	tonnes (sulphur content)	510 000	438 000	458 000	458 000	523 000	572 000	640 000	738 000	790 000	752 000
Sulphur ore	tonnes (sulphur content)	6 151	9 630	13 216	...	...	...	...	...	...	...
Talc	tonnes	107 690	105 549	111 645	93 841	129 888	154 138	* 150 000	* 150 000	* 150 000	* 150 000
Tin, mine (e)	tonnes (metal content)	5 200	6 600	5 500	4 300	3 700	3 000	2 500	2 600	2 500	1 500
Tin, smelter	tonnes	4 000	5 200	5 069	5 115	3 700	4 200	3 700	3 700	3 300	1 700
Tungsten, mine	tonnes (metal content)	* 3 500	* 3 500	* 3 500	* 3 400	* 3 900	* 2 800	* 2 900	* 2 900	* 3 200	* 3 200
Uranium, mine	tonnes (metal content)	* 2 000	* 2 000	* 2 500	2 900	3 150	3 280	3 431	3 262	3 413	3 521
Vanadium, mine	tonnes (metal content)	* 7 000	...	...	30 306	18 099	24 277	* 24 000	* 24 000	* 25 000	* 27 000
Vermiculite	tonnes	* 25 000	* 25 000	* 25 000	* 25 000	* 40 000	* 30 000	* 30 000	* 30 000	* 30 000	* 30 000
Zinc, mine	tonnes (metal content)	132 000	136 000	164 000	162 000	159 000	161 700	186 000	178 000	177 000	205 000
Slab zinc	tonnes	231 310	241 025	249 000	257 000	253 000	239 000	211 000	248 000	263 000	263 000
Zirconium minerals (f)	tonnes	6 200	6 300	* 6 500	* 6 500	* 6 600	* 5 500	* 6 700	* 7 500	* 7 136	* 7 000

Note(s):-
(a) Sales from mine production and stocks
(b) Smelter and/or refinery production
(c) From petroleum refining and/or natural gas
(d) Other
(e) Metal
(f) Including caldasite rock containing zircon and baddeleyite
(g) Nepheline concentrates

Table 6 Mineral production in Russia from 1999 to 2008.

Exports

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Primary aggregates	tonnes	661 707	726 020	391 826	207 457	414 890	406 228	332 856	315 171	798 025	314 144
Bauxite, alumina & aluminium											
Bauxite	tonnes	260 493	14 699	5 779	881	463	493	480	2 418	2 559	2 149
Alumina	tonnes	142 605	85 969	4 497	1 414	43 883	62 300	35 553	22 712	(a)* 15 000	23 288
Alumina hydrate	tonnes	3 953	1 850	3 726	2 932	5 592	2 122	1 348	848	1 394	271
Unwrought	tonnes	2 638 907	2 562 217	2 539 280	2 276 030	2 500 243	2 596 935	2 524 451	2 936 816	2 367 730	2 666 142
Unwrought alloys	tonnes	476 770	632 410	556 321	513 143	639 842	850 167	870 697	1 113 426	898 819	762 152
Scrap	tonnes	(a)* 502 600	(a)* 341 300	(a)* 181 000	1 528	235	444	5 284	124	109	55
Antimony											
Ores & concentrates	tonnes	1 000	(a)* 800	398	8 670	15 861	9 069	6 460	6 463	8 929	555
Metal	tonnes	(a)* 270	(a)* 90	662	1 233	104	1 111	3	6	1 306	671
Oxide	tonnes	97	143	172	90	344	406	648	284	930	74
Asbestos											
Unmanufactured	tonnes	261 138	332 417	340 397	370 929	450 031	554 428	610 757	632 459	644 986	657 034
Barytes	tonnes	(a)* 3 900	(a)* 1 800	(a)* 2 200	4 653	3 736	4 912	4 137	6 369	6 808	5 553
Bentonite & fuller's earth											
Bentonite	tonnes	1 351	9 988	7 951	5 598	5 624	5 307	4 721	7 979	10 648	11 405
Fuller's earth	tonnes	88	74	153	116	60	326	363	270	...	...
Bismuth											
Metal	tonnes	11	—	—	22	0	0	486	1	0	10
Cadmium											
Metal	tonnes	(a)* 270	(a)* 540	(a)* 1 220	2 228	600	593	535	404	373	685
Cement											
Cement clinkers	tonnes	595 726	670 795	609 891	397 242	370 991	595 160	744 755	420 460	211 723	32 047
Portland cement	tonnes	1 246 107	1 349 659	1 722 035	1 445 642	1 676 360	1 693 036	2 301 032	2 782 508	1 654 592	465 125
Other cement	tonnes	4 340	4 819	5 288	4 768	4 017	3 014	4 038	4 106	3 168	2 951
Chromium											
Ores & concentrates	tonnes	972	(a)* 200	(a)* 200	(a)* 600	235	(a)* 1	(a)* 200	540	730	871
Metal	tonnes	6 060	6 123	4 909	7 473	8 635	11 333	9 306	10 248	13 221	10 235
Coal											
Anthracite	tonnes	1 585 933	2 469 473	2 214 924	2 843 944	4 993 722	7 092 628	8 441 843	8 424 524	8 628 084	8 925 130
Other hard coal	tonnes	25 661 298	41 191 291	39 116 741	40 365 125	54 607 077	64 688 326	71 213 713	82 929 381	89 364 339	88 514 792
Lignite	tonnes	126 815	251 990	194 633	75 941	112 199	315 172	522 075	538 992	583 520	617 291
Briquettes	tonnes	12 068	539	9 211	3 290	11 671	8 319	5 143	1 806	197	164
Cobalt											
Metal	tonnes	9 136	8 493	8 350	4 934	5 841	6 463	6 516	6 494	9 814	12 001
Oxides	tonnes	1 031	1 265	514	794	918	403	424	748	317	59
Copper											
Ores & concentrates	tonnes	26 182	25 161	8 853	11 606	3 634	71 349	96 292	1 768	10 617	7 975
Unwrought	tonnes	640 150	647 978	597 917	518 594	407 694	337 917	308 515	268 944	282 979	203 195
Scrap	tonnes	(a)* 231 500	(a)* 71 900	(a)* 42 900	5 300	1 633	1 989	1 992	3 531	442	2 489
Diamond											
Gem, rough	carats	...	...	23 171 585	17 680 500	14 138 147	18 520 737	23 010 683	22 160 155	19 791 520	17 091 319
Industrial	carats	...	...	34 576 788	19 300 327	23 530 665	14 503 502	14 376 332	12 792 865	3 649 432	7 284 844
Diatomite	tonnes	258	407	228	260	563	289	193	300	445	372

Table 7 Mineral exports from Russia between 1999 and 2008 *(continued)*.

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Feldspar	tonnes	8 463	12 136	16 690	19 428	26 494	33 802	42 144	36 512	35 149	35 006
Fluorspar	tonnes	2 967	4 740	3 329	753	997	1 251	2 081	7 904	5 894	5 055
Gold											
Metal (a)	kilograms	* 29 200	* 24 800	* 22 900	* 22 300	* 47 000	* 59 600	* 54 900	* 29 300	* 19 200	* 5 100
Graphite	tonnes	997	1 570	1 048	1 383	2 049	1 362	1 144	1 152	1 286	558
Gypsum											
Crude & calcined	tonnes	4 674	7 312	13 641	22 999	25 135	36 589	48 025	53 676	33 631	14 818
Iodine	kilograms	85 000	101 000	47 417	14 712	9 152	37 144	27 106	6 233	11 798	829
Iron ore	tonnes	10 841 114	19 224 008	13 954 952	13 039 085	16 576 056	16 988 903	18 203 586	22 840 934	25 501 699	22 526 647
Iron, steel & ferro-alloys											
Pig iron	tonnes	2 814 343	3 573 846	3 494 786	4 084 928	4 595 985	5 403 014	5 132 096	5 942 189	5 633 645	5 271 448
Sponge & powder	tonnes	403 183	481 895	662 723	1 200 740	1 071 800	1 316 721	1 339 460	1 212 086	1 144 162	2 297 005
Ferro-chrome	tonnes	158 872	161 496	115 852	113 457	200 312	272 181	419 470	318 853	347 661	365 143
Ferro-silico-chrome	tonnes	12 634	6 346	...	1 840	3 844	8 185	13 890	7 765	12 063	3 660
Ferro-manganese	tonnes	1 874	3 062	2 696	779	16 301	25 532	19 713	11 507	114 607	40 554
Ferro-silico-manganese	tonnes	6 235	8 164	9 473	19 900	8 062	56 348	35 696	6 347	10 501	9 945
Ferro-molybdenum	tonnes	381	34	29	66	173	1 160	1 381	4 698	5 312	4 249
Ferro-nickel	tonnes	3 413	4 681	2 373	4 172	8 777	14 251	24 559	28 878	27 787	15 039
Ferro-silicon	tonnes	199 995	193 217	212 955	217 096	262 511	252 145	262 686	312 138	315 527	291 906
Ferro-titanium & ferro-silico-titanium	tonnes	15 566	14 197	12 826	18 926	16 664	20 728	23 200	18 952	17 982	16 448
Ferro-vanadium	tonnes	4 631	5 902	6 768	4 838	5 767	8 671	7 967	6 047	5 969	3 197
Other ferro-alloys	tonnes	2 144	1 307	1 690	3 180	6 956	2 622	4 929	4 929	3 782	1 374
Silicon metal	tonnes	33 462	44 502	53 136	48 854	33 678	27 739	24 165	25 865	25 299	28 063
Ingots, blooms, billets	tonnes	13 560 521	12 677 967	13 188 222	12 517 441	11 416 149	13 414 022	14 308 287	14 864 566	14 759 594	15 668 019
Scrap	tonnes	7 563 727	6 821 894	5 718 809	5 765 727	6 987 797	12 817 609	12 651 234	9 633 690	7 915 602	6 035 629
Kaolin	tonnes	1 233	1 050	1 214	1 477	1 282	1 387	407	1 437	914	729
Lead											
Ores & concentrates	tonnes	21 006	19 321	16 688	29 558	28 148	34 396	51 376	55 595	74 743	119 995
Unwrought	tonnes	(a)* 24 600	(a)* 59 600	(a)* 28 600	4 591	3 042	18 957	12 971	43 066	71 768	73 427
Scrap	tonnes	4 410	3 076	787	...	...	...	...	...	...	...
Lithium											
Oxides	tonnes	627	1 033	1 402	1 184	1 402	1 836	2 610	320	230	80
Magnesite & magnesia	tonnes	161 814	200 888	190 488	172 454	173 877	245 827	252 373	281 718	318 839	295 969
Manganese											
Metal (a)	tonnes	* 2 100	* 5 300	* 2 500	* 1 200	* 2 800	* 400	* 900	* 2 900	* 2 300	* 5 600
Mercury	kilograms	964 500	(a)* 148 000	(a)* 66 000	(a)* 19 000	99 187	(a)* 43 000	99 939	216 632	342 730	9 893
Mica	tonnes	730	828	1 090	1 156	1 440	1 538	1 760	2 363	3 818	2 068
Molybdenum											
Ores & concentrates	tonnes	10 941	9 297	9 373	10 500	9 235	8 348	5 889	2 467	228	18
Metal	tonnes	569	355	383	181	70	59	143	43	53	43
Natural gas	tonnes	383 327 817	129 176 998	* 125 600 000	102 530 071	108 889 868	149 352 062	150 049 634	142 759 869	338 616 810	451 325 891
Nickel											
Ores & concentrates	tonnes	250	1 648	3 756	...	...	...	...	2	225	106 456
Mattes, sinters etc.	tonnes	(a)* 16 200	(a)* 18 400	(a)* 13 700	18 101	8 340	1 392	...	...	52	5 556
Unwrought	tonnes	207 448	188 484	182 950	271 597	228 037	240 577	241 952	237 119	233 954	232 888
Unwrought alloys	tonnes	3 837	8 469	6 740	9 680	9 907	10 833	19 712	22 711	21 637	20 110
Scrap (a)	tonnes	* 5 400	* 7 500	* 7 400	* 5 500	* 4 100	* 7 000	* 8 100	* 8 400	* 8 000	* 5 900
Oxides	tonnes	350	33	52	88	14	33	40	76	19	—

Table 7 Mineral exports from Russia between 1999 and 2008 *(continued)*.

Russia exports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Crude petroleum	tonnes	134 545 000	144 414 000	147 900 000	159 100 000	208 522 461	239 811 732	234 250 128	227 538 722	238 542 348	221 639 174
Phosphate rock	tonnes	4 470 414	3 799 360	3 069 640	3 244 019	3 128 835	2 748 639	2 777 308	2 248 018	2 312 567	1 831 655
Platinum group metals											
Platinum & platinum metals	kilograms	...	(a)* 178 100	(a)* 123 400	(a)* 474 000	(a)* 172 000	(a)* 171 700	(a)* 200 400	141 698	118 345	337 414
Waste & scrap (a)	kilograms	* 17 900	* 25 900	* 70 200	* 3 400	* 32 300	* 7 500	* 33 300	* 23 200	* 3 100	* 2 700
Potash											
Fertiliser salts	tonnes	5 622	6 600	7 973	6 557	7 222	8 787	11 094	32 430	...	...
Sulphate	tonnes	(a)* 77 000	(a)* 98 000	(a)* 74 000	101 787	175 594	89 445	85 592	78 133	116 731	73 803
Chloride	tonnes	5 496 356	4 690 600	5 888 665	5 502 702	6 375 940	7 495 416	3 678 514	7 928 195	9 513 905	9 581 504
Other potassic fertilisers	tonnes	259	61	40	6	6	23	121	13	1 243	4 677
Rare earths											
Rare earth compounds	tonnes	...	2 495	1 330	1 765	2 275	3 490	4 675	7 004	6 674	6 075
Salt	tonnes	23 109	23 430	23 981	21 229	19 214	23 551	16 374	18 364	23 978	37 782
Silver											
Metal (a)	kilograms	* 420 000	* 256 100	* 155 000	* 127 100	* 548 000	* 1 028 200	* 2 033 600	* 968 700	* 1 261 400	* 2 104 900
Sulphur & pyrites											
Pyrites	tonnes	16 221	14 113	12 080	12 010	11 940	8 936	15 085	17 287	14 683	23 455
Sulphur	tonnes	2 642 574	3 110 639	1 544 925	3 253 346	4 008 636	4 195 579	3 713 779	3 210 712	4 667 299	3 226 776
Talc	tonnes	732	1 002	1 380	948	1 568	1 393	1 563	1 694	2 423	2 167
Tantalum & niobium											
Tantalum	tonnes	6	12	15	2	—	2	28	4	15	7
Tin											
Ores & concentrates	tonnes	4 315	3 241	727	...	...	20	121	...	...	20
Unwrought (b)	tonnes	792	1 747	1 736	1 786	613	600	1 033	382	766	384
Titanium											
Metal	tonnes	14 518	15 031	19 805	15 919	17 644	23 208	22 056	26 634	24 548	23 212
Tungsten											
Ores & concentrates	tonnes	4 639	4 906	3 064	3 176	4 240	4 217	4 219	4 809	4 726	3 952
Metal	tonnes	336	304	137	23	20	117	90	31	31	60
Vanadium											
Pentoxide	tonnes	7 638	8 431	7 276	7 384	2 807	3 269	3 727	5 480	4 160	6 435
Metal	tonnes	35	52	37	37	46	40	103	51	...	...
Zinc											
Ores & concentrates	tonnes	46 092	52 180	52 151	62 762	42 746	42 323	60 332	15 531	38 166	8 081
Unwrought (b)	tonnes	118 192	117 168	113 034	112 840	84 348	104 886	48 979	75 525	88 800	90 578
Scrap (a)	tonnes	* 3 100	* 2 000	* 500	* 1 000	* 400	* 300	* 800	* 400	* 200	* 2 600
Zirconium											
Ores & concentrates	tonnes	3 969	5 316	6 898	5 007	5 045	8 108	7 415	7 465	7 391	6 624
Metal	tonnes	40	343	219	187	77	58	49	30	22	10

Note(s):-
(a) BGS estimates, based on known imports into certain countries
(b) Including alloys

Table 7 Mineral exports from Russia between 1999 and 2008.

Imports

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Primary aggregates	tonnes	402 430	1 919 198	3 940 110	4 712 387	5 751 378	5 353 579	5 816 292	9 059 676	11 958 070	14 925 258
Bauxite, alumina & aluminium											
Bauxite	tonnes	58 000	299 651	324 761	358 620	292 942	99 075	121 195	24 420	49 490	32 439
Alumina	tonnes	3 815 878	3 770 061	3 685 906	3 636 772	3 797 598	3 945 914	4 394 544	4 265 054	4 661 925	5 243 667
Alumina hydrate	tonnes	29 948	70 027	20 253	2 233	2 068	12 404	36 299	69 599	73 221	39 422
Unwrought	tonnes	65 216	119 460	47 525	3 974	1 401	363	259	1 262	162	10 195
Unwrought alloys	tonnes	33 286	34 332	20 979	28 617	42 738	36 129	16 861	16 355	16 060	14 561
Scrap	tonnes	595	151	181	311	207	5	835	1 678	1 920	2 350
Antimony											
Metal	tonnes	1 230	1 374	1 338	368	518	310	216	158	1 089	995
Oxide	tonnes	374	640	856	398	181	237	63	915	598	925
Arsenic											
Metallic arsenic	tonnes	...	...	...	30	16	18	10	21	10	65
Asbestos											
Unmanufactured	tonnes	23 853	27 259	34 303	11 831	1 156	334	585	...	5	...
Barytes	tonnes	34 847	21 110	25 282	29 545	21 492	27 526	19 654	28 781	34 708	47 391
Bentonite & fuller's earth											
Bentonite	tonnes	176 089	149 475	127 291	54 852	62 260	84 351	100 625	111 674	123 948	106 707
Fuller's earth	tonnes	836	1 103	2 889	2 123	3 382	3 012	3 931	3 164	...	...
Bismuth											
Metal	tonnes	36	30	40	15	...	12	12	5	7	11
Cadmium											
Metal	tonnes	—	2	—	—	120	441	240	59	0	—
Cement											
Cement clinkers	tonnes	5 677	12 776	…	…	48 155	65 019	171 533	114 672	232 206	738 861
Portland cement	tonnes	26 985	42 250	58 500	87 875	81 372	108 971	155 771	536 319	2 200 313	7 237 443
Other	tonnes	3 327	3 595	1 868	2 667	2 033	17 275	39 290	19 906	11 991	18 009
Chromium											
Ores & concentrates	tonnes	625 538	714 322	600 337	589 584	745 589	844 066	911 435	898 230	989 404	1 112 030
Metal	tonnes	286	696	547	762	319	212	82	207	266	83
Coal											
Anthracite	tonnes	1 129 790	4 258 806	481 253	21 939	38 809	62 701	43 555	40 344	37 023	32 221
Other hard coal	tonnes	14 912 207	21 259 190	27 337 302	20 839 417	25 178 033	22 195 935	22 347 008	25 702 278	23 379 285	30 900 170
Coal Lignite	tonnes	2 996	9 898	242 024	86 841	125 630	171 420	253 442	340 576	270 364	909 110
Cobalt											
Metal	tonnes	17	158	179	105	26	20	28	26	33	22
Oxides	tonnes	72	109	86	12	8	1	8	3	26	27
Copper											
Ores & concentrates	tonnes	57 754	127 001	162 684	143 353	12 421	117 067	122 590	76 707	63 146	124 838
Matte & cement	tonnes	38	...	10 038	2 225	2 264	603	1 161	1 980	2 881	3 831
Unwrought	tonnes	3 439	8 961	3 410	605	1 379	346	540	2 222	323	9 566
Scrap	tonnes	711	221	326	18	1	178	542	474	648	3 524
Diamond											
Gem, rough	carats	...	...	21 214	19 036	20 784	71 573	41 285	8 052	6 712	64 953
Industrial	carats	...	...	1 653	6 724	33 517	70 505	44 833	93 560	188 067	188 928

Table 8 Mineral imports to Russia between 1999 and 2008 *(continued)*.

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Diatomite	tonnes	6 195	6 130	7 287	7 865	10 105	10 874	15 200	15 700	13 714	11 962
Feldspar	tonnes	166	530	279	1 005	5 441	11 044	27 669	212 546	230 176	344 505
Fluorspar	tonnes	173 544	178 217	199 523	143 723	192 936	146 291	161 688	180 863	196 514	264 445
Graphite	tonnes	1 418	6 316	7 562	10 333	13 826	14 580	14 902	17 613	18 079	15 607
Gypsum	tonnes	17 676	32 712	62 500	118 557	150 591	126 393	98 698	109 750	156 874	232 997
Iodine	kilograms	109 000	135 000	87 199	87 887	182 466	125 709	25 325	20 012	11 942	18 456
Iron ore	tonnes	3 313 496	9 188 913	8 799 202	9 330 839	10 574 223	10 555 282	9 889 586	11 155 228	12 624 183	11 728 691
Iron, steel & ferro-alloys											
Pig iron	tonnes	4 174	2 051	214	1 023	337	7 745	2 517	1 265	6 656	7 673
Sponge & powder	tonnes	3 516	5 265	4 613	4 204	5 414	6 086	6 851	9 824	8 807	10 709
Ferro-chrome	tonnes	7 449	9 056	8 278	11 123	24 362	31 609	16 223	20 587	5 451	4 077
Ferro-silico-chrome	tonnes	...	...	...	...	...	...	...	...	3 446	8 310
Ferro-manganese	tonnes	105 671	162 166	139 209	109 466	121 317	113 897	96 905	66 131	87 904	65 911
Ferro-silico-manganese	tonnes	123 599	189 994	190 852	221 897	326 714	334 575	307 813	362 859	435 845	372 430
Ferro-molybdenum	tonnes	2 141	862	361	2 473	259	1 368	145	20	193	22
Ferro-niobium	tonnes	224	396	99	135	128	95	43	—	2 442	2 175
Ferro-silicon	tonnes	4 464	18 632	23 997	14 905	39 895	105 204	75 299	55 912	45 286	47 268
Ferro-titanium & ferro-silico-titanium	tonnes	387	299	101	126	445	50	191	233	160	209
Ferro-tungsten & ferro-silico-tungsten	tonnes	31	113	56	94	75	283	20	0	1	3
Ferro-vanadium	tonnes	233	38	85	73	142	786	22	1	20	0
Other ferro-alloys	tonnes	2 336	2 372	6 333	4 877	7 299	15 756	14 382	17 524	24 331	20 394
Silicon metal	tonnes	4 436	8 589	10 723	10 570	10 744	7 826	13 038	17 085	18 039	9 909
Ingots, blooms, billets	tonnes	16 544	14 994	14 490	8 594	10 745	25 571	20 335	21 366	15 943	17 619
Scrap	tonnes	302 487	312 433	116 631	106 772	395 137	160 870	131 132	178 182	101 248	95 354
Kaolin	tonnes	133 106	190 328	163 881	132 537	176 677	218 631	240 596	264 078	299 192	356 980
Lead											
Ores & concentrates (b)	tonnes	* 45 000	* 62 700	* 45 000	* 22 300	* 8 400	* 28 100	* 18 600	* 7 300	...	...
Unwrought	tonnes	27 242	52 668	44 089	47 574	49 349	32 407	26 743	27 032	21 193	13 417
Lithium											
Oxides	tonnes	517	856	781	1 660	402	955	719	183	75	76
Carbonate	tonnes	1 793	1 787	1 824	1 835	1 526	2 399	2 955	938	873	891
Magnesite & magnesia											
Magnesite	tonnes	13 115	9 163	7 331	9 758	5 036	7 923	5 240	3 891	413	600
Magnesia	tonnes	28 977	81 075	87 086	72 387	106 851	101 817	116 514	123 698	123 995	111 089
Manganese											
Ores & concentrates	tonnes	738 422	621 078	483 787	515 725	501 053	657 786	434 684	539 311	724 753	738 731
Metal	tonnes	2 832	4 345	9 578	12 970	10 281	10 609	20 383	29 732	24 062	34 187
Mercury	kilograms	11 000	110 000	54 964	47 250	65 000	22 047	40 436	17 533	11 616	1 476
Mica	tonnes	126	34	172	365	341	487	878	1 477	2 268	1 108
Molybdenum											
Ores & concentrates	tonnes	1 202	939	2 134	2 250	580	98	349	516	70	115
Metal	tonnes	292	253	319	191	106	147	117	295	168	243
Oxides	tonnes	21	31	47	249	241	146	176	563	479	311
Natural gas	tonnes	7 166 334	2 906 811	225 531	760 510	924 000	424 774	520 474	...	1 078 686	740 360
Nickel											
Ores & concentrates	tonnes	17 729	* 30 000	30 421	12 268	1 042	61 677	25 002	...	7	4 498
Unwrought (a)	tonnes	413	329	577	361	249	3 408	2 838	832	441	363
Scrap	tonnes	4 021	3 971	3 986	462	2	20	(b)* 4	(b)* 21	31	24

Table 8 Mineral imports to Russia between 1999 and 2008 *(continued)*.

Russia imports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Crude petroleum	tonnes	6 015 437	5 891 728	4 700 000	5 700 000	5 736 687	4 002 028	2 425 988	2 320 215	2 693 443	2 456 022
Phosphate rock	tonnes	106 025	60 332	7 181	25 675	53	17 176	118 252	61 759	24 606	176 603
Potassic fertilizers	tonnes	878	1 140	1 127	1 256	1 270	1 119	1 588	3 907	4 282	2 597
Rare earths											
Cerium compounds	tonnes	—	532	249	81	94	96	215	265	510	257
Other rare earth compounds	tonnes	—	482	867	762	713	886	849	980	935	648
Metals	tonnes	11	11	17	71	56	38	43	95	115	19
Salt	tonnes	479 981	570 447	664 052	751 655	811 751	878 389	1 166 707	1 159 709	1 074 447	1 063 950
Silliminite minerals	tonnes	189	993	14	5	524	6 673	972	2 188	2 677	3 307
Sulphur & pyrites											
Sulphur	tonnes	147 694	9 870	10 178	62 214	167 895	132 728	165 863	99 633	113 153	249 553
Sulphur, sublimed & precipitated	tonnes	186	221	56	82	1	222	—	186	282	351
Talc	tonnes	6 961	9 521	12 453	14 109	17 242	13 226	11 232	14 629	13 299	11 959
Tantalum & niobium											
Tantalum	tonnes	12	5	6	10	46	12	40	9	14	27
Tin											
Ores & concentrates	tonnes	390	1 236	797	753	733	486	553	131	77	750
Unwrought (a)	tonnes	538	2 833	2 166	1 227	1 096	104	486	62	539	1 915
Titanium											
Titanium minerals	tonnes	63 408	75 478	103 986	71 466	82 231	111 356	108 131	130 282	136 312	119 039
Metal	tonnes	1 449	665	1 495	1 120	1 321	1 328	1 289	1 623	3 657	5 616
Oxides	tonnes	43 036	51 958	54 029	56 890	52 032	61 560	68 088	65 761	78 909	75 658
Tungsten											
Ores & concentrates	tonnes	...	229	740	142	128	33	81	1 029	3 037	188
Metal	tonnes	116	87	293	201	56	38	29	69	94	104
Vanadium											
Pentoxide	tonnes	1 718	1 139	1 964	814	1 113	1 327	1 867	1 620	1 741	1 467
Metal	tonnes	132	69	29	76	38	67	107	257	...	...
Zinc											
Ores & concentrates	tonnes	226 951	228 886	208 228	197 679	233 095	82 544	93 571	69 436	120 543	130 205
Unwrought (a)	tonnes	5 577	11 343	8 848	6 958	18 409	26 434	9 071	28 307	32 510	22 398
Zirconium											
Ores & concentrates	tonnes	8 445	9 530	11 955	11 507	14 913	10 236	11 394	12 119	12 372	14 070
Metal	tonnes	7	28	13	24	21	36	21	39	36	131

Note(s):-
(a) Including alloys
(b) BGS estimates, based on known exports from certain countries

Table 8 Mineral imports to Russia between 1999 and 2008.

India

Key facts

- *The seventh largest country in the world, with a land area of approximately 3.3 million square kilometres.*
- *The world's second most populous nation, totalling more than 1.1 billion.*
- *The fourth largest economy in the world on a GDP (PPP) basis and one of the fastest growing, averaging eight per cent per year between 2004 and 2008.*
- *The world's second largest producer of chromite, wollastonite, graphite and barytes and third largest of coal, talc and salt.*
- *The world's sixth largest producer of bauxite, but output has more than doubled since fiscal year 1999/2000.*
- *Output of chromite has increased by more than 200 per cent between fiscal years 1999/2000 and 2008/2009.*
- *The world's largest consumer of gold, averaging more than 700 000 kilograms per year since 2003.*
- *Mine production of lead and zinc has increased by 114 per cent and 235 per cent respectively over 10 years.*
- *Production of iron ore has increased by 192 per cent between 1999/2000 and 2008/2009, making it the fourth largest producer in the world.*
- *India has around 55 per cent of the world's diamond cutting and polishing business, but this suffered in the recession with exports of cut and polished diamonds falling by 31 per cent in the six months to March 2009.*
- *The world's third largest producer of coal, with output increasing by 62 per cent between fiscal years 1999/2000 and 2008/09.*

The Republic of India occupies the major part of the land area of the South Asian subcontinent. It lies to the north of the Equator and shares borders with Pakistan to the west, China, Nepal and Bhutan to the north, and Bangladesh and Burma (Myanmar) to the east. Sri Lanka lies off the south-east coast. India is the seventh largest country in the world extending over 3 287 000 square kilometres. In the north is the broad Indo-Gangetic plain flanked by the Himalayan ranges. To the west of this plain lies the Thar Desert. In the south, the remaining peninsular landmass, the Deccan Plateau, is flanked by the coastal ranges, Western Ghats and Eastern Ghats respectively (Figure 21).

Figure 21 India geography.

India, with a population of 1 156 898 000 (July 2009 estimate) is the second most populous country in the world after China. It has the world's twelfth largest economy by nominal gross domestic product (GDP) and the fourth largest in terms of GDP purchasing power parity (GDP (PPP)), estimated in 2008 at US$3561 trillion. It is one of the fastest growing economies with growth rates averaging eight per cent per annum for the past five years and estimated to be nearly seven per cent for 2009.

India has significant sources of coal (fourth largest reserves in the world), bauxite, titanium ore, chromite, natural gas, diamonds and petroleum. In terms of 2008 world rankings India is the world's second largest producer of chromite, wollastonite, graphite and barytes, and third in production of coal, talc and salt. Other rankings, together with the proportions of the world's total, are given in Table 9. Coal (43.7 per cent), iron ore (24.8 per cent), crude oil (15.6 per cent), and natural gas (7.9 per cent) contributed more than 90 per cent of the total value of mineral production, which increased by six per cent in fiscal year 2008/09 compared to the previous year.

Commodity	World rank	Percent of total world production	Commodity	World rank	Percent of total world production
Wollastonite	2	18	Bauxite	6	7
Barytes	2	17	Manganese ore	6	6
Chromium ores & concentrates	2	16	Titanium minerals	6	6
Graphite	2	6	Zinc (mine)	6	6
Talc	3	11	Vermiculite	6	3
Coal	3	8	Fullers Earth	6	1
Salt	3	7	Alumina	7	4
Pig iron	3	5	Aluminium (primary)	8	3
Bentonite	4	21	Gypsum	8	3
Iron ore	4	10	Lead (mine)	8	2
Sillimanite minerals	4	9	Zirconium minerals	8	2
Copper (smelter)	4	5	Asbestos	8	0.01
Zinc (slab)	5	5	Magnesium metal (primary)	9	0.03
Steel (crude)	5	4	Cadmium	10	3
Bromine	5	0.4	Magnesite	10	1

Table 9 India's top 10 world rankings by commodity, with proportion of world total produced.

Note: Data for India is predominantly quoted in fiscal years, which run from 1 April to 31 March of the year following.

The location of selected major mines and important deposits are shown in Figure 22 (metallics) and Figure 23 (non-metallics).

Figure 22 Selected major mines and important deposits in India (metallics).

Notes: Certain mines and/or deposits mentioned in the text have been omitted for clarity. Fe = iron ore, Au = gold,REE = rare earth elements, Ti = titanium, Zr = zirconium, Cu = copper, Mn = manganese, Al = aluminium, Cr = chromium, Zn = zinc, Pb = lead, Ag = silver

Figure 23 Selected major mines and important deposits in India (non-metallics).

Note: Certain mines and/or deposits mentioned in the text have been omitted for clarity.

Bauxite, alumina and aluminium

India possesses nearly three per cent of the world's bauxite reserves (i.e. it has the sixth largest reserves in the world). Bauxite production in 2008/09 amounted to 15.5 million tonnes, down 33 per cent on 2007/08 but up more than

100 per cent compared to 1999/2000 (Figure 24). Output of primary aluminium was just over one million tonnes, a fall of 15 per cent compared to 2007/08 but this was an increase of 72 per cent compared to 1999/2000 (Figure 24). India's demand for aluminium is expected to rise by between four and five per cent in 2009/10 from a growth of three per cent in 2008/09.

In calendar year 2008, output of alumina (three million tonnes) decreased by 6.5 per cent compared to 2007 but has increased by 55 per cent since 1999.

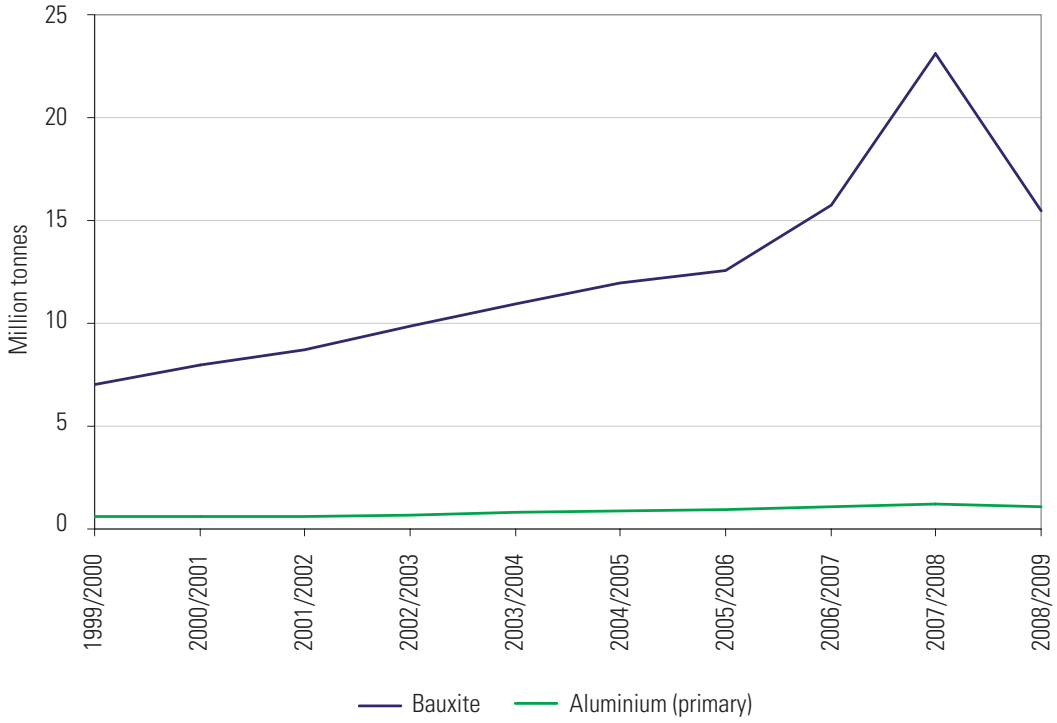

Figure 24 India's production of bauxite and primary aluminium between fiscal years 1999/2000 and 2008/2009.

Gujarat State has large bauxite deposits in the Kutch, Jamnagar and Junagadh districts with reserves estimated to total 104 million tonnes and accounts for 54 per cent of the production. This is followed by the states of Orissa (20 per cent), Chhattisgarh and Maharashtra (eight per cent each), Jharkland (five per cent), Tamil Nadu, Madhya Pradesh, Goa and Karnataka.

Five major companies namely, National Aluminium Company Ltd (NALCO), Prabhu Das Vithal Das, Bombay Minerals Ltd, Hindalco and Bharat Aluminium Company (BALCO) account for 49 per cent of total bauxite production. Hindalco, BALCO and NALCO are at the forefront of the primary aluminium industry with smelter capacities currently of 461 000 tonnes, 350 000 tonnes and 345 000 tonnes respectively.

Hindalco's Utkal project, which is due to start production in July 2011, involves development of a new bauxite mine and a 1.5 million tonnes per year alumina refinery in the Rayagada district of Orissa State. The Gujarat Mineral Development Corp Ltd (GMDC) has a joint venture partnership with US-based AluChem Inc to build a speciality alumina plant in the

Kutch district with a capacity of one million tonnes per year. GMDC, which holds 26 per cent equity in this project, would supply AluChem with bauxite feedstock.

NALCO is India's leading producer of alumina accounting for 46 per cent of output. In September 2009 NALCO obtained government approval for a bauxite mining lease in southern India and to build a 1.4 million tonnes per year alumina refinery in the Visakhapatnam district of Andhra Pradesh.

Chromium

India has approximately 12 per cent of the world's known shipping grade chromite reserves and is ranked third worldwide after South Africa and Kazakhstan. Production of chromium ores and concentrates decreased to 3.8 million tonnes in 2008/09 from 4.8 million tonnes in 2007/08 partly in response to a drop in demand for stainless steel in the latter half of 2008. However, output has been on a generally upward trend, increasing by more than 200 per cent between 1999/2000 and 2006/07 (Figure 25).

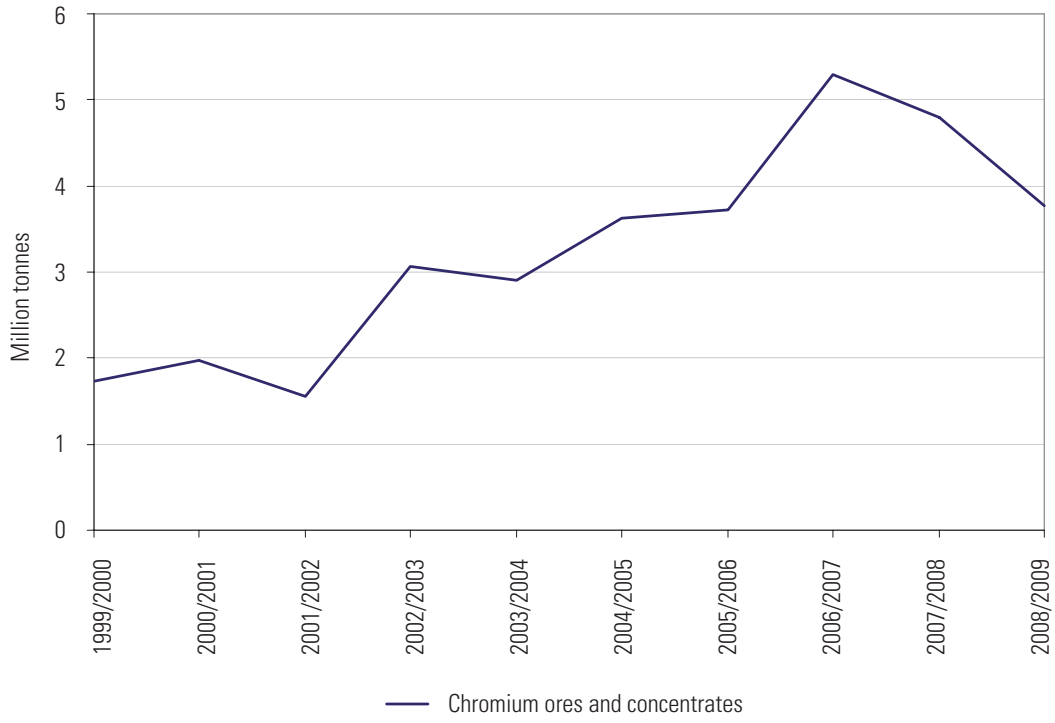

Figure 25 India's production of chromium ores and concentrates between fiscal years 1999/2000 and 2008/2009.

The State of Orissa accounts for 99 per cent of the total production; the remainder was from Karnataka. The six principal producers are Tata Iron and Steel Company (TISCO) (38 per cent of the total), Orissa Mining Corp Ltd (OMC) (26 per cent), Balasore Alloys Ltd (nine per cent), Indian Metals and Ferro Alloys Ltd (IMFAL) (seven per cent), Ferro Alloys Corp Ltd (FACOR) (five per cent) and Industrial Development Corp of Orissa (IDCOL) (four per cent). The three public sector companies namely Mysore Mineral Ltd (MML), OMC, and IDCOL have eight mines which together account for 30 per cent of total production.

Gold

No reliable estimate is currently available of the India's total gold reserves but the Archaean metamorphic belts are underexplored and it is considered that there are large resources of banded iron formation (BIF)-hosted gold. India's primary gold production for 2008/09 was 2462 kilograms, a drop of 14 per cent on 2007/08 and reflecting a general downward trend since 2004/05 (Figure 26). In addition, another 10.3 tonnes was recovered in fiscal year 2007/08 from imported copper concentrates.

India is the world's largest consumer of gold averaging 700 000–800 000 kilograms per year since 2003. Gold imports for 2008 were 675 000 kilograms and slumped by a further 55 per cent in the first six months of 2009. Imports for 2009 are unlikely to exceed 400 000 kilograms due to the record high gold price and up to 400 000 kilograms of scrap coming onto the domestic market.

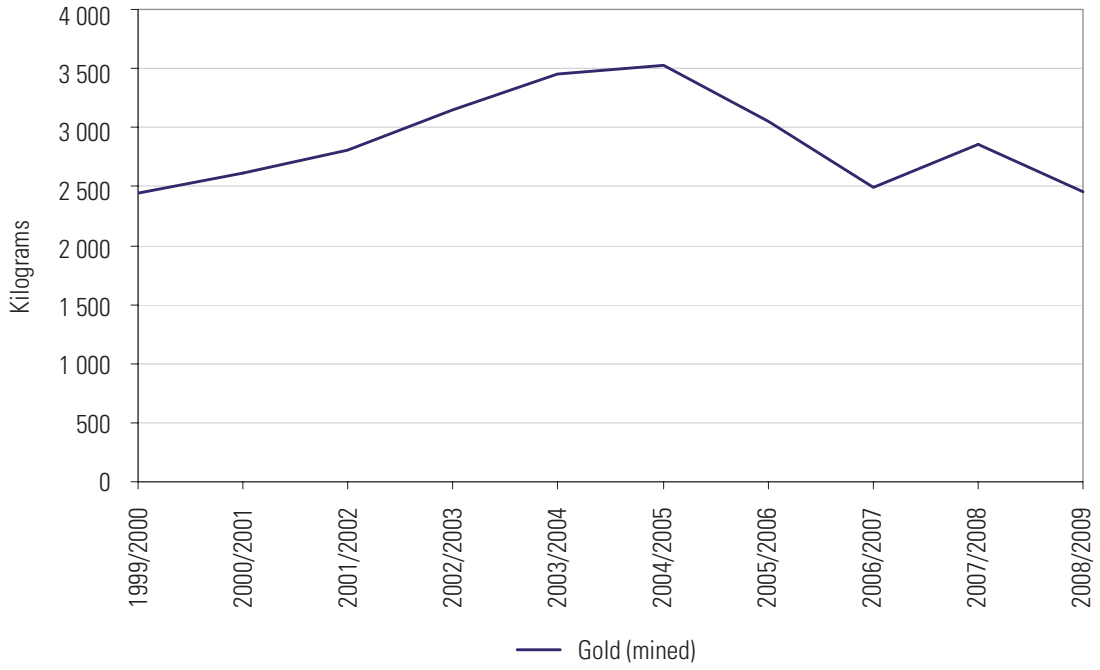

Figure 26 India's mined production of gold between fiscal years 1999/2000 and 2008/2009.

Hutti Gold Mines Ltd (HGML) accounts for 99 per cent of total production of primary gold; the rest was reported by the Manmohan Mineral Industries Ltd. HMGL is located in the State of Karnataka and has plants in Hutti and Chitradurga which serve mines in the Raichur and Tumkur districts respectively. Total ore reserves here are about 31 million tonnes containing about 150 000 kilograms of gold.

Other reserves exist in the Kolar gold fields, and at Gadag. The Kolar Gold Fields (KGF) located in Karnataka, close to the city of Bangalore, was India's premier producer with an output of approximately 800 tonnes of gold over the last 100 years, but was closed in 2003 due to reserve depletion and increasing costs. The Champion Reef Mine which reached 3.2 kilometres below surface was recognised as the world's second deepest gold mine. Lateritic gold deposits also exist in the Wynad–Nilambur region of Kerala and there have been many other discoveries.

Copper

It is estimated that India has 0.38 per cent of the world's land-based copper resources at an average grade of 0.82 per cent copper including 730 million tonnes at 1.17 per cent copper. However, the metal content is well below the world average of 1.5 per cent copper.

India produced 31 073 tonnes of mined copper for the 2008/09, down 14 per cent on the previous fiscal year. There was a similar decrease in the production of refined copper (323 000 tonnes, down 36 per cent) although the latter was still 42 per cent higher than output in fiscal year 1999/2000 (Figure 27).

Smelter production of copper fell by seven per cent in the 2008 calendar year compared to 2007, but this was 170 per cent higher than the production recorded in calendar year 1999.

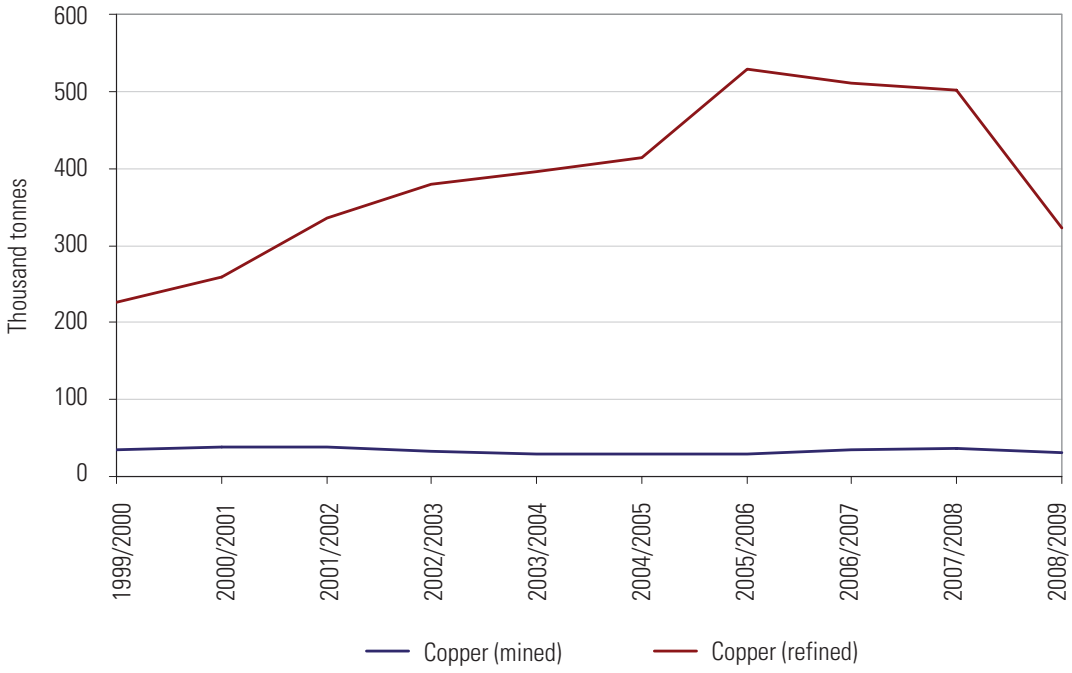

Figure 27 India's production of copper between fiscal years 1999/2000 and 2008/2009.

The copper industry has three major players: Sterlite Industries (India) Ltd (SIIL), Hindalco and Hindustan Copper Ltd (HCL) with a total smelting capacity of 900 000 tonnes per annum.

In 2007 the three mines of the State-owned HCL accounted for almost the entire production. Surda Mine in Bihar State was recommissioned by HCL in 2007 and produced nearly 9800 tonnes of copper concentrate by the end of 2008. HCL plans to expand its mines and explore for new copper deposits in the states of Jharkhand (80 million tonnes Chapri Sideshwar deposit), Madhya Pradesh (Malanjkhand mine expansion) and Rajasthan (Banwas mine development) with the goal of producing nearly eight million tonnes of ore per year by 2011.

SIIL, a London-based subsidiary of Vedanta Resources plc, is India's largest non-ferrous metals and mining company. SIIL operates a 0.4 million tonnes per year copper smelter at Tuticorin in Tamil State and a 0.3 million tonnes per year copper

refinery at Silvassa in Gujarat State. Sterlite plans to expand smelter capacity to 0.8 million tonnes per year and build a captive power plant at Tuticorin by mid 2011.

Lead and zinc

India, with reserves of 390 million tonnes grading at an average of 2.2 per cent lead and 8.2 per cent zinc, is estimated to have 10.8 per cent and 17.5 per cent of the world's lead and zinc reserves respectively and is ranked third after Australia and China.

India's mined lead and zinc production for the fiscal year 2008/09 was 80 729 tonnes and 649 581 tonnes respectively. These represent increases of two per cent and 18 per cent compared to the previous financial year. Compared to the 1999/2000 fiscal year, mined lead production has increased by 114 per cent and mined zinc by 235 per cent (Figure 28).

These increases are also reflected in India's output of refined lead and slab zinc, where production has increased in calendar year 2008 by 11 per cent and 32 per cent respectively compared to 2007. Since calendar year 1999 production of these metals has increased by 128 per cent and 221 per cent respectively.

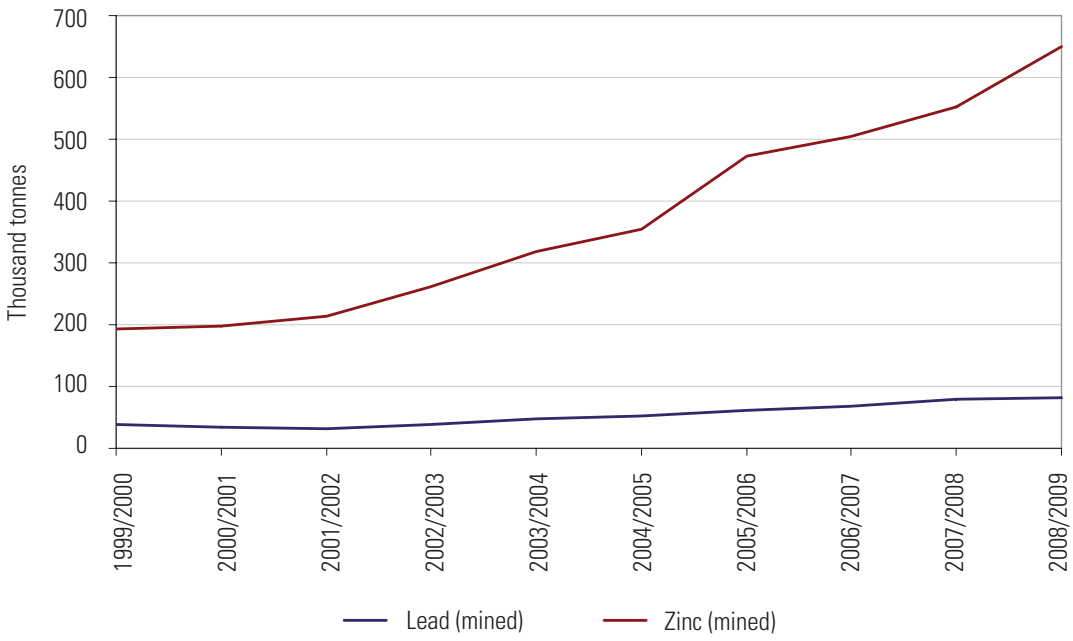

Figure 28 India's mine production of lead and zinc between fiscal years 1999/2000 and 2008/2009.

Hindustan Zinc Ltd (HZL), subsidiary of SIIL and India's largest producer, achieved a total installed capacity of 669 000 tonnes zinc and 85 000 tonnes lead in 2008/09. HZL has lead–zinc mines in Rampura Agucha, Sindesar Khurd, Rajpura Dariba and Zawar whilst its smelter operations are situated in Chanderiya, Debari and Visakhapatnam. The Rampura Agucha mine in Rajasthan State is estimated to have reserves of 53.4 million tonnes at 12.8 per cent zinc and two per cent lead. In April to September of fiscal year 2009/10 HZL production of mined zinc and lead increased by nine per cent to 375 359 tonnes, refined zinc by 12 per cent to 279 976 tonnes and refined lead by ten per cent to

26 783 tonnes compared to the same months of the previous fiscal year. Output of silver increased by 33 per cent to just under 60 tonnes during the same period.

Expansions at the mining projects at Rampura Agucha, Sindesar Khurd and Kayar mines are on schedule for progressive commissioning from mid 2010 onwards and will raise the mining capacity of concentrates from 7.1 million tonnes per year to 9.8 million tonnes per year. The company is also setting up a 210 000 tonne capacity zinc smelter and 100 000 tonne capacity lead smelter in addition to a 160 megawatt thermal power station at Rajpura Dariba close to the existing facility in Udaipur. These are scheduled for completion by mid 2010.

Binani Zinc (BZL) produced 30 443 tonnes of zinc in 2008/09 and registered an impressive rise of 73.4 per cent in output for April and May 2009. The company plans to ramp up smelter capacity in Binanipuram at Kerala to 50 000 tonnes per year and set up a greenfield smelter with a 50 000 tonne capacity in Rajasthan. Both projects should commence commercial operation by 2011. The zinc smelter in Kerala currently uses 100 per cent imported concentrates. BZL have entered a 65:35 joint venture with RBG Minerals Industries, in association with Rajashtan State Mines and Minerals Ltd (RSMML) and the Gujarat Mineral Development Corporation (GMDC), to mine deposits along the border between Ambamata in Gujarat and Deri in Rajasthan.

Iron ore

India's iron ore production in 2008/09 attained 218.6 million tonnes, up six per cent on 2007/08 and reflecting a significant increase year on year over the past decade amounting to 192 per cent since fiscal year 1999/2000 (Figure 29). Exports decreased by 15 per cent in 2008/09 compared to 2007/08. Fiscal year 2009/10 has seen a surge in demand with iron ore exports of 53 million tonnes in the first seven months, up from 44 million tonnes in the same period of the previous fiscal year.

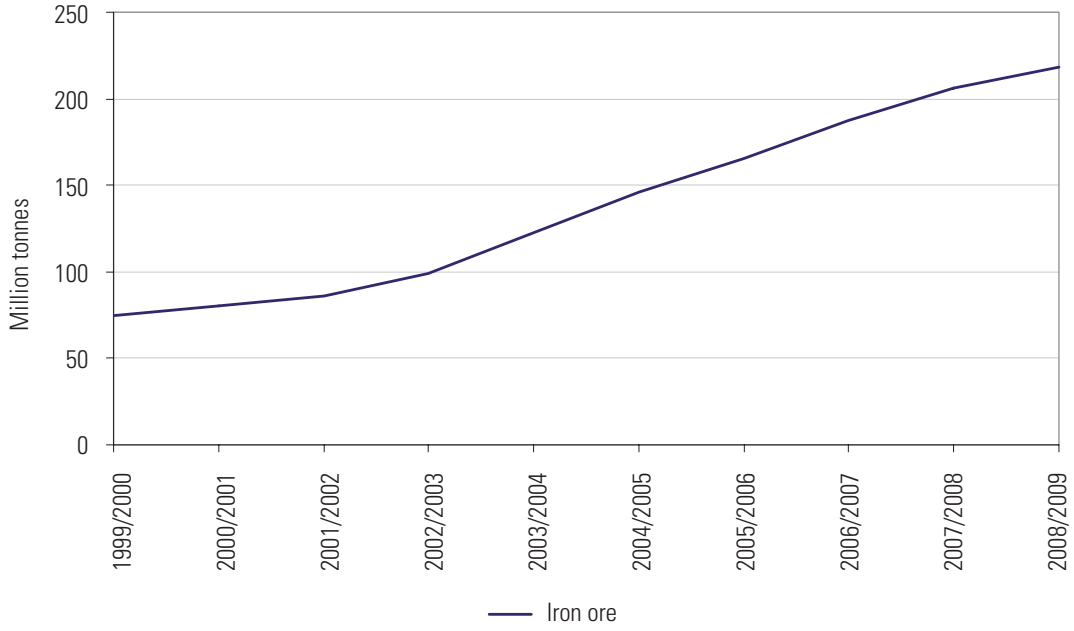

Figure 29 India's production of iron ore for fiscal years between 1999/2000 and 2008/2009.

India has huge iron reserves and was ranked sixth in the world in 2007 with 4.2 billion tonnes of reserves of contained iron and overall resources of 25 billion tonnes to a depth of 60 metres. The richest known deposits are along the Bihar–Orissa border. The Gandhamardon/Malanjtoli area of Orissa alone has reserves of 800 million tonnes. Sesa Goa, the largest exporter of iron ore, has reserves estimated at 207 million tonnes.

Orissa State was the leading producer of iron ore accounting for about 33 per cent of total production followed by Karnataka (22 per cent), Chhattisgarh (15 per cent), Goa (14 per cent), Jharkhand (10 per cent) and Andhra Pradesh (four per cent). The five leading producers, namely National Minerals Development Corp (NMDC), Steel Authority of India Ltd (SAIL), Tata Iron and Steel Co Ltd (TISCO), Essel Mining and Industries Ltd and Rungta Mines Pvt Ltd, contributed 37 per cent of the total production.

Indian state-owned iron ore miner NMDC produced 28 million tonnes of iron ore in 2008/09 slightly less than the 29.8 million tonnes in 2007/08. Output dropped 22 per cent in the first quarter of 2009/10. NMDC is introducing a new technology for commercial extraction of iron ore from banded haematite jasper (BHJ) and banded haematite quartzite (BHQ) (average 40 per cent iron) which should increase production to 50 million tonnes by 2014.

Crude steel

Crude steel production increased by four per cent to 55 million tonnes during calendar year 2008. Output has increased by 127 per cent since calendar year 1999.

TISCO is India's top steelmaker and also one of the world's lowest-cost producers, followed by SAIL and JSW Steel. TISCO and SAIL have their own iron ore and coal mines. TISCO currently has an annual crude steel capacity of 31 million tonnes. Its main plant is located in Jamshedpur, Jharkhand State. It produces about 18 million tonnes of steel in India and 52 million tonnes overseas annually. It has set an ambitious target to achieve a capacity of 100 million tonnes by 2015.

The corporate plan of SAIL for 2012 called for a 2.5 million tonnes per year expansion of the IISCO steel plant in West Bengal, upgrades to the Salem steel plant in Tamil Nadu State and expansion of SAIL's Bokaro steel plant in Jharkhand from 4.6 million tonnes per year to 7.5 million tonnes per year. This would increase the company's crude steel output to 22.5 million tonnes per year. SAIL needs the Chiria iron ore deposits of Jharkhand State to implement its growth plan. The area is estimated to hold 2 billion tonnes of good quality ore and the company was recently granted the lease renewal of two reserves amounting to around 1 billion tonnes including Gudaburu mines with 810 million tonnes.

Jindal Stainless Ltd (JSL) is India's leading manufacturer of stainless steel followed by SAIL and other producers such as Shah Alloys. The country produced around 2.2 million tonnes of stainless steel in the fiscal year 2008/09, of which Gujarat contributed 0.6–0.7 million tonnes; 93 per cent of the output was exported. JSL currently has two plants, one at Hisar and the other at Vizag. The Hisar plant is a fully integrated stainless-steel plant with a capacity of 0.72 million tonnes per year. The Vizag plant mainly produces ferrochrome and has an annual capacity of 40 000 tonnes. JSL has a strong global presence in 40 countries worldwide. It expanded its cold rolling capacity at Hisar from 275 000 tonnes to 400 000 tonnes in 2009. It is also currently building a new 1.6 million tonnes per year capacity stainless steel facility in Jaipur, Orissa, which is to be commissioned in 2012 and will raise JSL combined capacity to 2.5 million tonnes per year.

Kolkata-based VISA Steel Ltd is an integrated special and stainless steel manufacturer with a 1.5 million tonnes per year plant at Kalinga Naga, Jaipur district in Orissa State. It entered a joint venture, named Visa Bao Ltd with Baosteel Trading Co Ltd of China, in which VISA now holds a 65 per cent stake, to set up a 0.1 million tonnes per year ferrochrome plant in the Jaipur district. The plant would ensure a steady supply of ferrochrome for Baosteel's stainless steel facility.

The second half of 2009 has seen recovery in stainless steel production and domestic stainless steel consumption is expected to rise by 10 per cent in 2009.

Manganese

India is a leading producer and exporter of manganese ore accounting for about 23 per cent of the world's mid grade (30–43 per cent manganese) ore production. In 2008/09 it produced 2.6 million tonnes of manganese ore, 384 577 tonnes of ferro-manganese and 891 458 tonnes of ferro-silico-manganese. This represented a three per cent increase in mined ore but a small reduction in ferro-alloy output compared to 2007/08. Compared to 1999, manganese ore output has increased by 65 per cent (Figure 30).

High grade ore comprised only 0.87 million tonnes and Indian consumers had to import about 0.68 million tonnes to meet demand. India has known resources of 460 million tonnes of all grades of manganese ore. The manganese deposits are distributed mainly in the states of Madhya Pradesh, Karantaka and Orissa.

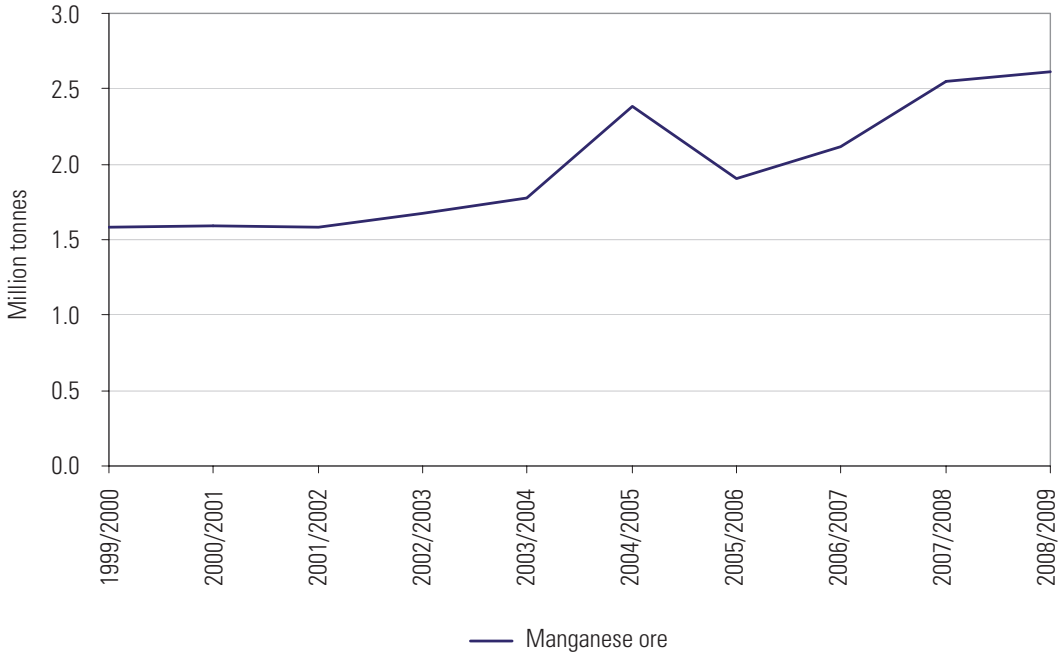

Figure 30 India's production of manganese ore between fiscal years 1999/2000 and 2008/2009.

Manganese Ore India Ltd (MOIL) continues to be the largest producer of manganese ore contributing 50 per cent of the total production followed by Tata Iron and Steel Co Ltd (TISCO) (12 per cent), Sandur Manganese and Iron Ores Ltd (SMIOR) (nine per cent), Mangilal Rungta (four per cent), Orissa Minerals Development Co Ltd (OMDC) (three per cent) and Krishnaping alloys (two per cent).

In Orissa, mining is mostly carried out by Tata Steel and Rungta, while in Karnataka, Sandur does most of the mining. Recoverable reserves are estimated to be around 166 million tonnes, of which only 33 million tonnes are high grade (more than 43 per cent manganese content). Of the available reserves, 58 per cent are held by MOIL which produced 1.4 million tonnes in 2007/08 and 1.2 million tonnes in 2008/09 of which 0.63 million tonnes was high grade.

At the current rate of exploitation the high grade ore is expected to last only 30–40 years. Requirement of ferro-alloys for steel production is expected to rise to 1.06 million tonnes by 2009/10 and 1.9 million tonnes by 2020.

Diamonds

India has around 55 per cent of the world's diamond cutting and polishing business. The majority of stones are imported from Belgium, while India has close relations with major diamond suppliers such as De Beers, Russia's Alrosa and BHP Billiton. The global economic downturn had a severe impact on India's diamond export market. In the six months to the end of March 2009, Indian diamond imports fell 60 per cent and exports of cut and polished diamonds fell by 31 per cent.

Rough diamond production in India dwindled to 498 carats in 2008/09, which is a fall of 99 per cent compared to the peak output achieved in fiscal year 2002/2003 (Figure 31). However, this industry is soon to be revived through the development of new projects and re-opening of mothballed mines.

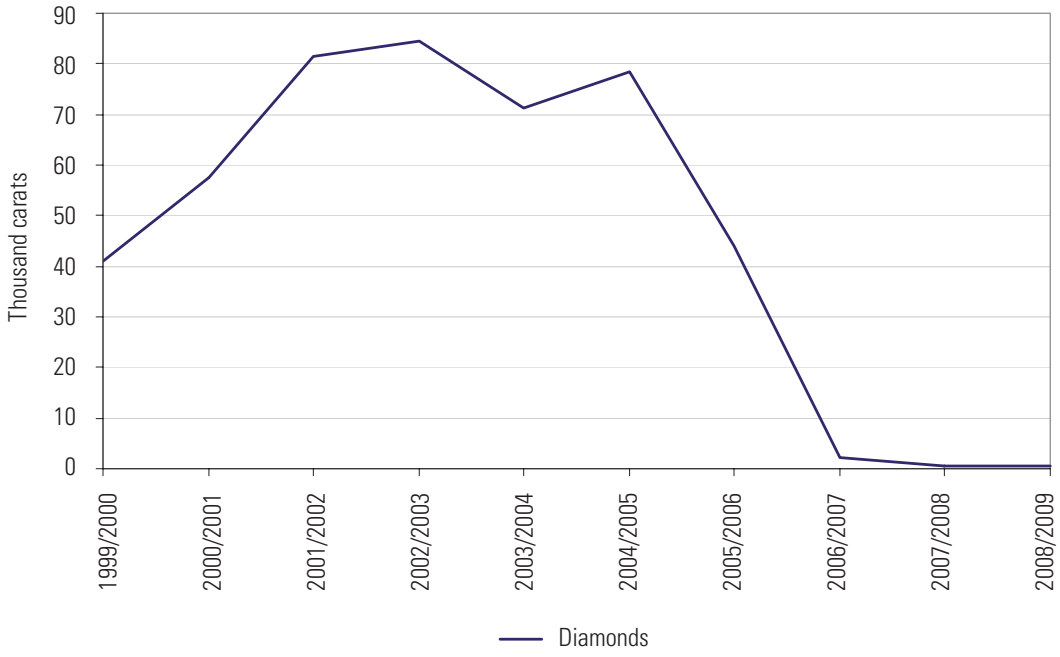

Figure 31 India's mine production of diamonds between fiscal years 1999/2000 and 2008/2009.

National Minerals Development Corp (NMDC) reopened the Panna diamond mine in Madhya Pradesh State in August 2009 after being closed for four years. It has a production capacity of 100 000 carats per year. NMDC is currently exploring for diamond reserves in the Chattarpur district.

Rio Tinto is to invest in its diamond prospect at Bunder in Madhya Pradesh which has inferred resources of 27.4 million carats. A feasibility study at the Bunder diamond project where Rio discovered a cluster of eight diamondiferous lamproites will start in 2010. Once operational, the mine will produce around 2–3 million carats per year.

India Resources Ltd (IRL) is exploring diamondiferous kimberlite prospects at Bhandara in Orissa State, in the Chigicherla kimberlite field in Andhra Pradesh State and Bundelkhand in Madhya Pradesh State.

Coal

India had 267 billion tonnes of coal resources at end March 2009 of which 106 billion tonnes are proven reserves to a depth of 1200 metres. Prime coking coal represents 17.5 billion tonnes; the remainder is of lower quality, with high ash content, and includes 47.7 billion tonnes of lignite reserves. The largest resources occur in the states of Jharkhand, Orissa, West Bengal, Chhattisgarh, Maharashtra and Andhra Pradesh. Hard coal occurs in the states of Bihar, Madhya Pradesh, Orissa and West Bengal in 18 major coalfields.

Production has steadily increased over the past decade from around 304 million tonnes per year in 1999/2000 to 493 million tonnes per year in 2008/09 (an increase of 62 per cent). Lignite production reached 33 million tonnes in 2008/09, slightly down on the previous year but reflecting an overall upward trend (Figure 32). Coal production is expected to increase by ten per cent in fiscal year 2009/2010.

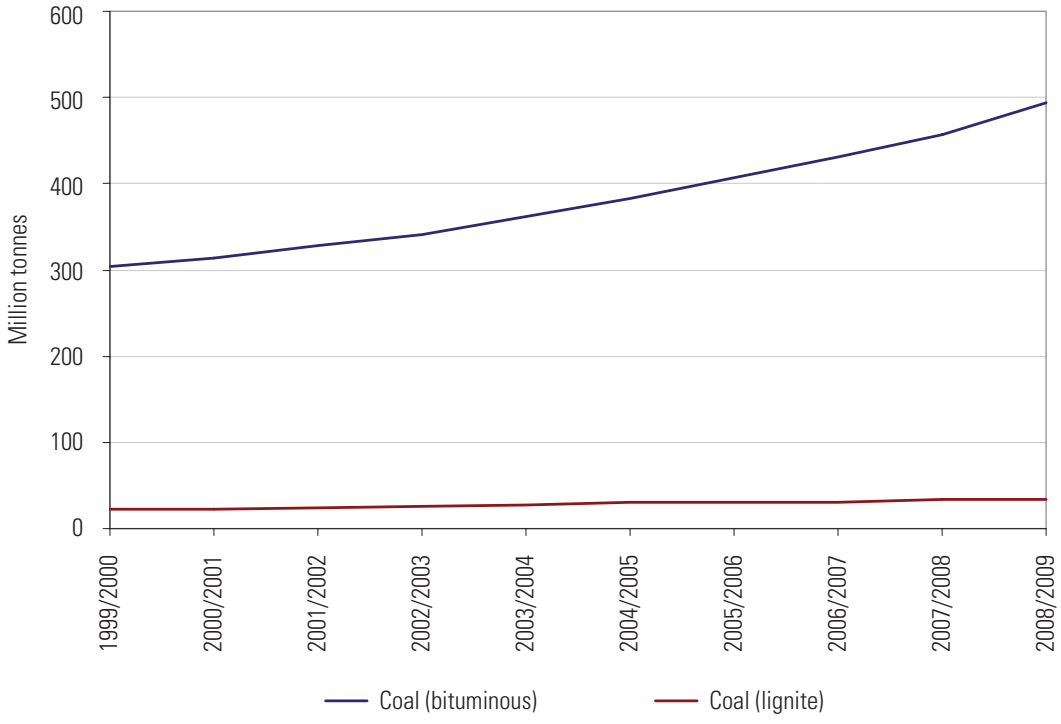

Figure 32 India's production of coal between fiscal years 1999/2000 and 2008/2009.

The state-run monopoly Coal India Ltd (CIL) produced 403.7 million tonnes in 2008/09 accounting for 82 per cent of the nation's production. CIL aims to raise output to 520 million tonnes by the fiscal year ending March 2012 and to 684 million tonnes in the following five years.

Coal is mainly used in electrical power generation and India aims to double generating capacity in the five years to March 2012 and add another 100 gigawatts in the following five years (equivalent to a further 67 per cent of current installed capacity). With the commissioning of new power plants demand for coal is expected to reach one billion tonnes per annum in the next seven years. India, therefore, will become increasingly reliant on hard coal imports. It already imports most of its coking coal. Imports of hard coal reached 60 million tonnes (31 million tonnes of thermal coal and 29 million tonnes of coking coal) in the fiscal year 2008/09 and are expected to approach 228 million tonnes by the end of year 2011/12.

Crude petroleum

Total reserves of crude oil are estimated at 726 million tonnes (357 million tonnes onshore and 369 million tonnes offshore). Offshore areas accounted for two thirds of the national oil output followed by onshore in Gujarat (18.3 per cent of the total) and Assam (12.9 per cent). With annual production of 67 million tonnes (1.3 million barrels per day) India is 25th in the world ranking as a producer but is the fifth largest oil consumer and imported 125.8 million tonnes (2.5 million barrels per day) in 2008/09, an increase of 5.3 per cent over the previous year.

The State-owned Oil and Natural Gas Corporation (ONGC) produced 14 per cent of India's oil requirements from the Mumbai High offshore oilfield and accounted for 38 per cent of domestic production in 2008/09. The Mumbai High has a 1659 million tonnes resource and produces around 12 million tonnes per year. Cumulative production to January 2009 was 140 million tonnes. Redevelopment of the Mumbai High North block is expected to be completed by September 2012 and will result in an additional 17 million tonnes of crude oil and 3 billion cubic metres of natural gas. OGNC envisages cumulative production to total 202.42 million tonnes by 2030.

Cairn India, a subsidiary of Cairn Energy, is the country's second largest crude oil producer. Oil production from Cairn's Mangala oilfield in Rajasthan, which promises to provide 20–25 per cent of India's domestic crude production, started in 2009. Output will accelerate to 125 000 barrels per day in 2010 and is forecast to reach peak production of 175 000 barrels per day in 2011.

Essar Oil Ltd has a fully integrated refinery at Vadinar in Gujarat State currently operating at 12.5 million tonnes per year capacity. It is to be expanded in two phases. The first phase is to increase oil refinery capacity to 16 million tonnes per year by December 2010 and 33 per cent of this work had been completed by the end of June 2009. Phase 2 will be the establishment of a new 18 million tonnes per year plant which is to be completed by December 2011.

Natural gas

Natural gas reserves stood at 1075 billion cubic metres (270 billion cubic metres onshore and 785 billion cubic metres offshore) in January 2009. Offshore areas account for over 70 per cent of the natural gas output followed by onshore areas in the states of Gujarat (10.6 per cent of the total), Assam (7.6 per cent), Andhra Pradesh (4.9 per cent), Tamil Nadu (3.6 per cent) and Tripura (1.7 per cent).

Natural gas production in 2007/08 amounted to 31.8 billion cubic metres and has remained virtually unchanged for the last five years. However, in the first half of fiscal year 2009/10 natural gas production was boosted by 28.2 per cent compared to the same period last year, due largely to an increase in output from Reliance Industries Ltd's (RIL) Krishna Godavari (KG) basin, which reached a peak of 80 million cubic metres per day by December 2009. Together with Cairn India's crude production, it will contribute to over 60 per cent of India's oil and gas production.

ONGC is to start natural gas production at one million cubic metres per day from an offshore field on the west coast from end November 2009. Production will increase to 1.3 million cubic metres per day in a year and the gas will be supplied to GAIL (India) Ltd. Essar Oil's Raniganj block in West Bengal has an in situ resource of 87.8 billion cubic metres and a recoverable reserve of 28.32 billion cubic metres. Gasflow has already started and sales will commence in 2010.

Domestic supplies of natural gas in fiscal year 2007/08 fell short of demand (43 billion cubic metres) and natural gas imports (as LNG) amounted to 10.8 billion cubic metres or 20 per cent of India's total consumption. This deficit should be satisfied by addition production from the KG basin until the Iran–Pakistan–India gas pipeline from Iran's South Pars Gasfield in the Persian Gulf is completed in 2014.

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India

Production

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Bauxite	tonnes	7 049 943	7 992 782	8 688 752	9 867 455	10 924 786	11 964 011	12 595 803	15 732 535	23 084 677	15 457 000
Alumina (a)	tonnes (Al_2O_3 content)	1 930 000	2 107 000	2 120 000	2 556 000	2 856 000	2 974 000	3 066 000	3 077 000	3 208 000	* 3 000 000
Primary aluminium	tonnes	612 968	624 206	635 573	688 921	810 282	883 960	930 543	1 113 849	1 239 581	* 1 051 740
Asbestos (Amphibole)	tonnes	18 550	15 397	11 148	14 139	10 107	6 392	2 323	390	261	325
Barytes	tonnes	363 414	845 001	915 976	679 628	723 075	1 159 031	1 156 227	1 680 695	1 071 765	1 676 213
Bentonite & fuller's earth											
Bentonite	tonnes	456 386	* 500 000	* 280 000	* 250 000	* 200 000	* 360 000	* 580 000	* 550 000	* 630 000	* 710 000
Fuller's earth	tonnes	138 287	* 130 000	* 150 000	* 62 000	* 76 000	* 144 000	* 93 000	* 50 000	* 80 000	* 24 000
Bromine (a)	kilograms	886 700	1 062 200	927 660	1 579 000	1 560 000	1 730 000	2 424 000	2 138 000	1 664 640	2 118 740
Cadmium	tonnes	278	326	431	483	478	480	406	481	589	503
Chromium ores & concentrates	tonnes	1 737 985	1 971 806	1 548 900	3 068 631	2 904 809	3 621 394	3 714 284	5 295 551	4 798 515	3 771 000
Coal											
Bituminous	tonnes	304 103 000	313 696 000	327 787 000	341 272 000	361 156 000	382 615 000	407 039 000	430 832 000	457 003 000	493 220 000
Lignite	tonnes	22 124 000	22 947 000	24 813 000	26 018 000	27 958 000	30 337 000	30 066 000	31 285 000	33 980 000	33 364 000
Cobalt metal (a)	tonnes	200	206	250	270	255	545	1 220	1 184	980	858
Copper, mine	tonnes (metal content)	35 479	37 511	38 177	32 780	29 529	30 072	28 602	34 120	36 293	31 073
Copper, smelter (a)	tonnes	240 704	256 000	287 100	374 900	386 200	399 600	482 300	609 600	699 900	651 000
Copper, refined	tonnes	226 999	259 683	335 769	378 850	395 967	413 354	529 248	510 623	501 485	323 000
Diamond	carats	40 956	57 407	81 436	84 407	71 259	78 315	44 170	2 180	586	498
Feldspar	tonnes	194 158	179 046	228 735	239 093	332 220	379 055	426 498	479 715	410 926	373 924
Fluorspar	tonnes	48 072	7 035	20 766	13 023	12 393	14 008	5 577	2 053	3 502	2 201
Gold, mine	kilograms (metal content)	2 442	2 615	2 810	3 153	3 457	3 526	3 047	2 488	2 858	2 462
Graphite (b)	tonnes	108 826	124 790	105 814	106 060	87 207	108 150	125 651	162 293	116 007	134 257
Gypsum (c)	tonnes	3 247 009	2 644 415	2 879 344	2 672 244	2 793 553	3 689 927	3 291 478	3 005 572	2 606 788	* 3 600 000
Iron ore	tonnes	74 946 000	80 762 000	86 226 000	99 072 000	122 838 000	145 942 000	165 230 000	187 696 000	206 452 000	218 554 000
Pig iron (a)	tonnes	25 359 000	26 761 000	27 595 000	30 046 000	33 601 000	34 238 000	39 177 000	43 288 000	46 884 000	49 050 000
Crude steel (a)	tonnes	24 296 000	26 924 000	27 291 000	28 814 000	31 779 000	32 626 000	45 780 000	49 450 000	53 080 000	55 050 000
Ferro-alloys											
Ferro-aluminium	tonnes	...	1 510	1 743	2 000	5 169	5 917	7 214	9 947	9 377	8 170
Ferro-chrome	tonnes	298 807	382 339	302 109	380 528	525 824	594 994	662 297	801 368	948 601	817 239
Ferro-silico-magnesium	tonnes	2 310	2 460	2 385	6 369	6 289	7 092	11 171	11 387	13 525	13 400
Ferro-manganese	tonnes	136 416	170 362	206 624	236 676	248 388	270 234	273 057	296 726	391 210	384 577
Ferro-silico-manganese	tonnes	232 611	276 008	235 730	304 212	380 316	498 047	596 372	782 962	911 402	891 458
Ferro-molybdenum	tonnes	1 693	1 881	2 152	3 114	2 949	2 864	2 827	3 120	2 899	2 162
Ferro-silicon	tonnes	56 286	67 349	76 209	81 955	68 844	99 296	90 652	92 632	83 716	99 595
Ferro-titanium	tonnes	—	—	155	157	252	512	735	1 761	1 937	1 661
Ferro-vanadium	tonnes	735	674	644	914	769	826	877	1 139	1 585	1 501
Other ferro-alloys	tonnes	40	45	110	209	166	211	225	409	362	541
Kaolin (d)	tonnes	168 618	179 274	187 232	204 694	209 920	220 262	238 759	273 262	264 444	* 95 000
Lead, mine	tonnes (metal content)	37 700	34 600	32 600	37 800	46 700	52 200	61 655	67 331	78 887	80 729
Lead, refined (a)	tonnes	60 500	57 400	74 400	74 200	71 000	49 000	59 000	104 000	124 000	138 000
Magnesite	tonnes	325 764	317 765	282 943	278 267	323 977	383 953	340 674	238 981	247 527	247 421
Primary magnesium metal (a)	tonnes	* 1 000	* 500	* 500	* 500	* 200	* 200	* 200	* 200	* 200	* 200
Manganese ore	tonnes	1 585 726	1 595 458	1 587 305	1 678 372	1 776 153	2 386 396	1 906 353	2 115 507	2 550 560	2 616 000

Table 10 Mineral production in India from 1999 to 2008 *(continued)*.

India production continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mica	tonnes	3 386	4 117	6 095	3 575	4 002	3 773	2 116	1 411	1 242	1 176
Natural gas	million m^3	26 885	27 860	28 037	29 964	30 908	30 820	32 202	31 747	32 274	31 804
Perlite	tonnes	383	274	176	283	279	355	122	68	—	—
Crude petroleum	tonnes	31 949 000	32 426 000	32 032 000	33 044 000	33 373 000	34 015 000	32 190 000	33 988 000	34 117 000	33 505 000
Phosphate rock	tonnes	1 203 282	1 264 035	1 251 553	1 212 834	1 435 959	1 722 983	2 049 277	1 586 843	1 859 851	1 753 000
Rare earth minerals											
Monazite	tonnes	1 698	1 890	2 651	2 856	2 891	149	93	45	...	...
Salt											
Rock salt (a)	tonnes	3 000	2 600	2 500	1 900	1 000	3 800	1 900	1 600	* 1 200	* 2 100
Sea salt (a)	tonnes	9 775 700	11 219 100	10 295 000	14 366 400	11 787 300	11 949 500	15 484 600	13 156 300	* 12 328 000	* 13 970 500
Other salt (a)	tonnes	4 674 000	4 429 600	3 986 500	3 510 900	3 094 100	2 807 900	4 437 500	4 927 900	* 5 516 000	* 5 178 600
Selenium metal	tonnes	6	10	10	6	2	—	8	—	—	...
Silliminite minerals											
Kyanite	tonnes	6 191	4 733	4 225	5 327	9 057	8 208	8 869	8 059	4 804	4 234
Silliminite	tonnes	14 933	15 498	14 720	13 290	19 729	30 711	33 119	26 366	42 566	33 399
Silver, mine	kilograms (metal content)	53 641	46 150	57 675	59 502	37 870	10 955	27 961	53 271	80 684	* 100 000
Sulphur and Pyrites											
Pyrites (a)	tonnes (sulphur content)	2 100	—	—	—	—	—	—	—	—	—
Recovered (a) (e)	tonnes (sulphur content)	261 000	359 000	458 000	458 000	539 000	539 000	637 000	801 000	955 000	1 103 000
Recovered (a) (f) (g)	tonnes (sulphur content)	101 000	376 000	526 000	326 000	451 000	501 000	576 000	801 000	951 000	1 101 000
Talc											
Pyrophyllite	tonnes	106 268	148 346	150 345	147 233	176 240	271 225	182 526	147 807	204 889	226 063
Steatite	tonnes	557 112	595 724	578 857	688 135	726 398	684 440	681 534	739 849	825 986	820 347
Tin, smelter (a)	tonnes	* 3 600	—	—	—	—	—	—	—	—	—
Titanium minerals											
Ilmenite	tonnes	388 271	429 707	450 678	478 717	589 829	632 025	703 796	692 906	* 730 000	* 730 000
Rutile	tonnes	17 505	18 974	17 817	14 531	19 646	19 649	20 299	16 157	* 22 000	* 22 000
Uranium, mine (a)	tonnes (metal content)	200	200	230	230	230	* 230	* 230	* 177	* 270	* 271
Vermiculite	tonnes	3 123	5 003	5 097	5 499	4 493	3 377	6 674	11 827	10 801	* 13 368
Wollastonite	tonnes	117 094	121 891	136 420	178 298	150 814	170 292	128 582	131 572	118 666	103 837
Zinc, mine	tonnes (metal content)	194 100	198 800	214 600	262 100	318 300	354 600	472 241	504 863	551 992	649 581
Slab zinc (a)	tonnes	189 000	204 000	234 000	248 000	280 000	272 000	302 000	415 000	459 000	606 000
Zirconium minerals (a)	tonnes	* 19 000	* 19 000	* 19 000	23 219	25 263	25 432	27 133	20 535	* 24 000	* 24 000

Note(s):-
(1) Unless otherwise noted this table is fiscal years ended 31 March following that stated.

(a) Calendar year ended 31 December of that stated
(b) Crude
(c) Including selenite
(d) Beneficiated; excludes directly used natural kaolin
(e) From metal sulphide processing
(f) From petroleum refining and/or natural gas
(g) Other

Table 10 Mineral production in India from 1999 to 2008.

Exports

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Primary aggregates	tonnes	327 882	698 355	1 050 785	695 711	836 311	723 980	861 554	996 035	950 460	1 351 082
Bauxite, alumina & aluminium											
Bauxite	tonnes	596 801	1 248 175	979 570	1 785 350	896 137	1 016 142	2 355 277	5 073 894	7 157 309	3 520 438
Alumina	tonnes	86 062	189 310	263 104	1 101 614	808 179	896 518	1 025 023	916 530	688 044	968 247
Alumina hydrate	tonnes	31 496	77 116	107 707	110 895	71 298	46 232	52 540	64 638	75 762	50 950
Unwrought	tonnes	95 394	72 890	64 107	49 212	96 361	103 310	64 824	119 647	159 625	230 248
Unwrought alloys	tonnes	5 667	48 359	57 871	55 756	5 676	19 250	31 613	4 238	7 044	3 509
Scrap	tonnes	59	79	1 117	888	555	853	687	410	1 403	939
Antimony											
Metal	tonnes	—	8	—	11	3	10	4	2 158	23	58
Oxide	tonnes	60	146	189	237	122	476	464	646	227	135
Arsenic											
Metallic arsenic	tonnes	...	...	...	1	13	29	3	...	3	5
Asbestos											
Unmanufactured	tonnes	172	403	1 129	169	2 548	377	288	526	3 942	919
Barytes	tonnes	37 845	153 960	177 721	314 623	405 890	442 552	555 442	629 518	564 919	843 945
Bentonite & fuller's earth											
Bentonite	tonnes	123 857	118 613	124 709	91 958	80 662	285 295	465 414	480 187	462 504	566 891
Fuller's earth	tonnes	36 142	19 655	94 735	52 078	66 077	134 103	82 351	39 593	84 015	...
Bromine	kilograms	10 983	22 476	18 606	9 300	18 815	327 097	632 896	38 850	2 066	322
Cadmium											
Metal	tonnes	6	—	1	116	6	3	383	156	174	1
Cement											
Cement clinkers	tonnes	1 343 193	1 592 097	1 318 029	1 942 275	4 124 505	4 199 784	1 510 956	628 144	427 632	817 861
Portland cement	tonnes	835 241	1 824 605	1 934 962	2 661 338	2 816 404	3 081 730	4 119 244	4 186 889	2 983 775	2 439 606
Other	tonnes	155	613	13 736	1 872	3 629	5 146	7 935	1 123	10 670	2 797
Chromium											
Ores & concentrates	tonnes	714 448	659 882	1 181 791	1 098 343	35 850	1 116 401	692 674	1 203 060	906 576	1 899 028
Metal	tonnes	...	27	117	7	32	29	54	4	36	12
Coal											
Hard coal (a)	tonnes	1 156 289	1 290 313	1 902 513	1 516 058	1 611 371	1 372 573	1 987 216	1 546 024	1 626 782	1 655 469
Lignite	tonnes	1 001	667	20	36	32	622	194	964	574	200
Briquettes	tonnes	15 470	521	100	734	15 484	217	1 635	8 453	167 696	22 156
Cobalt											
Ores & concentrates	tonnes	21	294	189	...	150	84	443	...	451	522
Metal	tonnes	220	49	27	19	20	28	355	479	371	275
Oxides	tonnes	5	21	12	1	26	12	24	44	4	58
Copper											
Ores & concentrates	tonnes	...	87 221	...	121 125	299	18 990	...	44 645	565	26 613
Matte & cement	tonnes	1	37	34	1 505	191	533	248	127	30 472	15 732
Unwrought	tonnes	1 609	32 899	52 881	105 563	116 314	144 344	182 767	273 219	216 370	143 471
Scrap	tonnes	207	401	2 611	4 531	4 112	2 835	3 393	4 158	1 245	1 008

Table 11 Mineral exports from India between 1999 and 2008 (*continued*).

India exports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Diamond											
Unsorted	carats	—	300	—	3 790	9 503	6 145	20 140	31 977	24 195	39 265
Gem, rough	carats	1 741 501	266 952	1 642 555	743 060	1 267 307	14 363 648	7 980 343	9 721 908	8 529 674	10 160 335
Gem, cut	carats	14 478	22 383 779	25 957 232	27 320 270	30 076 400	31 268 385	36 386 929	26 992 192	34 625 222	47 760 630
Industrial	carats	12 570	201 449	14 645	14 550	52 048	5 273 349	302 974	268 336	355 758	2 484 310
Dust	carats	12 449	44 862 124	22 946 852	11 311 970	8 495 541	33 952 382	28 713 017	13 584 174	20 517 443	8 634 447
Diatomite	tonnes	289	320	396	438	139	1 439	810	2 419	962	1 924
Feldspar	tonnes	56 981	164 119	157 029	200 920	245 197	448 204	469 051	557 564	427 220	337 662
Fluorspar	tonnes	24	150	20	145	468	286	2 599	1 111	348	79
Gold											
Metal (d)	kilograms	...	...	100	...	32	114	308	456	277	185
Graphite	tonnes	1 107	3 937	413	906	2 817	1 309	2 179	1 849	1 418	1 908
Gypsum											
Crude & calcined	tonnes	31 765	37 553	63 098	47 078	62 964	103 003	88 037	116 026	120 581	209 159
Iodine	kilograms	319 350	214 195	83 740	26 248	34 657	77 275	92 269	542 478	339 306	289 740
Iron ore	tonnes	15 716 166	20 161 360	23 084 567	57 093 338	51 497 912	97 282 642	84 045 800	91 424 431	68 476 019	68 902 791
Iron, steel & ferro-alloys											
Pig iron	tonnes	130 952	205 481	327 400	466 680	458 518	421 525	413 131	651 566	790 818	438 583
Sponge & powder	tonnes	2 588	7 475	16 193	38 366	18 110	40 236	32 236	67 927	60 814	35 307
Ferro-chrome	tonnes	85 316	125 134	66 163	62 468	81 201	157 371	255 996	287 760	482 953	491 673
Ferro-silico-chrome	tonnes	6 275	820	2 367	236	3 044	46 757	268	121	64	26
Ferro-manganese	tonnes	1 459	5 381	12 338	27 555	9 675	11 797	23 732	54 226	114 459	121 533
Ferro-silico-manganese	tonnes	35 684	61 502	26 667	40 328	44 173	73 486	119 274	152 050	262 593	300 421
Ferro-silicon	tonnes	1 114	2 318	1 223	1 993	2 926	4 120	7 860	7 943	9 374	37 167
Ferro-vanadium	tonnes	...	...	3	120	19	313	101	1 971	787	387
Other ferro-alloys	tonnes	28 988	19 180	4 950	8 239	7 876	25 812	16 175	6 504	8 482	8 887
Silicon metal	tonnes	362	5 588	2 574	2 531	4 626	678	584	183	568	290
Ingots, blooms, billets	tonnes	62 552	155 133	132 122	363 341	507 999	152 048	325 429	1 043 083	749 402	1 024 561
Scrap	tonnes	2 240	1 569	26 397	14 908	32 157	8 943	6 608	84 872	106 760	28 548
Kaolin	tonnes	9 335	8 462	9 168	8 923	56 940	65 610	65 255	70 230	59 456	120 416
Lead											
Ores & concentrates	tonnes	162	13 996	28 651	834	542	81 157	9 838	75 410	1 102 514	81 095
Unwrought	tonnes	171	229	1 043	138	2 535	4 603	5 530	7 459	71 883	10 669
Scrap	tonnes	...	22	164	404	156	446	142	368	73	95
Lithium											
Oxides	tonnes	1	50	...	113	61	128	110	228	174	229
Carbonate	tonnes	—	—	...	2	—	8	72	141	99	8
Magnesite & magnesia											
Magnesite	tonnes	761	2 253	982	2 605	3 129	1 878	1 055	452	904	458
Magnesia	tonnes	3 100	2 743	2 089	2 614	4 311	10 124	6 086	12 224	7 793	11 825
Manganese											
Ores & concentrates	tonnes	(b) 75 685	(b) 265 010	(b) 248 103	335 672	239 632	317 786	237 344	157 312	208 372	205 424
Metal	tonnes	...	...	...	...	...	13	35	9	378	266
Mercury	kilograms	35 837	359 534	18 604	2 300	2 430	14 920	14 512	12 554	17 799	98 470

Table 11 Mineral exports from India between 1999 and 2008 (*continued*).

India exports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mica											
Splittings	tonnes	2 109	3 282	21 579	1 772	4 090	29 154	2 522	2 267	3 069	6 271
Ground	tonnes	38 926	55 304	33 743	27 888	87 995	55 153	56 770	62 071	73 682	72 106
Waste	tonnes	5 000	4 660	2 360	4 188	14 549	13 160	20 506	16 029	22 639	112 049
Molybdenum											
Ores & concentrates	tonnes	...	...	35	...	288	106	6 276	4 712	33	29 784
Oxides	tonnes	2	7	15	12	10	18	19	8	4	51
Natural gas (d)	tonnes	18 397	18 855	190	50 720	23 047	31 142	9 584	77 679	41 993	48 166
Crude petroleum	tonnes	—	—	50 000	2 200	103 205	76 675	138 208	107 201	29 270	56 846
Phosphate rock	tonnes	102	7 399	50 077	602	5 097	993	920	1 180	1 018	5 406
Platinum group metals											
Platinum & platinum metals	kilograms	12 079	18 557	1 794	2 340	2 665	404	1 077	659	1 984	1 452
Potash											
Chloride	tonnes	393	28 690	40 003	828	1 392	8 628	9 668	527	24 810	38 700
Other potassic fertilisers	tonnes	13	176	99	192	7 005	466	2 642	14 855	2 635	2 744
Rare Earths											
Rare earth compounds	tonnes	5	964	1 728	—	499	476	546	812	212	89
Salt	tonnes	315 913	737 997	978 846	625 749	370 518	2 066 633	1 691 156	1 508 136	822 542	1 295 610
Sillimanite minerals	tonnes	311	682	617	10 402	1 133	25 754	2 022	374	4 025	2 232
Silver											
Metal	kilograms	67	762	2 234	1 460	6 440	20 835	16 617	67 230	25 526	36 181
Sulphur & pyrites											
Pyrites (d)	tonnes	36	96	28	21	282	2 475	745	269	2	37
Sulphur	tonnes	286	647	1 289	6 523	3 483	2 536	5 344	136 583	3 576	171 159
Sulphur, sublimed & precipitated	tonnes	3 045	3 137	2 516	3 444	30 102	3 399	34 908	5 117	7 208	5 068
Talc	tonnes	12 378	24 285	21 008	29 383	29 335	59 210	47 080	112 532	153 813	99 519
Tantalum & niobium											
Tantalum	tonnes	...	...	...	8	15	2	3	1	20	49
Tin											
Unwrought (c)	tonnes	423	94	376	71	347	905	1 573	683	399	366
Scrap	tonnes	14	44	1	—	228	138	75	173	268	59
Titanium											
Titanium minerals	tonnes	68 558	58 752	45 256	107 552	205 329	436 175	438 105	311 490	255 337	226 306
Metal	tonnes	...	32	21	11	24	139	90	125	157	61
Oxides	tonnes	1 154	1 246	3 348	9 106	8 918	27 811	37 264	20 246	35 721	33 644
Tungsten											
Ores & concentrates	tonnes	...	1	28	19	360	4	2	415	133	15 915
Metal	tonnes	172	23	126	132	48	337	244	273	113	166
Vanadium											
Pentoxide	tonnes	15	14	12	23	30	31	65	33	18	32
Zinc											
Ores & concentrates	tonnes	32 315	11 580	21 316	327 676	62 041	180 704	433 648	3 174 196	506 774	88 387
Unwrought (c)	tonnes	51	155	1 344	828	28 836	16 707	13 505	162 416	71 883	205 108
Scrap	tonnes	—	36	122	27	30	54	81	519	262	60

Table 11 Mineral exports from India between 1999 and 2008 (*continued).*

India exports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Zirconium											
Ores & concentrates	tonnes	82	210	1 840	18 165	112	90	94	32	123	25
Metal	tonnes	28	18	229	36	153	5	28	22	—	140

Note(s):-
(1) Unless otherwise noted this table is fiscal years ended 31 March following that stated.

(a) Including anthracite
(b) Including ferruginous manganese ore
(c) Including alloys
(d) Calendar year ended 31 December of that stated

Table 11 Mineral exports from India between 1999 and 2008.

Imports

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Primary aggregates	tonnes	3 601	3 718	1 199	3 762	113 323	213 400	844 382	3 752 620	3 855 008	4 103 202
Bauxite, alumina & aluminium											
Bauxite	tonnes	29 902	27 099	20 830	44 183	37 432	52 895	45 240	47 138	122 912	45 612
Alumina and alumina hydrate	tonnes	14 819	12 855	15 480	25 557	29 333	41 314	191 472	350 284	652 649	217 345
Unwrought	tonnes	37 126	37 238	60 376	55 653	62 066	40 023	83 776	49 261	92 868	108 477
Unwrought alloys	tonnes	10 113	9 199	11 881	15 071	15 337	32 275	42 524	62 554	76 943	75 396
Scrap	tonnes	81 503	60 100	109 664	97 276	107 725	131 501	236 010	245 563	226 146	250 043
Antimony											
Ores & concentrates	tonnes	25	1	443	196	773	441	445	478	692	476
Metal	tonnes	1 949	1 589	2 584	1 917	2 214	1 412	1 897	2 107	2 144	966
Oxide	tonnes	289	273	342	327	923	1 103	1 260	2 079	2 148	2 346
Arsenic											
Metallic arsenic	tonnes	310	67	261	186	181	183	190	219	429	238
Asbestos											
Unmanufactured	tonnes	112 936	97 345	143 583	148 821	182 761	172 398	236 494	253 382	311 706	346 657
Barytes											
Barytes & witherite	tonnes	—	25	242	271	91	541	264	3 362	1 369	1 824
Bentonite & fuller's earth											
Bentonite & fuller's earth	tonnes	4 192	3 971	2 858	1 145	1 814	3 074	4 561	7 683	8 024	4 501
Bismuth											
Metal	tonnes	40	20	28	55	74	58	152	185	153	100
Bromine	kilograms	1 037 859	1 995 890	1 991 850	2 601 930	(a) 3 229 788	3 750 520	4 129 068	1 443 163	6 372 722	4 809 569
Cadmium											
Metal	tonnes	2 339	1 046	348	539	288	387	142	121	115	271
Cement											
Cement clinkers	tonnes	25	967	58 864	2 332	2 259	2 235	4 537	182 030	174 014	170 601
Portland cement	tonnes	9 680	12 779	482	2 110	15 162	9 608	13 240	24 450	572 095	851 277
Chromium											
Ores & concentrates	tonnes	6 886	54 567	1 153	1 740	1 699	2 521	5 100	4 801	121 000	94 415
Metal, alloys	tonnes	156	138	176	220	177	478	283	309	497	600
Coal											
Hard coal (b)	tonnes	19 699	20 929 858	20 547 978	23 030 119	21 682 215	28 949 960	38 585 948	43 080 736	49 794 085	59 003 143
Cobalt											
Ores & concentrates	tonnes	2 356	4 030	2 125	4 181	5 480	8 011	8 313	9 473	9 951	7 824
Metal	tonnes	357	352	502	438	500	476	661	493	600	803
Oxides	tonnes	11	18	37	43	92	86	57	71	63	70
Copper											
Ores & concentrates	tonnes	400 546	471 399	827 520	697 505	488 063	774 138	1 072 904	2 707 370	1 914 178	2 264 732
Matte & cement	tonnes	...	...	57	189	113	290	1 100	170	161	378
Unwrought	tonnes	49 964	15 436	10 467	16 260	50 001	39 195	47 504	20 682	28 413	32 112
Scrap	tonnes	205 116	85 067	111 318	92 529	92 284	109 648	150 327	103 944	100 481	95 685

Table 12 Mineral imports to India between 1999 and 2008 *(continued).*

India imports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Diamond											
Unsorted	carats	100	6 536	1 569	12 250	428 701	6 091	15 821	31 056	3 729	3 473
Gem, rough	carats	112 015	100 027 307	117 409 814	140 757 340	124 558 399	122 592 116	108 668 552	112 397 798	107 418 845	97 087 588
Gem, cut	carats	3 096 916	2 472 461	2 119 776	3 614 807	8 116 759	16 188 497	16 059 067	7 196 681	6 884 984	46 372 999
Industrial	carats	3 180	40	1 904	5 610	200 892	14 705	12 244	4 503	40 912	24 502
Dust	carats	6 509 609	11 610 610	14 177 986	12 538 650	38 372 476	27 373 785	47 792 030	56 847 555	72 600 707	72 331 936
Diatomite	tonnes	2 804	3 389	3 195	2 337	770	1 305	1 259	1 777	2 053	2 230
Feldspar	tonnes	231	5	246	8 219	1 507	2 238	6 032	53 127	90	246
Fluorspar	tonnes	76 295	59 677	91 460	76 001	100 051	82 547	105 836	130 913	162 034	153 508
Gold											
Metal	kilograms	471 573	471 207	471 407	606 662	766 605	768 879	723 780	715 811	698 409	771 045
Graphite	tonnes	979	987	1 662	2 800	5 587	6 111	8 029	9 927	11 666	7 307
Gypsum											
Crude & calcined	tonnes	10 126	20 136	25 327	11 531	18 502	34 223	75 910	421 772	575 686	890 912
Iodine	kilograms	700 823	801 057	794 911	1 237 593	1 485 932	1 384 981	1 881 021	1 958 335	1 975 351	2 372 075
Iron ore											
Iron ore	tonnes	243 963	486 106	395 557	520 950	1 743 558	485 479	611 152	483 150	328 570	69 402
Burnt pyrites	tonnes	...	—	272	455	214	63	64	22	290	218
Iron, steel & ferro-alloys											
Pig iron	tonnes	3 417	1 867	2 178	2 270	3 846	13 118	5 397	5 752	11 502	11 850
Sponge & powder	tonnes	2 625	57 309	2 564	2 056	32 696	38 289	37 242	167 570	12 975	9 285
Ferro-chrome & ferro-silico-chrome	tonnes	7 360	24 915	7 348	11 905	11 564	11 364	11 188	19 167	19 361	12 375
Ferro-manganese	tonnes	9 582	7 203	5 573	6 904	10 639	9 608	12 302	12 037	17 966	27 772
Ferro-silico-manganese	tonnes	1 145	2 070	22	3 072	2 785	2 161	1 287	207	513	239
Ferro-molybdenum	tonnes	60	16	43	126	59	559	323	262	481	841
Ferro-nickel	tonnes	5 412	1 956	1 940	1 299	2 393	3 067	1 246	7 753	8 133	7 663
Ferro-niobium	tonnes	226	189	384	262	413	689	860	1 706	1 599	1 779
Ferro-silicon	tonnes	33 350	23 460	24 832	35 547	31 965	44 018	62 035	86 835	96 310	82 751
Ferro-titanium & ferro-silico-titanium	tonnes	642	323	312	285	692	399	334	441	570	559
Ferro-vanadium	tonnes	155	1 649	392	225	388	426	509	523	196	243
Other ferro-alloys	tonnes	2 682	2 306	3 822	3 469	4 137	10 419	4 695	5 978	15 190	11 957
Silicon metal	tonnes	10 918	13 064	11 435	18 241	23 302	19 722	22 603	25 733	25 523	19 998
Ingots, blooms, billets	tonnes	1 155 515	354 952	145 871	97 667	121 591	445 051	713 565	381 194	276 718	630 945
Scrap	tonnes	1 924 394	1 698 895	2 879 077	2 397 985	2 567 970	3 411 026	4 803 276	3 188 061	3 548 203	4 443 073
Kaolin	tonnes	6 690	6 671	10 622	17 080	28 259	29 722	40 999	29 805	43 549	62 085
Lead											
Ores & concentrates	tonnes	12 270	13 344	4 219	1 059	8 266	2 502	3 970	8 032	5 686	5 183
Unwrought	tonnes	64 186	54 110	74 924	93 841	131 661	144 976	140 977	158 515	136 165	181 939
Scrap	tonnes	13 657	12 773	19 798	31 282	36 661	17 530	32 678	24 173	16 470	25 844
Lithium											
Oxides	tonnes	1 070	653	910	1 108	1 153	1 098	1 433	1 556	1 841	1 689
Carbonate	tonnes	237	20	400	348	448	348	540	498	382	343
Magnesite & magnesia											
Magnesite	tonnes	9 755	11 448	22 263	20 880	15 093	14 612	10 672	877	3 156	441
Magnesia	tonnes	47 453	54 768	40 157	50 785	75 450	63 654	73 059	91 248	73 128	50 981
Manganese											
Ores & concentrates	tonnes	5 102	2 887	7 721	7 620	6 258	211 036	13 281	284 202	686 052	852 200
Metal	tonnes	1 910	1 937	1 838	6 452	6 341	11 105	10 973	14 933	10 634	7 175

Table 12 Mineral imports to India between 1999 and 2008 *(continued).*

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mercury	kilograms	207 384	285 644	260 440	531 187	197 461	173 908	155 427	220 423	120 059	114 223
Mica	tonnes	409	339	967	1 232	2 372	800	773	739	858	551
Molybdenum											
Ores & concentrates	tonnes	2 967	3 141	4 462	4 863	5 400	3 953	3 260	3 967	2 782	2 359
Metal	tonnes	97	70	113	130	153	194	217	224	386	421
Oxides	tonnes	29	20	11	2	43	55	272	426	348	478
Natural gas	tonnes	2 000	0	3 500	23 755	42 001	2 371 849	4 776 791	7 044 455	8 086 104	8 306 769
Nickel											
Ores & concentrates	tonnes	—	101	157	336	427	37	...	85	279	345
Mattes, sinters etc.	tonnes	368	348	405	595	1	6	447	116	27	84
Unwrought (c)	tonnes	9 820	12 287	23 527	22 250	19 792	22 961	15 792	18 464	18 381	16 945
Scrap	tonnes	925	111	380	875	776	368	479	2 262	1 970	320
Oxides	tonnes	97	81	73	117	147	246	377	287	319	249
Crude petroleum	tonnes	58 384 523	74 120 000	79 420 000	83 677 000	93 178 003	96 694 000	99 334 000	106 828 382	115 335 968	130 042 837
Phosphate rock	tonnes	3 137 653	4 280 824	3 621 612	3 889 220	2 311 886	3 174 988	4 477 863	5 009 214	5 017 655	5 009 662
Platinum group metals											
Platinum & platinum metals	kilograms	2 607	4 970	2 532	2 075	3 250	5 978	5 477	6 058	6 459	53 957
Potash											
Sulphate	tonnes	13 632	10 208	13 199	14 896	73 135	25 570	43 981	24 854	49 753	33 570
Chloride	tonnes	2 686 028	2 000 811	2 076 385	1 957 486	2 189 522	2 908 031	3 601 619	2 880 986	3 403 289	4 691 149
Other potassic fertilisers	tonnes	54 344	112 500	125 188	148 504	50 728	68 160	65 803	132 698	265 909	338 176
Rare earths											
Rare earth compounds	tonnes	86	168	270	290	330	769	920	1 009	410	459
Metals	tonnes	95	77	106	116	166	191	228	261	221	288
Salt	tonnes	13 250	17 754	36 077	13 126	21 605	29 596	17 120	27 668	28 981	33 637
Sillimanite minerals											
Kyanite, silliminite & andalusite	tonnes	3 337	1 152	3 967	741	2 144	8 703	3 697	4 210	6 173	11 212
Mullite	tonnes	4	22	330	490	1 323	1 994	2 075	2 386	3 544	3 308
Silver											
Metal	kilograms	3 553 069	3 717 485	3 030 652	3 069 120	2 367 884	2 932 983	2 174 351	835 756	2 692 454	5 696 643
Sulphur & pyrites											
Pyrites	tonnes	49	38	35	61	73	136	96	111	2 173	190
Sulphur	tonnes	2 024 090	1 802 402	1 638 941	1 387 602	1 003 137	1 207 533	1 390 258	1 401 893	1 405 537	1 286 431
Sulphur, sublimed & precipitated	tonnes	841	959	1 169	615	839	2 890	1 009	1 131	1 084	1 202
Talc	tonnes	162	58	79	234	486	514	803	882	565	5 607
Tantalum & niobium											
Tantalum	tonnes	11	11	26	6	81	1	2	2	3	9
Tin											
Ores & concentrates	tonnes	—	8	0	6	...	...	630	1 126	702	979
Unwrought (c)	tonnes	3 366	3 276	3 931	3 173	3 696	3 525	4 933	5 061	5 493	5 492
Scrap	tonnes	—	182	639	289	63	189	276	141	120	42
Titanium											
Titanium minerals	tonnes	0	138	42	103	7 752	566	6 821	13 186	17 356	22 366
Metal	tonnes	129	299	419	229	585	231	501	467	576	810
Oxides	tonnes	29 871	22 976	32 136	49 474	49 176	56 271	70 693	78 733	88 110	88 911
Tungsten											
Tungsten ores & concentrates	tonnes	130	44	145	241	190	258	104	149	20	20
Metal	tonnes	161	315	693	518	838	292	350	326	293	304

Table 12 Mineral imports to India between 1999 and 2008 *(continued)*.

India imports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Vanadium											
Pentoxide	tonnes	54	31	40	56	55	14	37	225	540	411
Metal	tonnes	2	2	4	3	2	6	5	8	—	—
Zinc											
Ores & concentrates	tonnes	49 460	34 537	68 149	37 550	103 007	81 547	40 187	52 003	49 493	78 201
Unwrought	tonnes	62 023	46 054	74 106	82 604	111 233	123 750	145 958	107 540	55 345	64 628
Unwrought alloys	tonnes	3 433	2 760	5 528	6 649	9 400	7 352	14 174	12 305	9 157	20 359
Scrap	tonnes	45 480	44 592	49 643	31 598	51 895	37 523	97 288	48 470	32 569	29 414
Zirconium											
Ores & concentrates	tonnes	3 665	3 636	7 267	14 090	15 558	21 652	28 187	27 578	28 592	30 478
Metal	tonnes	21	29	17	82	87	88	34	3	9	12

Note(s):-
(1) Unless otherwise noted this table is fiscal years ended 31 March following that stated.

(a) May include some fluorine
(b) Including anthracite
(c) Including alloys
(d) Calendar year ended 31 December of that stated

Table 12 Mineral imports to India between 1999 and 2008.

China

Key facts

- *Fourth largest country in the world, with a total land area of 9.6 million square kilometres.*
- *The world's most populous nation, with nearly 20 per cent of the world's total.*
- *Unprecedented economic growth of approximately 10 per cent per year.*
- *The world's largest producer of 37 of the minerals and metals included in this report.*
- *Coal provides 70 per cent of the country's electricity generation.*
- *Coal production increased by 151 per cent between 1999 and 2008, but China may still become a net importer in the near future.*
- *The world's largest producer and importer of iron ore, with domestic output increasing by 247 per cent in 10 years while imports increased by 700 per cent in the same period.*
- *The world's largest producer of gold since 2007, with a 72 per cent increase in production between 1999 and 2008.*
- *The world's largest consumer of copper, as demonstrated by its output of refined copper increasing by 222 per cent over 10 years.*
- *The largest output in the world of several other metals including refined lead, slab zinc and primary aluminium, which have increased by 249 per cent, 130 per cent and 369 per cent respectively between 1999 and 2008.*
- *Produces more than three quarters of the world's rare earths, antimony, graphite, magnesium metal, strontium minerals and tungsten.*
- *Only produces half its requirement for crude petroleum and is therefore the world's second largest oil importer.*

The People's Republic of China is the fourth largest country in the world behind Russia, Canada and the USA with a total land area of 9.6 million square kilometres. It comprises a large part of the East Asian landmass including the Tibetan high plateau bordered by the Himalayas in the south-west, the Gobi and Taklamakan deserts in the north-central region and predominantly fertile lowlands in the south-eastern half where 94 per cent of the population lives (Figure 33). The population in 2009 is estimated to be 1 339 million, equivalent to nearly 20 per cent of the world population.

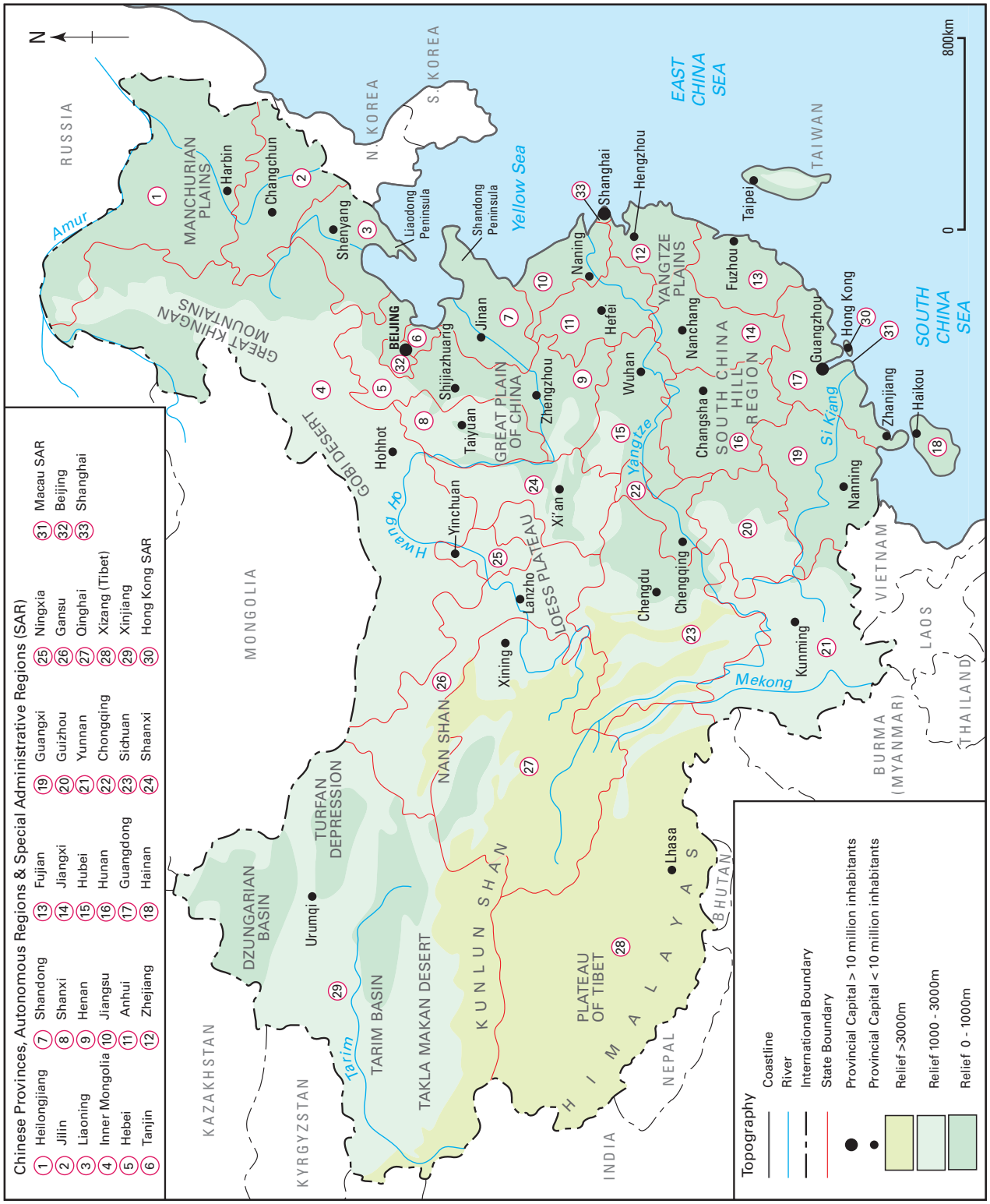

Figure 33 China geography.

The location of selected major mines and important deposits are shown in Figure 34 (metallics) and Figure 35 (non-metallics).

China's unprecedented economic growth has made it the world's largest consumer and producer of many commodities and it now plays a major role in international mineral and energy markets. It is the world's second largest economy after the USA in terms of gross domestic product (purchasing power parity) (GDP(PPP)). GDP (PPP) for 2009 is estimated at US$8791 trillion with real growth of just under nine per cent in 2009, down slightly compared to 2008 and several points below the 13 per cent achieved in 2007. China's metals-intensive industrial sector, which accounted for 48.6 per cent of GDP, grew by 9.3 per cent and industrial value-added output by 14.8 per cent in 2008.

China's potential for foreign direct investment is huge and it has a pressing need for security of supply of raw materials. By the end of 2007 cumulative outbound investment reached US$127.6 billion and in the first half of 2008 mergers and acquisitions reached US$32 billion, more than the whole of 2007. Chinese investment in fixed assets has now reached US$67 billion. In recent years China has targeted early-stage projects in the emerging markets in Africa, but now appears to be switching its investment focus to late-stage development projects in developed countries such as Australia, Canada and Chile.

China is currently the main world producer of 37 of the minerals and metals included in this report and produces more than 50 per cent of the world's total output of 12 of these. China's top 10 world rankings are shown in Table 13, together with the proportion of the world's total production of each mineral.

Commodity	World rank	Percent of total world production	Commodity	World rank	Percent of total world production
Rare earth minerals	1	99	Salt	1	23
Antimony (mine)	1	90	Copper (refined)	1	21
Graphite	1	85	Copper (smelter)	1	20
Magnesium metal (primary)	1	83	Gold (mine)	1	12
Strontium minerals	1	80	Bentonite	2	31
Tungsten (mine)	1	75	Perlite	2	23
Magnesite	1	57	Diatomite	2	22
Arsenic	1	56	Vermiculite	2	22
Mercury	1	55	Asbestos (white)	2	17
Wollastonite	1	55	Nickel (smelter/ refinery)	2	15
Fluorspar	1	54	Beryl	2	11
Barytes	1	51	Vanadium	3	28
Pig iron	1	47	Bromine	3	24
Tin (mine)	1	45	Silver (mine)	3	13
Coal	1	40	Feldspar	3	11
Lead (mine)	1	39	Kaolin	3	11
Tin (smelter)	1	39	Bauxite	3	10
Steel (crude)	1	38	Zirconium minerals	3	10
Bismuth	1	37	Lithium minerals	3	9
Iron ore	1	37	Titanium minerals	4	8
Lead (refined)	1	37	Copper (mine)	4	7
Mica	1	36	Iodine	4	2
Molybdenum (mine)	1	35	Petroleum (crude)	5	5
Manganese ore	1	34	Tantalum & Niobium minerals	5	0.1
Zinc (slab)	1	34	Potash	6	6
Aluminium (primary)	1	33	Borates	7	5
Cobalt (metal)	1	33	Selenium	7	4
Phosphate rock	1	31	Nickel (mine)	8	5
Alumina	1	28	Cobalt (mine)	8	3
Zinc (mine)	1	27	Uranium	10	2
Talc	1	26	Chromium ores & concentrates	10	1
Gypsum	1	25	Diamond	10	1
Cadmium	1	23			

Table 13 China's top 10 world rankings by commodity, with proportion of the world total produced.

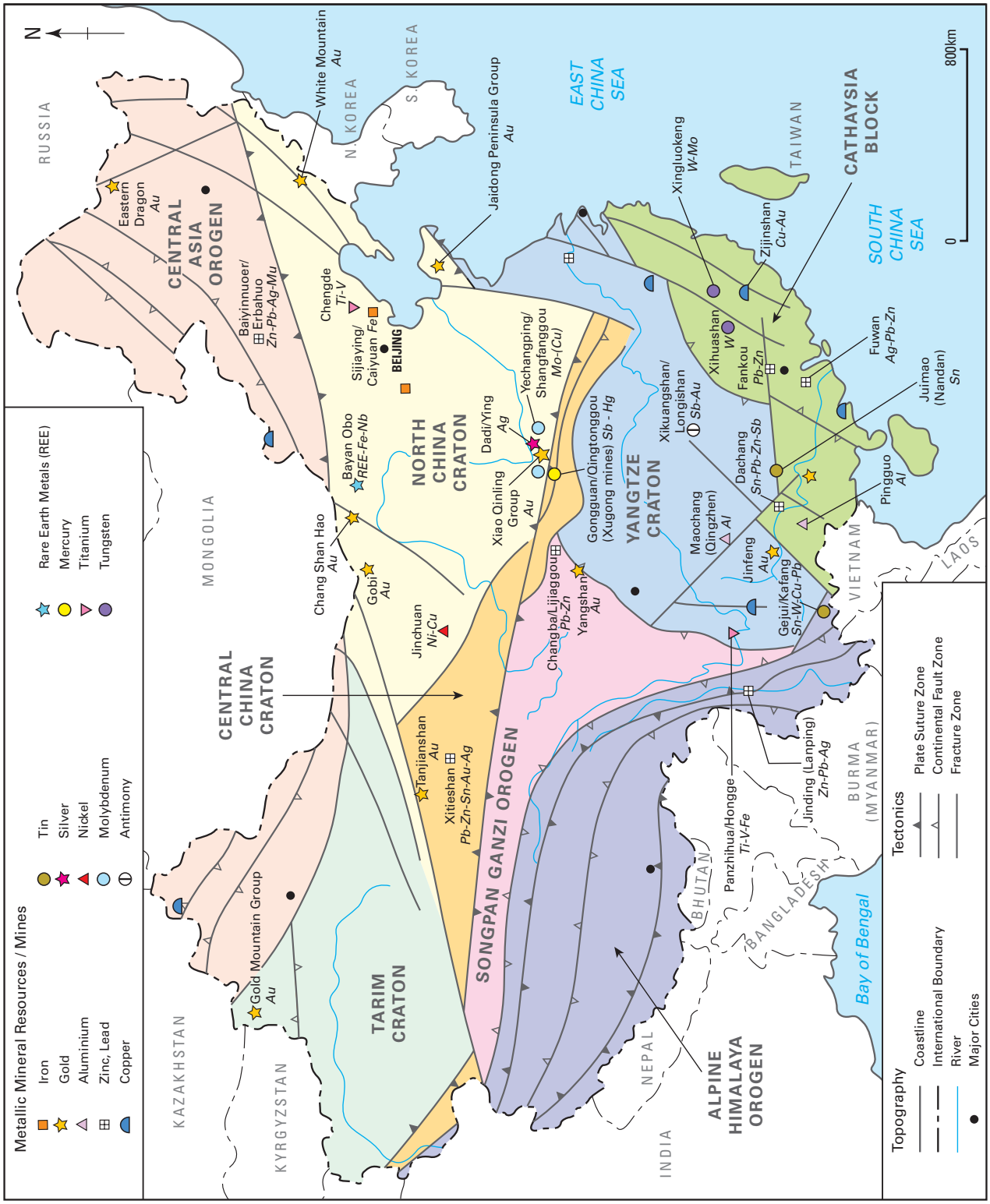

Figure 34 Selected major mines and important deposits in China (metallics).

Notes: Certain mines and/or deposits mentioned in the text have been omitted for clarity.
Fe = iron ore, Au = gold, Sn = tin, Ta = tantalum, Nb = niobium, REE = rare earth elements, Ti = titanium, Cu = copper, Ni = nickel, Mn = manganese, Pd = palladium, Pt = platinum, Al = aluminium, W = tungsten, Cr = chromium, U = uranium, Zn = zinc, Pb = lead, Ag = silver, V = vanadium, Sb = antimony, Hg = mercury, Mo = molybdenum

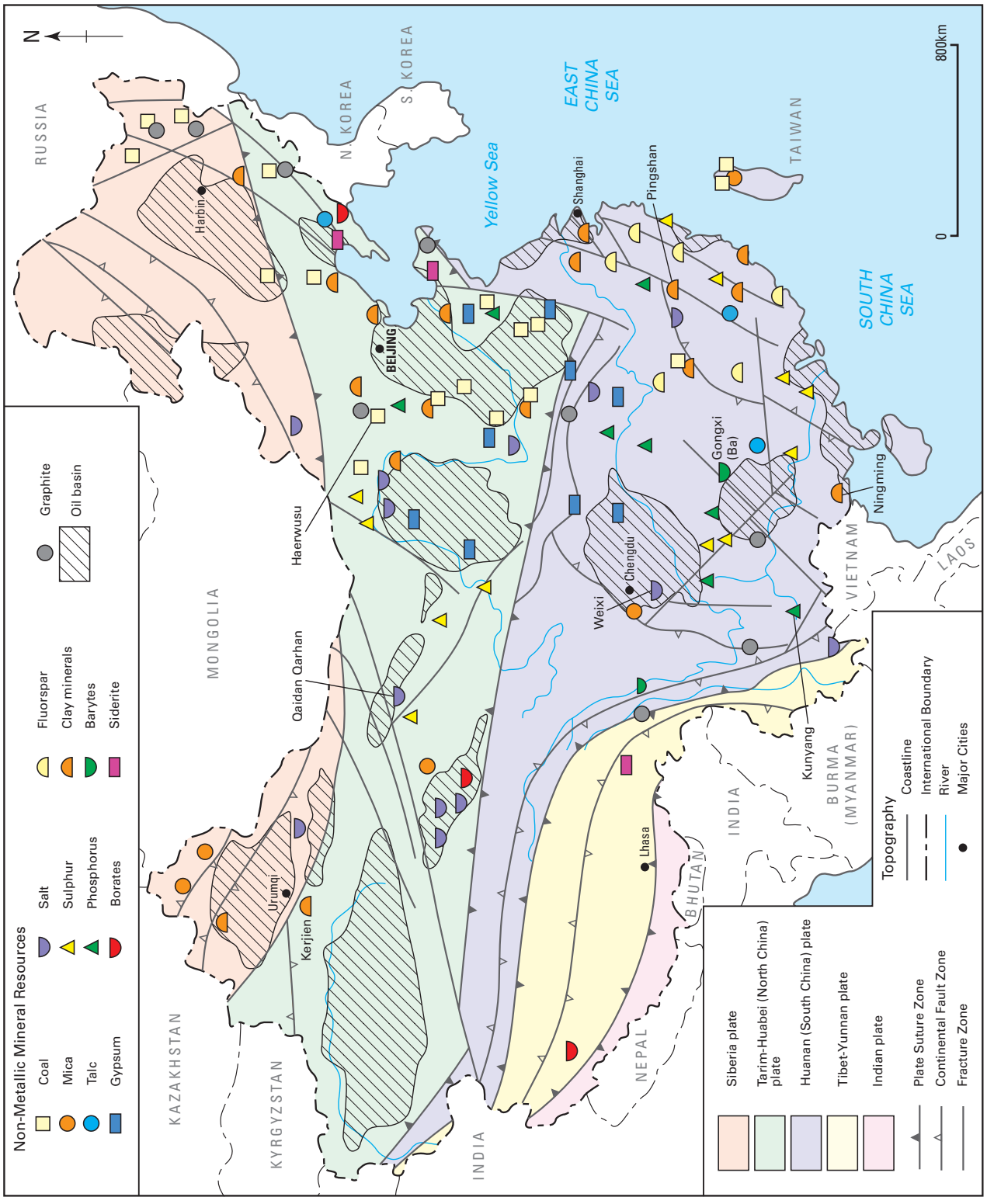

Figure 35 Selected major mines and important deposits in China (non-metallics).

Notes: Certain mines and/or deposits mentioned in the text have been omitted for clarity.

Coal

Coal underpins the Chinese economy by providing 70 per cent of its electricity generation. China has approximately 13 per cent of the world's proven coal reserves. The demand is so large that China, despite being the world's largest producer, may become a net importer in the near future. In 2008 it produced approximately 2622 million tonnes, an increase of 151 per cent compared to 1999 (Figure 36) and is set to increase its coal production by as much as 30 per cent to over 3300 million tonnes by 2015.

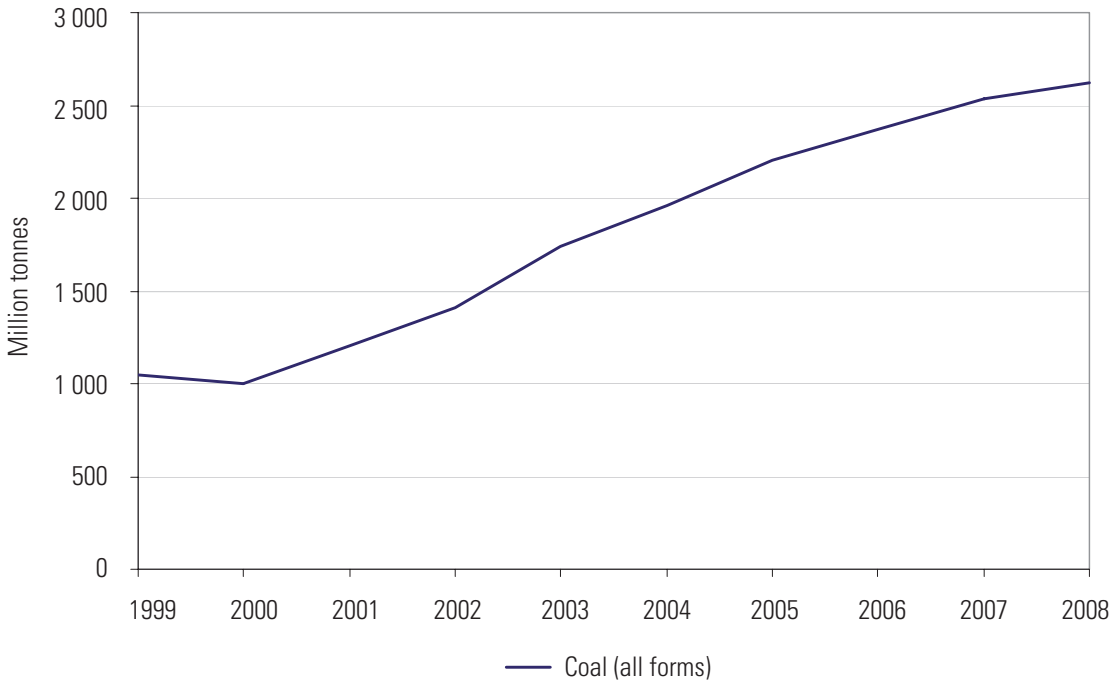

Figure 36 China's production of coal between 1999 and 2008.

China is seeking to address the problem of safety in its coal mines by closing numerous small and unsafe mines. It had closed more than 15 000 by the end of 2008 and another 2500 mines, with capacities of less than 300 000 tonnes per year, will be closed by the end of 2010.

China's largest open pit mine, operated by the Shenhua Group in Haerwusu in Inner Mongolia, started production in October 2008 and produced seven million tonnes by December 2008. It has total reserves of 1.73 billion tonnes and a design capacity of 20 million tonnes per year of coal for 79 years.

As a result of the government restructuring of the coal sector, six to eight companies will have output capacities of more than 100 million tonnes per year each and ten will have output capacities of more than 50 million tonnes per year each by 2010.

Iron ore

China has 21 billion tonnes of iron ore reserves. It is ranked third in the world in terms of ore reserves (equivalent to 14 per cent) but fifth in terms of iron content (equivalent to 9.6 per cent of the world total).

It is the world's largest iron ore importer, despite also being the world's largest producer with 37 per cent of the total world output. Domestic production in 2008 rose by a further 17 per cent compared to 2007 to 824 million tonnes. Since 1999 output has increased by 247 per cent (Figure 37). Imports in 2008 were 444 million tonnes, an increase of 16 per cent compared to 2007 and more than 700 per cent greater than in 1999. By 2010 importation of iron ore is expected to reach 540 million tonnes.

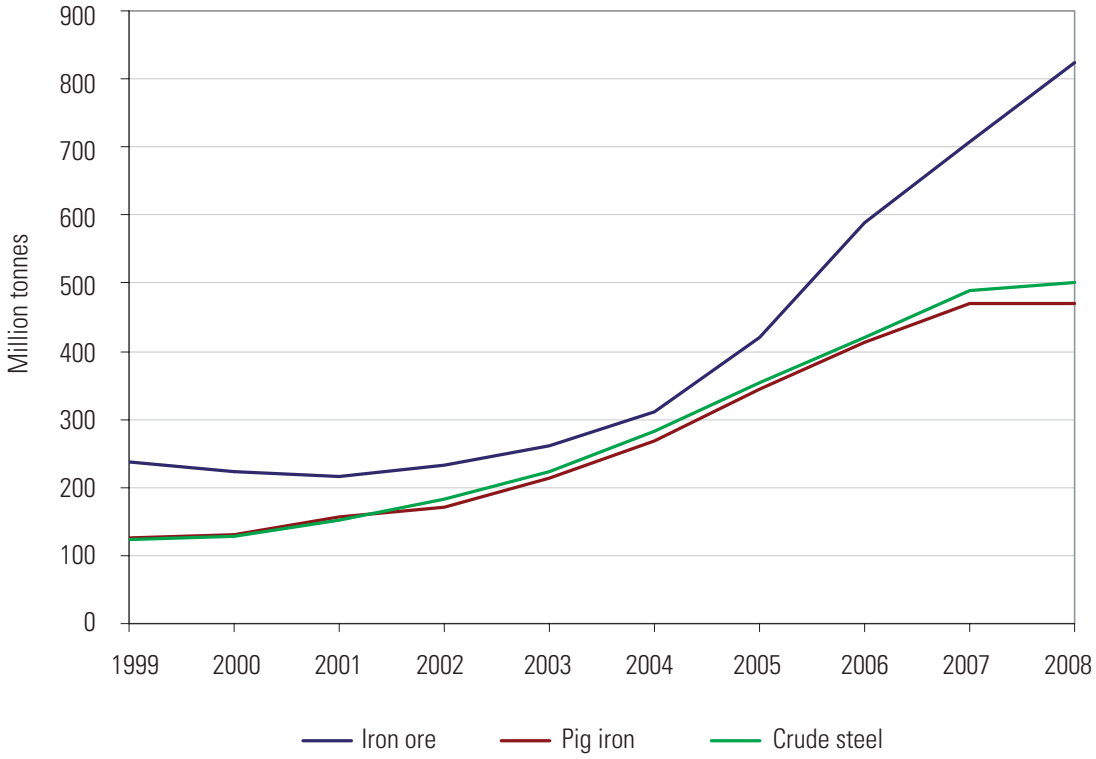

Figure 37 China's production of iron ore, pig iron and crude steel between 1999 and 2008.

Around 50 per cent of iron ore production comes from mines located in Hebei (Fengjiayu, Dacao, Sangyuan, Shirengou, Longwan, Dongzigou, Miaogou and Qian'an district) and Liaoning (Anshan–Benxi, Waitoushan–Daheyan, Gongchanling–Nanfen) provinces. The other provinces and regions that produce iron ore include Beijing (e.g. Jianshan mine), Fujian (e.g. Longyan Makeng mine), north-eastern and western regions of Shanxi province and Inner Mongolia (e.g. Bayan Obo mine).

There are numerous iron ore producers in China: some of the most important include the Angang New Steel Company, the Anshan Iron and Steel Group Corporation, the Anyang Iron and Steel (Group) Co Ltd, the Baotou Iron and Steel (Group) Co Ltd, the Beitai Iron and Steel Group, the Benxi Iron and Steel (Group) Co Ltd, the Chiang Zhi Iron and Steel (Group) Co Ltd, the China Iron and Steel Association, the Hunan Valin Iron and Steel Group Co Ltd, the Jiuquan Iron and Steel Company, the Shanghai Baosteel Group Corporation, the Sinosteel Corporation and the Taiyuan Iron and Steel Co.

Crude steel

China is the world's largest producer of pig iron and crude steel. In 2008 production of crude steel rose by two per cent to just over 500 million tonnes; an increase of more than 300 per cent compared to 1999 (Figure 37).

Steel use in China increased by 2.9 per cent in 2008 whilst worldwide consumption decreased by 1.4 per cent. Steel mills in China currently have the capacity to produce 700 million tonnes per year, whilst Chinese demand for steel is expected to expand by 19 per cent in 2010 to 526 million tonnes.

Baosteel, China's largest steel maker, which controls about 10 per cent of the world market, increased overall crude steel output by nearly five per cent to 35 million tonnes in 2008 and is expected to exceed 40 million tonnes in 2010. Hebei Iron and Steel Group Co Ltd, which was established in June 2008 with the merger of Tangsteel and Hansteel, was the second largest producer in China in 2008, at 33 million tonnes, and the fifth largest in the world.

Shandong Iron and Steel Group formed a 67:33 joint venture in 2008 with the Rizhao Iron and Steel Co Ltd to build a 20 million tonnes per year quality steel production facility in Rizhao. As a result of the merger Shandong Steel, with a production of 29 million tonnes in 2008, was ranked third in China.

The Shoutang Iron and Steel Co, a Shougang (51 per cent)–Tanggang (49 per cent) joint venture, is building a 9.7 million tonnes per year iron and steel plant on Caofeidian Island, Hebei Province. The first phase at half capacity commenced operation in September 2009; the plant will be fully operational in 2010. Shougang (Shoudu Iron and Steel Group Co) plans to relocate its entire iron and steel operations from Beijing to Hebei Province in 2012 when production should be up to 30 million tonnes per year.

The country's largest iron pellet plant (capacity 5 million tonnes) became operational in September 2009 in Zhanjiang, Guangdong Province. This is jointly owned by Baosteel (72 per cent), Shaoguan Steel (20 per cent) and the Zhanjiang Port Group (8 per cent). The Zhanjiang integrated plant will produce 9.2 million tonnes of pig iron, 10 million tonnes of crude steel and 9.4 million tonnes of steel products from the end of 2011. Guangdong Province will eliminate 10 million tonnes of outdated steel capacity to embrace this new steel project.

The Wuhan Iron and Steel Co Ltd (WISCO) – parent company Wugang – has an annual production capacity of 20 million tonnes. During 2009 WISCO entered strategic cooperation agreements with shipping giants (Sinotrans and UK-based Zodiac Maritime Agencies Ltd.) and has been investing in overseas iron ore assets including joint venture deals with Centrex Metals and Western Plains Resources of Australia and Brazil's EBX. It has also acquired a 25 per cent stake in the Canadian Consolidated Thompson.

Nickel

China has about five million tonnes of nickel resources of which sulphide ore accounts for 90 per cent. Eleven operating nickel mines have 81 per cent of the total reserves. Chinese companies have invested in nickel projects in Papua New Guinea, Burma (Myanmar), Cuba, Zambia and Australia.

Within China, mined nickel production amounted to 71 500 tonnes in 2008, up eight per cent compared to 2007. Refined nickel output reached 200 300 tonnes in 2008, up just one per cent compared to the previous year, while nickel consumption reached 345 000 tonnes, comparable to that of 2007.

The fall in nickel prices in 2008 and suspended operations of stainless steel factories forced most Chinese producers of nickel pig iron to stop (or drastically scale back) production and resulted in nickel laterite stockpiles at China's ports reaching 6.9 million tonnes by the end of 2008.

China's annual stainless steel output declined by 3.6 per cent to 6.9 million tonnes in 2008, equivalent to 27 per cent of the world stainless steel production. Stainless steel production is expected to reach 9.7 million tonnes and nickel consumption rise to 447 000 tonnes in 2009, an increase of nearly 40 per cent year on year. This is still a long way short of China's current 12 million tonnes of stainless steel production capacity. Refined nickel production is expected to grow by nearly ten per cent in 2009 and 2010.

Gold

Gold output in China rose 12 per cent to 275 tonnes in 2007 to become the world's largest gold producer for the first time. China produced 285 tonnes of gold in 2008; an additional increase of four per cent compared to 2007, and contributing to a 72 per cent increase since 1999 (Figure 38). It is also the only country in the top four where production rose in 2008.

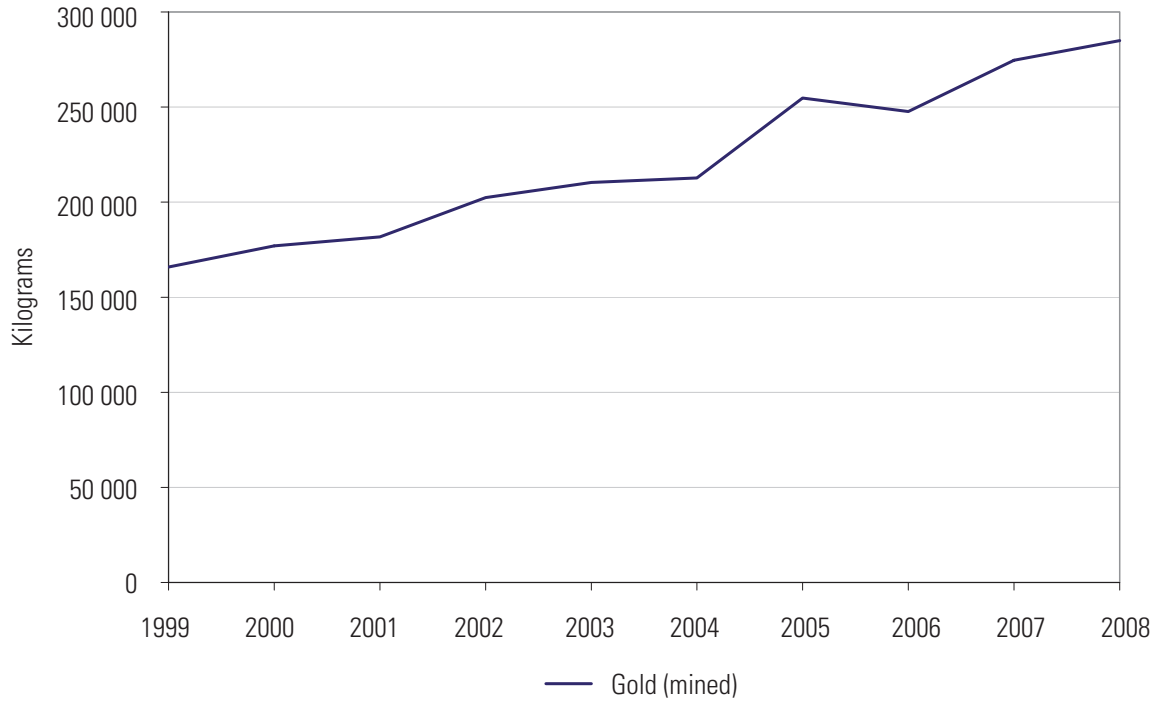

Figure 38 China's mine production of gold between 1999 and 2008.

Currently there are about 1200 gold mines, of which more than 230 active gold mines and a further 40 mines under construction are on deposits with more than 7775 kilograms of contained gold. Nevertheless, China's gold reserves constitute only about seven per cent of the world total and the deposits, albeit numerous, are relatively small.

Production has mostly been concentrated in the eastern provinces of Shandong, Henan, Fujian and Liaoning. Recently, western provinces such as Guizhou and Yunnan have seen a sharp increase. The Shandong (Jaiodong) peninsula has more than 60 gold mines that annually produce about 15 per cent of China's total gold output.

The country's oldest and largest gold producer is the China National Gold Group Corporation (CNGGC), which accounts for 20 per cent of total production and controls more than 30 per cent of domestic reserves. In February 2009 the CNGGC announced its intention to build or acquire up to 20 major gold mines to add to its 65 operating mines.

The Zijin Mining Group Co Ltd, China's second largest gold miner, produced 57 tonnes of gold including 28 tonnes of mine-produced gold in 2008. It owns the Zijinshan copper–gold mine in Fujian Province which has reserves of 138 million tonnes at 1.57 grams per tonne gold and is the largest known and most productive gold deposit in the country.

Australian Sino Gold is the leading international gold company in China. Its 82 per cent-owned Jinfeng Mine in Guizhou Province is now China's second largest gold mine with a production of 5600 kilograms per year and resources nearing 300 tonnes. The 95 per cent-owned White Mountain gold mine in Jilin Province commenced commercial gold production in January 2009. The company also has projects in Inner Mongolia and Heilongjiang Province. The high-grade Eastern Dragon Project in Heilongjiang Province will start producing at 2800 kilograms per year from 2011.

The Vancouver-based Eldorado Gold Corporation bought Sino Gold Mining Ltd in December 2009. Eldorado Gold already had a 90 per cent stake in Tanjianshan (TJS) gold mine in Qinghai Province. Under the planned acquisition Eldorado Gold will become the dominant foreign gold producer in China. The combined company will have gold production of 17 000 kilograms per year which is expected to rise to 26 000 kilograms in 2011 as new mines come on stream and over 31 000 kilograms per year in 2013 and beyond.

The Canadian Minco Gold Corporation (Minco Gold) is involved in the direct acquisition and development of high grade advanced-stage gold properties in China. It holds the 1800 kilograms per year Gobi Gold mine in Inner Mongolia and the 31 000 kilograms Changkeng gold project. Minco Gold has a controlling interest in the Yangshan gold properties in the Qinting Gold Triangle with a recoverable reserve of approximately 200 tonnes gold.

Canadian miners Silvercorp Metals Inc and Jinshan Gold Mines Inc also have producing precious metal mines in China. Jinshan Gold Mines Inc (41 per cent owned by China National Gold) started production in July 2008 at its Chang Shan Hao (CSH) gold mine in Inner Mongolia. The mine is designed to produce about 3700 kilograms per year of gold. In north-west China, Tianshan Goldfields Ltd's continuing drilling programme has outlined further mineralisation at its Gold Mountain deposit, which already has resources estimated at approximately 80 000 kilograms.

Silver

Silver production in 2008 was 2.8 million tonnes, up four per cent compared to 2007 and 103 per cent compared to 1999 (Figure 39). Most of China's silver reserves occur in 700 large and medium-scale polymetallic deposits which also contain 81 per cent and 88 per cent of the lead and zinc reserves respectively.

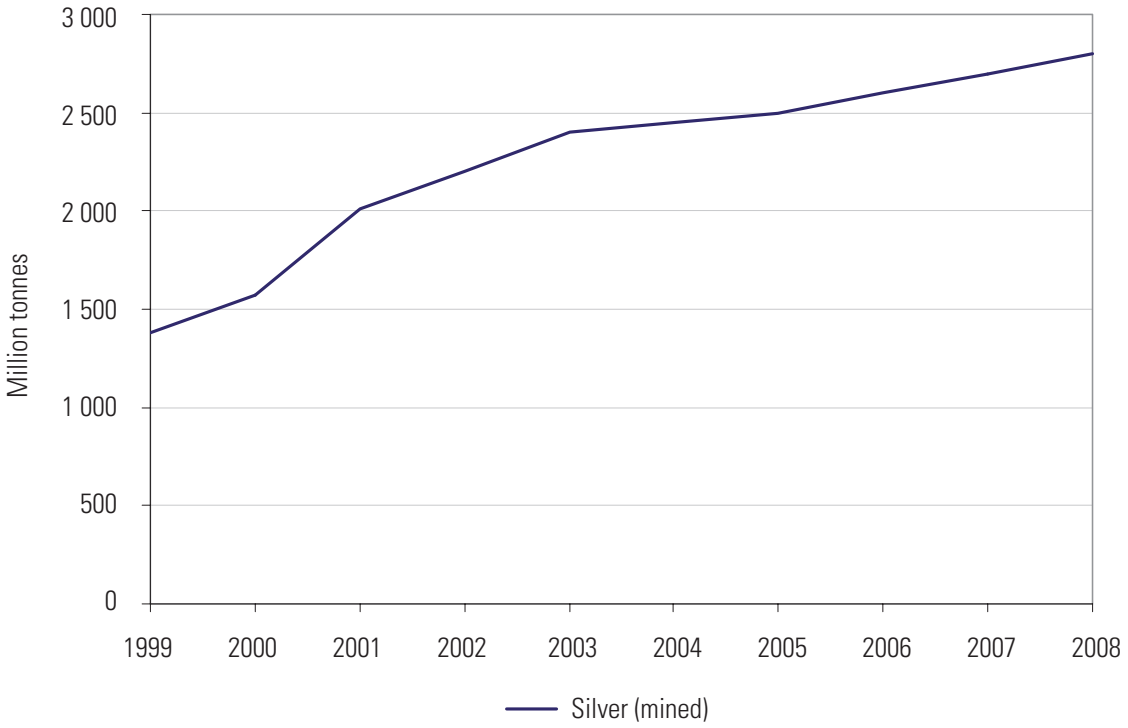

Figure 39 China's mine production of silver from 1999 to 2008.

Silvercorp Metals Inc, China's largest primary silver producer in the first half of 2009, produced a record 37 324 kilograms of silver from its high-grade Ying deposit.

Minco Silver, a subsidiary of the Minco Gold Corp, completed a feasibility study in September 2009 raising contained silver in resources at its Fuwan project in Guangdong Province to 4877 tonnes. Mining and ore processing will yield silver, lead and zinc concentrates respectively. Reserves total nine million tonnes averaging 189 grams per tonne of silver. Just over half of the company's silver resources are on its Changkeng permit.

Erbahuo polymetallic silver–lead–zinc–manganese mine north west of Chifeng City, which is 70 per cent owned by Silver Dragon Resources Inc and 30 per cent by Chinese corporations led by Huaguan Industrial Corp (HIC), is being developed. Erbahuo has a mineable resource of 68 tonnes of silver. Guangda Mining Ltd, a wholly-owned subsidiary of Sanhe Sino-Top Resources & Technologies Ltd (Sino-Top), in which Silver Dragon has a 40 per cent equity stake, will be responsible for developing the Company's eight exploration properties, commencing with development of the Dadi and Laopandao mines.

The Gansu Shengda Group Ltd currently owns eight producing mines, including a 42 per cent interest in Bairendaba, and over 20 exploration properties, mostly in northern China. Bairendaba silver–lead–zinc mine has proven reserves of

over 4000 tonnes of silver and 1.5 million tonnes of lead and zinc, and a milling capacity of over one million tonnes per year.

Copper

China has an estimated 30 million tonnes of copper reserves, equivalent to 5.5 per cent of the world total, and is ranked sixth equal with Poland. China is the world's largest consumer of copper which in 2008 increased to nearly five million tonnes.

In 2008 output from the copper mines rose by nine per cent to one million tonnes, while smelter production grew by 19 per cent to 2.5 million tonnes and production of refined copper increased by eight per cent to 3.8 million tonnes. Increases over the 10 years from 1999 were 97 per cent, 200 per cent and 222 per cent respectively (Figure 40). China's refined copper production for January to October 2009 was 3.5 million tonnes and was expected to rise to over four million tonnes by the year end, whilst consumption was expected to grow by 10.2 per cent compared to 2008.

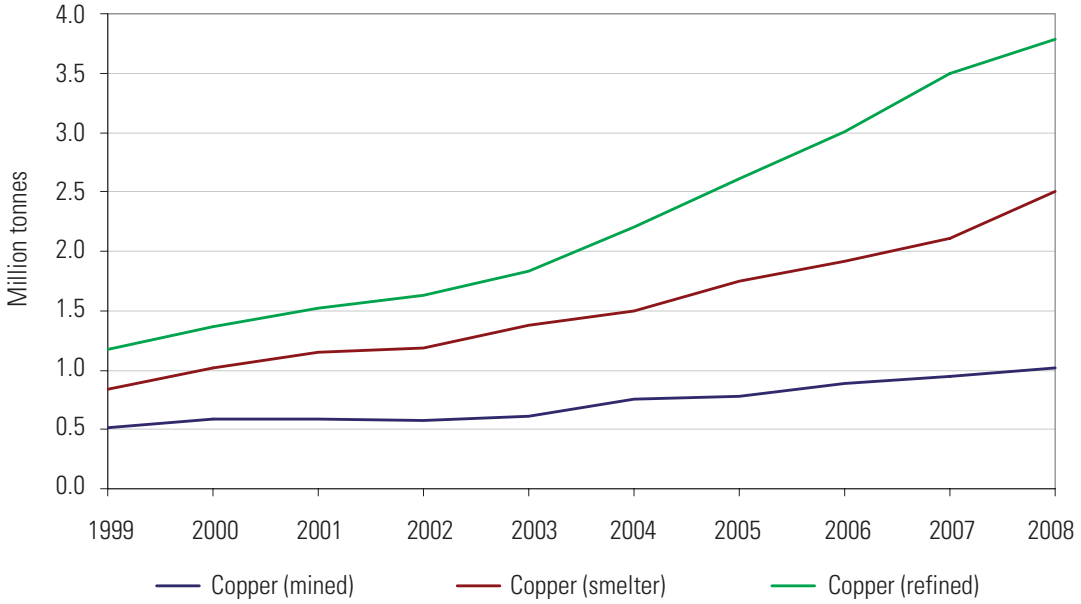

Figure 40 China's production of copper between 1999 and 2008.

The growth in refined copper production is due to capacity expansion including a 300 000 tonnes per year project run by Jiangxi Copper, the second phase of Shandong Yanggu Xiangguang's greenfield copper refinery completed in 2008 bringing total capacity to 400 000 tonnes per year and Jinchuan Nonferrous Metals Group which increased refined copper output to 200 000 tonnes per year. China's reliance on imported copper concentrate increased as growth of domestic mine production lagged behind expansion in the smelter capacity.

In April 2009, the Zijin Mining Group Co Ltd acquired UK-based Monterrico Metals plc owner of the controversial Rio Blanco copper–molybdenum project (total resource 1257 million tonnes) in Peru, which could produce 191 000 tonnes per year of copper. It is expected to become operational in 2015. In September 2009 Zijin Mining

announced the discovery of a copper–gold deposit in Fujian Province which is estimated to contain 81 200 tonnes of copper, 5770 kilograms of gold, and 238 000 kilograms of silver.

The Aluminium Corporation of China Ltd (Chinalco), which acquired a 91 per cent stake in Peru Copper Inc of Canada in 2007, is to invest in the Toromocho copper project in central Peru which has reported reserves of 1.5 billion tonnes and is expected to produce 225 000 tonnes per year of copper by 2012.

The Chinese government intends to phase out 1.3 million tonnes of non-ferrous metal production capacity by the end of 2009. Plants that had been using outdated or obsolete technologies will be closed and the industry restructured.

Lead and zinc

China has the world's second largest lead and zinc reserves after Australia accounting for approximately 11.8 per cent and 18.3 per cent of the global total respectively.

China's zinc endowment is arguably superior to that of any of the world's great zinc producing countries (Australia, United States, and Peru). World class deposits include: major sedimentary exhalative (SEDEX) deposits (e.g. the 300 million tonnes Dongshengmiao deposit in Inner Mongolia and the 80 million tonnes Changba–Lijiagou deposit of Gansu); volcanic massive sulphide (VMS) deposits (e.g. the 40 million tonnes Xitieshan deposit in Qinghai); skarn deposits (e.g. the 50 million tonnes Dulong deposit in Yunnan); manto deposits (e.g. those of the 50 million tonnes Dachang District of Guangxi); Mississippi Valley-type (MVT) deposits (e.g. Huize in Yunnan with >5 million tonnes of combined zinc–lead metal; grade 25 per cent); and Irish type deposits (e.g. Fankou, with 35 million tonnes at 10 per cent zinc).

China's mine production of lead in 2008 increased by ten per cent to 1.5 million tonnes whilst output of refined lead grew by 15 per cent to 3.2 million tonnes compared to 2007. Since 1999 production has increased by 182 per cent and 249 per cent respectively (Figure 41). Refined lead consumption grew by eight per cent to 2.75 million tonnes in 2008, leaving the market in surplus. As outmoded lead smelters are closed, over 0.56 million tonnes per year of new or expanded smelter capacity is due to come on stream by the end of 2012.

Mine production of zinc increased by five per cent in 2008 to reach 3.2 million tonnes. China produced 3.9 million tonnes of slab zinc in 2008, up five per cent compared to the previous year, whilst consumption reached 3.7 million tonnes, up three per cent. Compared to 1999 production outputs have increased by 116 per cent and 130 per cent respectively (Figure 41).

As demand dropped after the outbreak of the financial crisis, major domestic zinc producers cut production and postponed new production facilities from coming online. Huludao Zinc Industry Co Ltd and Yunnan Luoping Zinc, Electricity Co Ltd and other major Chinese zinc smelters cut output by 25–30 per cent. China's zinc consumption continued to fall in the first half of 2009 despite the government's stimulus policies and some plants shut down to reduce losses and the zinc surplus.

Lanping in Yunnan Province is the largest lead–zinc mine in China, with confirmed reserves (in March 2009) of 15.5 million tonnes of lead and zinc metal and a combined ore grade for both metals of 9.4 per cent. At Lanping's current mining capacity of approximately 130 000 tonnes per year lead and zinc, there are sufficient reserves for over 100 years.

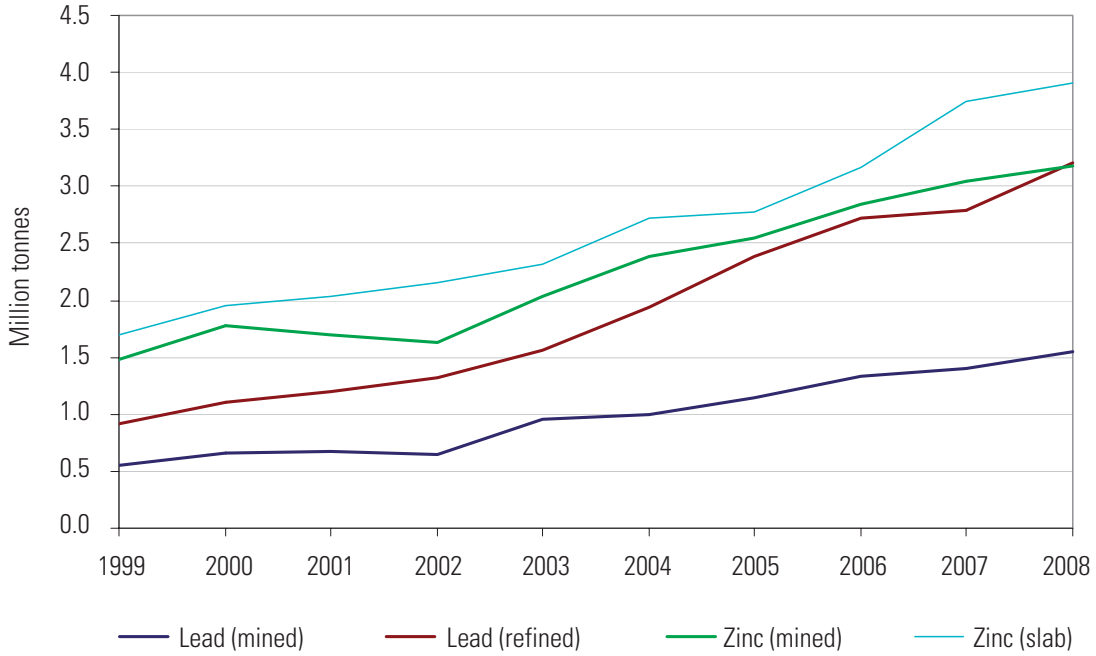

Figure 41 China's production of lead and zinc between 1999 and 2008.

The Yunnan Tin Minerals Group will complete the construction of a new 100 000 tonnes per year zinc smelter in Gejui City in Yunnan Province by 2010. It acquired the Guangzhou magnetite copper–lead mine in Guangdong province in May 2009.

Bauxite, alumina and aluminium

China imported 25.9 million tonnes of bauxite in 2008 to supplement its domestic production of 21.6 million tonnes, which equates to a six per cent increase compared to 2007 and a 204 per cent increase since 1999 (Figure 42). The provinces of Guangxi, Guizhou, Henan, Shandong and Shanxi account for 90 per cent of the country's bauxite resources. There are about 31 deposits with reserves of more than 20 million tonnes and 83 deposits with 5–20 million tonnes together accounting for 86 per cent of the total reserves. Compared to other major bauxite-producing nations China's deposits (mostly karst bauxite) are relatively small and low grade. High aluminium/silicon bauxite only accounts for 18.5 per cent of the total reserve.

Alumina production in 2008 increased to 22.8 million tonnes, an increase of 17 per cent compared to 2007 and nearly 500 per cent compared to 1999 (Figure 42). Imported alumina declined in 2008 by 10 per cent compared to 2007 to 4.6 million tonnes. This is despite two million tonnes of domestic smelting capacity being suspended due to falling commodity prices. In recent years about 23 alumina plants were either completed or under construction and by the end of 2008 China's alumina output capacity reached 33 million tonnes per year. Further expansions in progress or scheduled for completion in 2009 would add three million tonnes per year whilst projects to be completed after 2009 will add another six million tonnes per year of refining capacity.

Primary aluminium production in 2008 increased to 13.2 million tonnes, an increase of five per cent compared to 2007 and 369 per cent compared to 1999 (Figure 42).

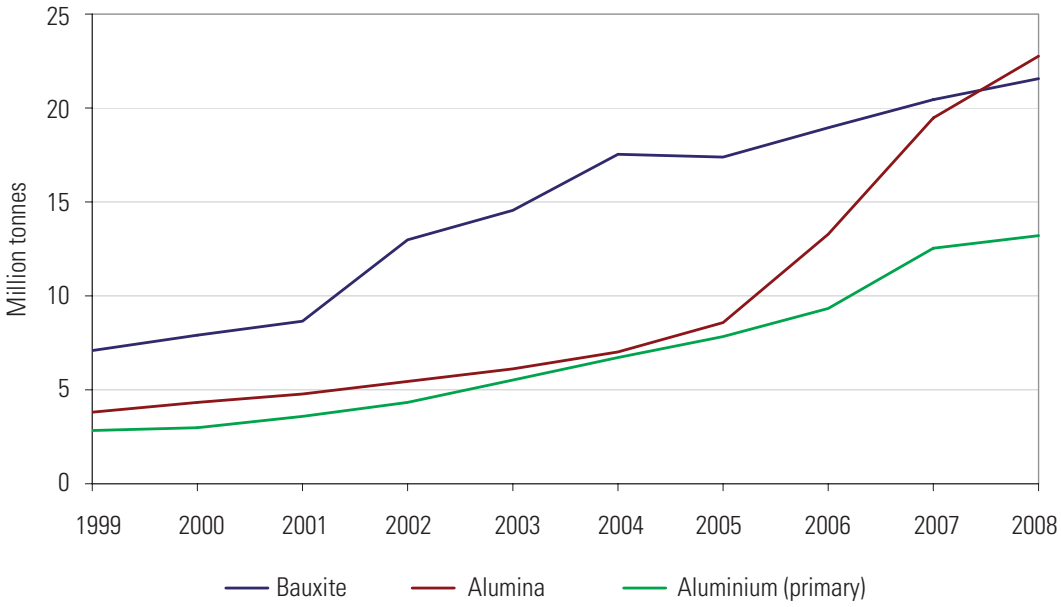

Figure 42 China's production of bauxite, alumina and primary aluminium between 1999 and 2008.

Several new bauxite deposits have been discovered in Guangxi (e.g. Chongzhou), Guizhou and Shanxi provinces in recent years. A greenfield four million tonnes per year bauxite mine was also completed in Guangxi Province by Huayin Aluminium Co Ltd. This will produce more than five million tonnes of alumina and two million tonnes of aluminium by the end of 2010.

In September 2008 Chinalco announced its intention to increase bauxite self-sufficiency and double production of bauxite in 2009. The Qingzhen bauxite mining complex in Guizhou province is one of China's three largest bauxite mining sites with proven reserves of 229 million tonnes. In June 2009 the Guangdong Aluminium Group (Chinalco and partners) announced the development an additional aluminium complex to include a 1.6 million tonnes per year bauxite mine, 0.8 million tonnes per year alumina refinery, and a 0.2 million tonnes per year aluminium smelter. The refinery and smelter are scheduled to come on-stream in 2012.

Other high-profile projects of Chinalco include: the phase 3 expansion (with partners) of the Guangxi Huayin alumina refinery from 0.8 million tonnes per year to 1.6 million tonnes per year which came on-stream in 2008; construction of a two million tonnes per year bauxite mine and 0.8 million tonnes per year alumina refinery in Chongqing province plus another 0.8 million tonnes per year alumina refinery in Zunyi, Guizhou Province, completed in mid 2009; and an expansion project at the Zhonghou alumina refinery in Henan Province which would raise refining capacity from two million tonnes per year to three million tonnes per year by the end of 2009.

Luneng Jinbei Aluminium Co Ltd, following completion of an expansion of its Shandong alumina refinery to one million tonnes per year in 2008, is undertaking further expansion to two million tonnes per year capacity projected for completion by the end of 2009.

It is reported that China will exhaust its domestic bauxite supplies in 10 years. Bauxite deposits in Shandong Province are nearly depleted and in May 2009 the Shandong Provincial Bureau of Geology and Mineral Resources (SDGM) signed

a JV agreement with Perth-based Bauxite Resources Ltd (BRL) (SDGM 60 per cent, BRL 40 per cent) to explore and develop BRL's Darling Range and Kimberley tenements in Australia. Shipments from BRL's Darling Range North project area commenced in August 2009.

Tin

China is the world's largest tin producer with identified resources of 3.5 million tonnes and mineable reserves of 1.7 million tonnes. Domestic mined tin output in China declined by 15 per cent to 125 000 tonnes in 2008, while tin smelter production fell by 13 per cent. Despite this, mine production since 1999 has still risen by 56 per cent and smelter production by 42 per cent (Figure 43).

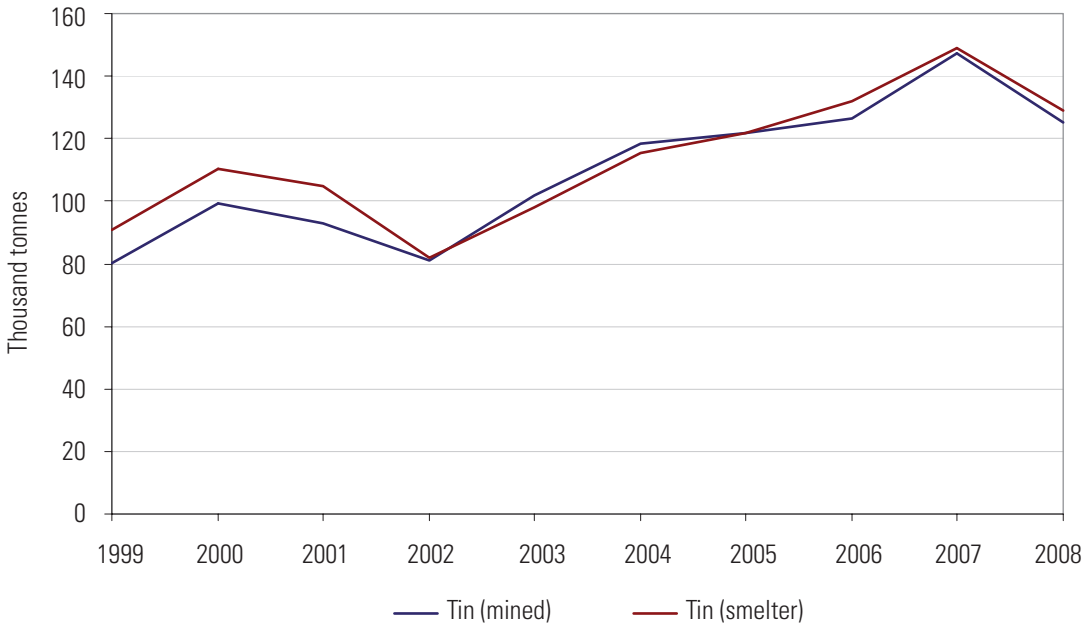

Figure 43 China's production of tin between 1999 and 2008.

China's tin resources are mainly located in the provinces of Guangxi, Hunan and Jiangxi and Yunnan which account for about 90 per cent of the metal output. The two largest mines are Gejui (Yunnan) and Nandan (Guangxi).

China's tin smelting capacity (currently 190 000 tonnes) far exceeds its mine output capacity and the country is required to import tin concentrates. With the slump in the tin price from May to December 2008 imports of tin concentrates dropped from 20 699 tonnes in 2007 to 7154 tonnes in 2008. Imports of unwrought tin and tin alloys dropped 23 per cent and 18.5 per cent respectively in 2008.

Global tin consumption during 2008 amounted to 337 500 tonnes, a reduction of five per cent compared to 2007, whilst in China consumption grew ten per cent from 132 300 tonnes to 146 000 tonnes. China's consumption will be buoyed up by the planned increase in tin plate capacity by 1.2 million tonnes per year, in contrast to an expected 10–15 per cent fall in global tin consumption in 2009.

The Yunnan Tin Co (YTC), the world's largest tin producer, suspended output at its Yunnan smelter from December 2008 to February 2009. Output in 2008 was 58 400 tonnes compared with earlier forecasts of 62 000 tonnes. This includes production from its wholly-owned Chenzhou tin smelter, Hunan Province, and the Singapore Tin Industries Ltd (STI) joint venture 20 000 tonnes per year refinery in Singapore. STI also closed at the end of 2008. With the depletion of the mine reserves in the Gejiu area, YTC is exploring and acquiring tin prospects and deposits in other provinces and overseas. YTC holds a 51 per cent share of Bangka Belitung Tin Co, Indonesia, which has a smelter capacity of 20 000 tonnes per year.

The Liuzhou Huaxi Group based in Guangxi Province is the second largest tin producer in China with reserves of 0.5 million tonnes of tin, 0.41 million tonnes of antimony, 2.7 million tonnes of zinc and 0.48 million tonnes of lead.

Tungsten

China's Ministry of Land and Resources has imposed a ceiling on the output of tungsten, antimony and rare earths in 2009, with tungsten ore concentrate output limited to 68 555 tonnes, rare earth ore to 82 320 tonnes, and antimony ore to 90 180 tonnes. Furthermore, it has suspended new licence approvals for exploring and producing the three minerals until mid 2010.

The tungsten production target for 2008 was 66 850 tonnes (59 440 tonnes mined and 7 410 tonnes recovered) of which Jiangxi Province at 32 200 tonnes and Hunan Province at 13 200 tonnes accounted for 76 per cent of mined output. The 2009 target represents an increase of 2.5 per cent.

China has an estimated 1.8 million tonnes of proven tungsten reserves (i.e. approximately 64 per cent of the world's mineable reserves). Of these reserves, 61.4 per cent occur in the provinces of Hunan, Jiangxi and Henan. Many new deposits have been found in Gansu, Xinjiang and Jilin.

In 2008 China produced 84 470 tonnes of tungsten concentrate (based on WO_3 content) up five per cent on 2007. It exported 4433 tonnes of tungsten metal and 4835 tonnes of ferro-tungsten alloys; equivalent to 51.1 per cent of the total output and representing a drop of 27.1 per cent on 2007.

The Xingluokeng tungsten mine in Fujian Province commenced operations in 2008 with an annual output of 2400 tonnes of tungsten concentrates. It has metal reserves of more than 0.3 million tonnes. The first phase of the Yangjingou tungsten project in Jilin Province, was also launched with a design capacity of 6000 tonnes per year of tungsten concentrates. This deposit has 125 000 tonnes of reserves (WO_3 content).

Discovery of a 96 200 tonne tungsten deposit in Anhui Province was reported in the first quarter of 2009. The reserve base may be as much as 1.4 million tonnes.

Tungsten carbide accounts for a major proportion of the tungsten consumption with 37 major cemented tungsten carbide plants producing 15 060 tonnes in 2008. Xiamen Tungsten Co Ltd (XTC), which owns two tungsten mines and a complete downstream industry, is the world's largest producer and exporter.

Rare earths

China is the world's largest rare earth metal producer, consumer and exporter. China's rare earth industrial reserves and basic reserves reached 27 million tonnes and 89 million tonnes of rare earth oxides respectively in 2008, accounting for 30.7 per cent and 59.3 per cent in the world's total. There are three reserve centres: Baotou in Inner Mongolia, Chinalco in Sichuan province and China Minmetals Corporation in Jiangxi province.

China's rare earth ore output of 125 000 tonnes accounted for 98.9 per cent of the reported global total in 2008. It also consumes about 60 per cent of the world's rare earths which are vital for a wide range of green energy technologies and military applications.

The Bayan Obo (or Baijunebo) Rare Earth mine, 70 per cent owned by the Inner Mongolia-based Baotou Steel Rare-Earth (Group) Hi-Tech Co Ltd, has had its output restricted to 46 000 tonnes in 2009 and revenue had dropped 30 per cent by the middle of the year.

In 2008 China exported 30 921 tonnes of rare earth oxide (REO) and in 2009 the export quota was set at 35 000 tonnes against a total production quota of 82 320 tonnes REO. On the basis that China will adhere to the announced production limits, with the forecast demand growth of 8–11 per cent year on year, it is probable that within 5–10 years the country will only be meeting its domestic needs. To meet the estimated global demand of 0.18–0.19 million tonnes of rare earth oxides in 2010, at least 40 000 tonnes of new capacity will be needed to meet the unfulfilled demand from outside China.

In the first half of 2009 Chinese companies acquired a stake in two developing Australian rare earth mines which are to open with combined production equal to a quarter of global output. China Non-Ferrous Metal Mining became the majority shareholder (51.7 per cent) in Lynas Corporation (LYC) and East China Exploration bought a 25 per cent share in Arafura Resources (ARU). China's monopoly on production of rare earths through price control and buying up other rare-earth resources around the world, however, should weaken over the next 3–4 years as deposits are re-opened and production increases in Canada, Russia and elsewhere.

Antimony

China is the world's leading producer of antimony with a mined production in 2008 of 183 000 tonnes of antimony metal. Proven reserves currently stand at 0.79 million tonnes, equivalent to 38 per cent of the world's known deposits.

Antimony is mainly produced in Hunan, Guangxi, Gansu, Yunnan, Guangdong and Guizhou provinces. Hunan has the richest antimony deposits (9.3 per cent of the world's total) and, with output in 2008 of around 125 000 tonnes of refined antimony, is currently the largest producing province in China. Major mines include Lengshuijiang, Hsikuangshan, Taojang Banxi, Xinshao Longshan, Taoyuan Woxi mines in Hunan, Da Chang mine in Guangxi, Yawan mine in Gansu and the Xuyang antimony–mercury mines in Shanxi. Hsikuangshan Twinkling Star Co Ltd (HTSC) is the world's largest producer with 26 000 tonnes per year capacity. It also produces zinc and indium.

Output in 2008 was affected by the fall in antimony prices (38 per cent in the fourth quarter) which led to closure of many smaller producers and the crackdown on pollution levels which restricted production at some antimony plants. Expansion in smelter capacity outstripped domestic supply of concentrates. China exported 9557 tonnes of antimony ingots in 2008,

14.7 per cent up on the previous year. Antimony oxide exports rose 0.35 per cent to 52 389 tonnes. Although quotas for antimony were increased by 23 per cent, demand weakened in 2009. The country's antimony consumption is expected to increase to 65 000 tonnes in 2010.

In September 2009 the Hunan Nonferrous Metals Corporation (HNC), the largest integral metals producer (except aluminium) in China, acquired the Canada-based Beaver Brook Antimony Mine Inc — the only operating antimony mine in North America and one of the world's largest antimony deposits outside China.

Following a major accident in a HTSC mine in October 2009, in which 26 people were killed and five others were injured, the provincial government of Hunan required all antimony mines and smelters to shut down for safety checks. Supplies to the market were reduced and the price of antimony rose temporarily as a direct consequence.

Molybdenum

Although not the largest producer, China has the largest molybdenum reserves of any country estimated at 3.3 million tonnes, equivalent to 38 per cent of the world's reserves. Identified resources amount to 8.3 million tonnes and are mostly located in the provinces of Henan, Hebei, Liaoning, Shaanxi and Inner Mongolia. Henan-based Luanchuan County has two million tonnes of proven reserves and includes the Louyang deposit (reserve 707 482 tonnes of molybdenum). China's largest tungsten–molybdenum processing plant is being constructed at Louyang which upon completion will have an output of over 24 000 tonnes of primary and derivative products. China's largest molybdenum producer is Jinduiching Molybdenum Mining (JDC), Shandong Province.

In China output of molybdenum in 2008 was up 20 per cent compared to 2007, and 172 per cent compared to 1999 (Figure 44). Demand is predicted to grow at 4.5–6.0 per cent over the next three years which is expected to outpace the growth in supply. World consumption of molybdenum in 2009 is estimated to decrease by 25–30 per cent compared to 2008.

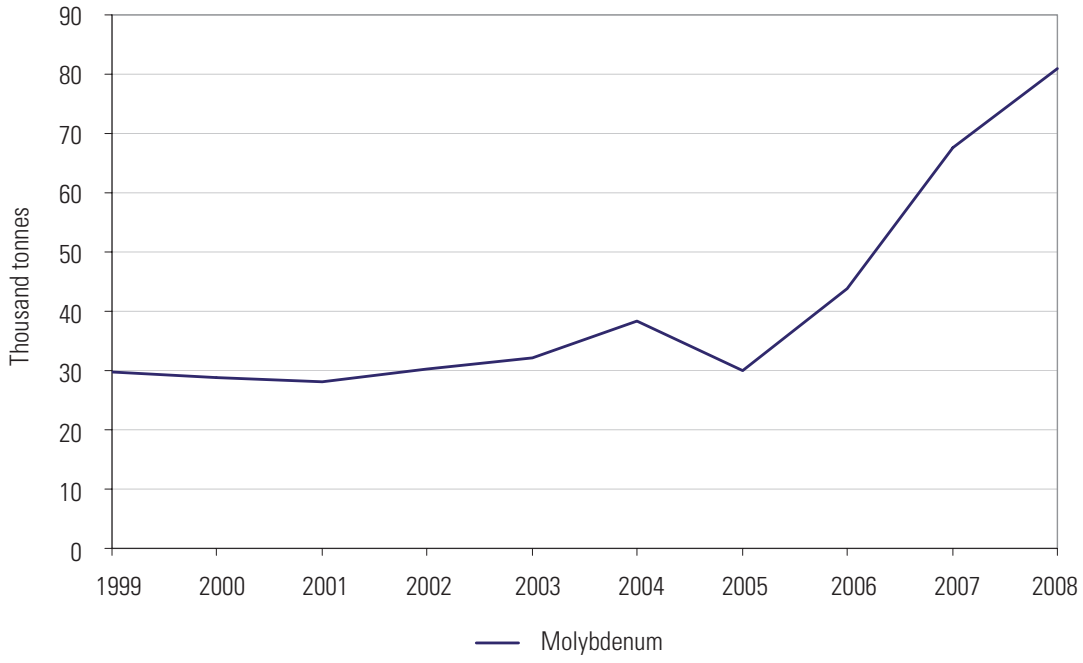

Figure 44 China's production of molybdenum between 1999 and 2008.

During the first half of 2009 molybdenum manufacturers' revenues dropped sharply and China became a net importer (33 219 tonnes of concentrate equivalent to 40.5 million pounds of molybdenum). Chinese molybdenum export quotas have been cut by three per cent for 2009; 70 per cent of which will be distributed between molybdenum oxide and ferro-molybdenum. Whilst current molybdenum production meets demand, refiners expect to run into a shortfall between 2009 and 2015.

Titanium

China produced one million tonnes of ilmenite, the main ore of titanium, in 2008 a level comparable to the past two years but imports rose sharply in 2007 to 1.2 million tonnes falling back slightly to 1.1 million tonnes in 2008. China has 965 million tonnes of proven titanium ore reserves widely distributed in 21 provinces and accounting for more than 60 per cent of the world's total but the ore is generally of low quality. Vanadiferous titanomagnetite ore mostly occurs in the Sichuan and Hebei provinces with Sichuan accounting for 95 per cent of the national total.

China is currently the largest titanium dioxide supplier in the world with its capacity exceeding that of the USA in 2008 due to growing domestic demand. Consumption of titanium dioxide has surpassed output despite its rapid increase and so it remains a net importer. However, China has transformed itself from a net importer to net exporter of sponge titanium. The production capacity of sponge titanium increased from 50 000 tonnes in 2007 to 70 000 tonnes in 2008 and is expected to surpass 100 000 tonnes in 2010. This compares with a global production capacity of 200 000 tonnes in 2008.

China's consumption of titanium products and titanium sponge is predicted to reach 20 000 tonnes and 30 000 tonnes respectively in 2010. Chinese titanium sponge production is mainly located in the Guizhou, Liaoning, Henan, Hebei, Sichuan and Shaanxi provinces. There are currently seven producers of more than 2000 tonnes per year. Large chlorination titanium dioxide projects, which provide the feedstock for sponge titanium, are also under construction in Zhejiang, Shandong, Liaoning provinces, amongst others, and should be on-stream in 2010. Exports of titanium sponge amounted to 6292 tonnes in 2008, up 12.7 per cent on 2007, and production in 2009 has far exceeded demand with a consequent decrease in the export price by over 10 per cent. If all this titanium sponge production capacity is put on-stream on schedule by 2010 the world market will average 70 per cent of capacity utilisation.

Vanadium

In China 18 500 tonnes of vanadium was produced in 2008 with practically all of it going for steel production. Exports of ferro-vanadium alloys (high-strength low-alloy steels) more than doubled whilst vanadium pentoxide exports dropped by 23 per cent compared with 2007. The two major producers are Panzhihua New Steel and Vanadium Co, the third largest in the world, and Chengde Xinxin Vanadium and Titanium Stock Co Ltd. Both have expansion plans as demand for vanadium is expected to increase by 7–8 per cent per year for the foreseeable future.

China has vanadium reserves of five million tonnes, the joint largest in the world (with Russia). Over 90 per cent of the vanadium and titanium magnetite resources and outputs are centred on the area of Panzhihua–Xichang in Sichuan province and Chengde in Hebei province.

Fluorspar

China produced 3.25 million tonnes of fluorspar in 2008, the same as 2007. Exports of Chinese fluorspar dropped 35 per cent between 2002 and 2008 as domestic demand rose but exports of fluorspar derivatives such as aluminium fluoride have risen markedly. Demand for fluorspar in the manufacture of aluminium fluoride and synthetic cryolite used in aluminium smelters grew 6.7 per cent from 2000 to 2007. Worldwide metaspar (ceramic and metallurgical grades) account for 35–40 per cent of total mine production but its use as a flux in the steel industry is declining.

China is the main source of acid-grade fluorspar and by the end of 2008 China's active production capacity of hydrofluoric acid reached one million tonnes per year. The extent and availability of Chinese fluorspar has been the main determinative factor on prices over the past three decades but recent removal of Chinese fluorspar from global trade has been largely offset by increased production from Mongolia and Mexico. Chinese export restrictions may in part be due to mine depletion as current known reserves could only maintain 3.2 million tonnes per year production for 40 years.

Crude petroleum

China produced 189.7 million tonnes of crude petroleum and imported a further 178.9 million tonnes in 2008, representing increases of 1.6 per cent and 9.6 per cent respectively compared to 2007. Whilst oil production was an estimated 2.7 million barrels per day, oil consumption was 7.9 million barrels per day, an increase of 12 per cent in 2008. Refinery capacity was ramped up by 54.5 million tonnes in that year.

China accounted for nearly 40 per cent of the increase in global oil consumption in the years 2004–2007 and in 2008 became the world's second largest oil importer. Demand fell by nearly six per cent in the first quarter of 2009 to 7.4 million barrels per day but had already recovered to 7.9 million barrels per day by the third quarter of 2009 and is expected to grow by nearly 20 per cent in the next few years. It is estimated that China will increase oil imports to as much as 9.6 million barrels per day in 2010 and 11.4 million barrels per day by 2015.

China's proven oil reserves stood at 19.6 billion barrels at the beginning of 2008 and therefore it will become increasingly dependent upon overseas sourced oil. With some US$1.95 trillion in foreign exchange reserves China has taken full advantage of the global financial difficulties to acquire crude petroleum or gas assets at relatively low cost.

The China National Petroleum Corporation (CNPC), the China Petrochemical Corporation (Sinopec) and the China National Offshore Oil Corporation (CNOOC) together with PetroChina are vigorously pursuing oil supply contracts and have acquired holdings in over 20 countries. The largest Chinese oil acquisition to date is that of the Canadian oil company PetroKazakhstan by CNPC in 2007. This company has large reserves in Kazakhstan and the purchase was complemented by the completion of the Sino–Kazakh oil pipeline that has already delivered in excess of an estimated 300 000 barrels per day of crude oil to China.

Petrochina, the world's second largest company by value, is responsible for 75 oil and gas infrastructure development projects in 29 countries. In December 2009 Petrochina announced that it had found more than 100 million tonnes of oil reserves in Qinghai province.

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China

Production

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Bauxite	tonnes	* 7 100 000	* 7 900 000	* 8 650 000	12 958 700	14 567 000	17 518 000	17 408 200	18 981 600	20 446 000	* 21 600 000
Alumina	tonnes (Al_2O_3 content)	3 837 400	4 328 100	4 746 500	5 449 600	6 112 100	6 980 000	8 592 200	13 256 900	19 453 000	22 788 100
Primary aluminium	tonnes	2 808 900	2 989 200	3 575 800	4 321 000	5 546 900	6 688 800	7 806 000	9 358 400	12 558 600	13 176 600
Antimony, mine	tonnes (metal content)	89 600	99 300	97 000	121 547	100 000	125 433	151 457	156 200	163 000	183 000
White arsenic	tonnes	* 16 000	* 40 000	* 39 500	* 40 000	* 40 000	* 30 000	* 30 000	* 30 000	* 25 000	* 25 000
Asbestos	tonnes	329 000	276 000	257 581	* 480 000	* 430 000	438 962	332 407	360 000	* 390 000	* 380 000
Barytes	tonnes	1 715 740	3 024 030	3 985 200	2 700 000	3 300 000	3 700 000	4 100 000	4 600 000	4 300 000	5 000 000
Bentonite	tonnes	766 860	1 124 340	1 289 700	2 180 000	2 200 000	2 250 000	2 300 000	3 200 000	* 3 300 000	* 3 300 000
Beryl	tonnes	* ...	* 500	* 500	* 500	* 500	* 500	* 500	* 500	* 500	* 500
Bismuth, mine (a)	tonnes (metal content)	2 682	1 122	1 245	944	1 036	1 857	1 886	1 900	1 900	1 900
Borates	tonnes	289 400	283 000	346 500	* 283 000	* 270 000	* 275 000	* 280 000	* 290 000	* 290 000	* 280 000
Bromine	kilograms	* 42 000 000	* 42 000 000	* 40 000 000	* 42 000 000	* 42 000 000	* 80 000 000	* 105 000 000	* 124 000 000	* 130 000 000	* 135 000 000
Cadmium	tonnes	2 154	2 368	2 507	2 426	2 705	4 528	4 080	3 791	4 215	* 4 300
Chromium ores & concentrates	tonnes	220 540	208 000	181 900	164 200	197 800	230 000	220 000	220 000	220 000	220 000
Coal	tonnes	1 043 635 200	999 169 800	1 202 800 000	1 413 000 000	1 740 000 000	1 960 000 000	2 205 000 000	2 373 000 000	2 536 000 000	2 621 832 300
Cobalt, mine	tonnes (metal content)	100	91	150	1 004	707	1 253	2 104	1 840	* 2 000	* 2 000
Cobalt metal	tonnes	* 1 200	* 1 200	1 470	1 842	4 576	(g)* 8 000	(g)* 12 700	(g)* 12 700	(g) 13 245	(g) 18 239
Copper, mine	tonnes (metal content)	520 100	592 600	587 000	578 100	614 400	754 200	776 000	889 000	946 400	1 022 500
Copper, smelter	tonnes	837 000	1 013 900	1 145 100	1 179 900	1 379 200	1 502 900	1 751 500	1 917 500	2 111 500	2 507 000
Copper, refined	tonnes	1 174 200	1 371 100	1 523 300	1 632 500	1 836 300	2 198 700	2 606 800	3 002 100	3 499 400	3 779 300
Diamond	carats	113 065	160 000	1 185 000	1 190 000	1 190 000	* 1 060 000	* 1 060 000	* 1 065 000	* 1 070 000	* 1 070 000
Diatomite	tonnes	82 170	83 300	* 350 000	* 370 000	* 380 000	370 000	400 000	* 420 000	* 420 000	* 440 000
Feldspar	tonnes	* 2 000 000	* 2 000 000	* 2 000 000	* 2 000 000	* 2 000 000	2 300 000	2 300 000	* 2 350 000	* 2 400 000	* 2 400 000
Fluorspar	tonnes	* 2 230 000	* 2 240 000	* 2 200 000	2 650 000	2 400 000	2 500 000	2 700 000	3 000 000	3 200 000	3 250 000
Germanium metal	tonnes	14	14	21	* 20	* 30	* 30	* 35	* 100	* 100	* 100
Gold, mine (b)	kilograms (metal content)	165 680	176 910	181 870	202 000	210 100	212 350	255 000	247 500	275 000	285 000
Graphite (c)	tonnes	1 500 000	1 650 000	1 700 000	1 320 000	1 400 000	1 450 000	1 650 000	1 730 000	1 800 000	1 800 000
Gypsum	tonnes	* 6 700 000	* 6 800 000	* 6 800 000	25 500 000	27 500 000	29 520 000	32 000 000	35 000 000	* 37 000 000	* 35 000 000
Iodine	kilograms	* 500 000	* 500 000	* 500 000	* 500 000	* 500 000	* 550 000	* 550 000	* 560 000	* 570 000	* 570 000
Iron ore	tonnes	237 230 100	223 947 600	217 014 700	232 619 000	261 084 600	310 104 800	420 492 700	588 171 400	707 073 000	824 011 100
Pig iron	tonnes	125 329 900	131 034 200	155 542 500	170 850 000	213 666 800	268 309 900	343 751 900	412 451 900	469 446 300	470 674 100
Crude steel	tonnes	123 954 100	127 236 100	151 634 400	182 370 000	222 336 000	282 911 000	353 239 800	419 148 500	489 660 000	500 488 000
Ferro-alloys											
Ferro-chrome	tonnes	289 778	395 000	340 637	332 011	534 842	635 000	854 000	1 042 500	1 296 000	1 505 800
Ferro-silico-chrome	tonnes	50 400	50 000	59 859	43 492	97 552	105 000	48 000	35 000	38 700	72 300
Other ferro-alloys (h)	tonnes	3 456 760	3 584 345	4 131 200	4 465 000	5 738 000	7 930 000	9 798 000	13 223 000	16 165 000	16 722 000
Silicon metal	tonnes	* 350 000	* 400 000	* 400 000	* 500 000	* 600 000	* 660 000	* 650 000	* 730 000	* 820 000	* 820 000
Kaolin	tonnes	1 332 000	1 450 000	* 1 500 000	2 600 000	2 700 000	3 120 000	3 120 000	3 270 000	2 781 000	* 3 000 000
Lead, mine	tonnes (metal content)	548 900	659 500	676 000	640 700	954 600	997 200	1 142 000	1 331 000	1 402 000	1 546 000
Lead, refined	tonnes	918 400	1 099 900	1 195 400	1 324 700	1 564 100	1 934 500	2 391 400	2 714 900	2 788 300	3 206 400
Lithium minerals	tonnes	46 198	31 967	34 276	* 34 000	* 35 000	* 36 000	* 37 000	* 37 000	* 38 000	* 40 000
Magnesite	tonnes	* 9 500 000	* 10 000 000	* 10 000 000	11 000 000	12 000 000	13 310 000	15 440 000	13 640 000	* 13 600 000	* 13 600 000
Primary magnesium metal	tonnes	120 700	142 100	199 700	235 000	341 800	442 400	467 600	525 600	659 300	664 000

Table 14 Mineral production in China from 1999 to 2008 *(continued).*

China production continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Manganese ore	tonnes	3 186 000	3 514 000	4 306 800	* 4 500 000	* 4 600 000	* 5 500 000	* 7 500 000	* 8 000 000	* 10 000 000	* 14 000 000
Mercury	kilograms	195 000	203 000	193 000	495 000	612 000	1 140 000	1 094 000	760 000	798 000	* 600 000
Mica (d)	tonnes	* 40 700	* 43 300	* 52 200	* 54 000	* 66 200	* 92 000	* 89 000	* 94 000	* 93 000	* 139 000
Molybdenum, mine	tonnes (metal content)	29 745	28 755	28 201	30 330	32 220	38 430	30 000	43 900	* 67 700	* 81 000
Nickel, mine	tonnes (metal content)	49 500	50 300	51 000	53 700	61 100	75 600	72 700	82 100	66 400	71 500
Nickel, smelter/refinery	tonnes	44 400	50 900	49 700	52 400	64 700	72 600	97 800	136 600	199 300	200 300
Perlite	tonnes	* 450 000	* 500 000	* 550 000	* 600 000	* 650 000	* 700 000	* 700 000	* 700 000	* 700 000	* 700 000
Crude petroleum (e)	tonnes	160 215 400	162 620 300	164 931 400	166 900 000	169 599 800	175 873 300	181 352 900	184 765 700	186 656 900	189 728 200
Natural gas	million m^3	25 198	27 226	30 344	32 700	35 015	41 460	49 320	58 553	69 200	76 100
Phosphate rock	tonnes	29 117 700	22 475 800	24 371 100	* 26 000 000	24 470 000	26 174 300	30 444 900	38 959 500	45 417 000	50 740 600
Potash	tonnes (K_20 content)	218 000	275 000	395 000	* 430 000	* 450 000	1 128 200	1 450 000	1 571 900	1 822 600	1 980 000
Rare earth minerals (f)	tonnes	80 500	73 000	80 600	88 000	92 000	98 300	119 000	133 000	120 000	125 000
Salt	tonnes	31 166 000	35 182 800	34 547 500	36 024 000	34 377 000	40 434 400	46 610 600	56 631 300	59 755 300	59 527 800
Selenium metal	tonnes	* 65	* 65	* 65	* 65	* 65	* 65	* 65	* 65	* 65	* 65
Silver, mine	kilograms (metal content)	1 378 714	1 569 145	2 013 250	* 2 200 000	2 400 000	2 450 000	2 500 000	* 2 600 000	* 2 700 000	* 2 800 000
Strontium minerals	tonnes	...	...	...	...	* 500 000	500 000	700 000	* 700 000	* 700 000	* 700 000
Sulphur and pyrites											
Pyrites	tonnes (sulphur content)	3 130 000	4 010 000	3 065 000	2 766 000	3 974 000	4 720 000	4 714 000	4 663 000	6 082 000	6 022 000
Recovered	tonnes (sulphur content)	1 716 000	1 797 000	2 391 000	2 400 000	2 637 000	3 070 000	3 195 000	3 588 000	4 485 000	5 268 000
Sulphur ore	tonnes (sulphur content)	240 000	250 000	260 000	450 000	700 000	827 000	950 000	1 000 000	1 200 000	1 290 000
Talc	tonnes	1 136 000	1 975 070	2 555 500	2 500 000	2 600 000	2 700 000	2 700 000	2 500 000	* 2 000 000	* 2 000 000
Tantalum & niobium											
Columbite-tantalite	tonnes	201	217	357	* 350	* 350	* 350	* 350	* 350	* 350	* 350
Tin, mine	tonnes (metal content)	80 100	99 400	93 000	* 81 000	101 800	118 200	121 600	126 300	147 300	* 125 000
Tin, smelter	tonnes	90 800	110 200	104 900	81 800	98 100	115 300	121 800	132 100	148 800	129 100
Titanium minerals											
Ilmenite	tonnes	* 400 000	* 650 000	* 750 000	* 840 000	* 840 000	* 840 000	* 1 015 000	* 1 000 000	* 1 100 000	* 1 000 000
Tungsten	tonnes (metal content)	20 200	23 453	27 473	35 927	36 185	59 947	51 200	45 000	41 000	43 500
Uranium, mine	tonnes (metal content)	* 500	* 500	* 665	* 730	* 750	* 750	* 750	* 750	* 712	* 769
Vanadium, mine	tonnes (metal content)	* 10 400	* 12 000	* 12 000	* 13 200	* 14 000	* 16 000	* 17 000	* 17 000	* 18 000	* 18 500
Vermiculite	tonnes	* 40 000	* 60 000	* 70 000	* 80 000	* 90 000	* 100 000	* 100 000	* 110 000	* 110 000	* 110 000
Wollastonite	tonnes	391 060	427 540	* 400 000	330 000	340 000	345 000	350 000	350 000	* 350 000	* 325 000
Zinc	tonnes (metal content)	1 476 000	1 780 300	1 693 200	1 624 100	2 029 100	2 391 200	2 547 800	2 844 200	3 047 700	3 186 000
Slab zinc	tonnes	1 703 200	1 957 000	2 037 600	2 155 100	2 318 500	2 719 500	2 776 100	3 162 700	3 742 600	3 913 100
Zirconium minerals	tonnes	1 850	29 898	25 594	* 20 000	* 50 000	* 120 000	* 120 000	* 135 000	* 140 000	* 140 000

Note(s):-
(1) China is also believed to produce sillimanite minerals

(a) Exports of metal have always been higher than mine production in recent years
(b) Metal production
(c) Including flake graphite
(d) Conservative BGS estimates, based on exports
(e) Including oil from shale and coal
(f) REO content. Assumed to be 60% of concentrates produced
(g) Some metal production in China is recorded in Belgium
(h) Including ferro-manganese, ferro-molybdenum, ferro-rare earth, ferro-silicon, ferro-titanium, ferro-tungsten and ferro-vanadium

Table 14 Mineral production in China from 1999 to 2008.

Exports

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Primary aggregates	tonnes	9 066 589	15 658 949	28 067 879	52 295 144	29 427 101	29 668 024	33 699 193	38 290 334	30 151 159	29 749 254
Bauxite, alumina & aluminium											
Bauxite	tonnes	847	1	145	290	496	576	140	20	—	2
Alumina	tonnes	14 406	9 642	25 339	23 710	63 118	22 583	27 890	20 784	31 793	44 142
Alumina hydrate	tonnes	35 225	44 973	56 656	56 629	55 198	101 410	131 588	93 345	108 539	136 172
Unwrought	tonnes	99 540	81 189	294 902	620 999	1 032 433	1 401 224	1 142 277	838 781	160 793	110 127
Unwrought alloys	tonnes	107 062	127 921	113 927	167 049	211 515	278 214	182 084	374 047	385 113	731 165
Scrap	tonnes	6 910	7 557	9 189	9 605	11 411	3 793	1 042	1 024	2 714	891
Antimony											
Metal	tonnes	45 339	45 091	22 097	20 276	25 284	21 592	29 995	21 310	8 332	9 557
Oxide	tonnes	36 704	36 086	36 067	49 539	46 543	53 601	52 742	54 422	52 200	52 389
Sulphide	tonnes	1 975	2 395	5 622	2 447	3 454	...	1 768	1 628	2 337	...
Arsenic											
Metallic arsenic	tonnes	2 497	2 505	2 039	2 263	2 608	2 491	1 996	2 816	2 626	1 850
Asbestos											
Unmanufactured	tonnes	10 720	11 814	18 431	5 029	3 472	3 576	5 396	10 239	4 515	14 492
Barytes	tonnes	1 286 855	2 523 041	2 588 004	1 705 031	2 168 975	2 394 038	3 077 933	3 646 434	3 110 335	3 846 492
Bentonite & fuller's earth											
Bentonite	tonnes	83 105	108 748	113 738	140 729	172 963	187 936	257 553	285 898	319 451	367 928
Fuller's earth	tonnes	7 116	12 150	27 723	33 525	30 384	18 429	15 599	13 876	...	...
Bismuth											
Metal	tonnes	2 694	5 369	2 414	2 621	5 050	5 970	6 931	8 219	4 946	5 418
Bromine	kilograms	113 669	147 644	(a) 68 086	76 245	41 334	(a) 7 034	44 619	115 175	(a) 2 447	(a) 2 149
Cadmium											
Metal	tonnes	12	25	254	251	168	213	311	75	378	100
Cement											
Cement clinkers	tonnes	400 179	234 387	102 393	77 924	379 579	1 027 417	10 782 914	16 722 559	17 814 399	12 823 212
Portland cement	tonnes	5 934 467	588 495	6 077 709	5 057 339	4 894 906	5 931 280	11 302 032	19 175 636	14 397 482	12 477 006
Other	tonnes	21 883	19 970	29 254	28 928	57 571	67 987	68 661	243 910	797 481	751 728
Chromium											
Ores & concentrates	tonnes	3 612	2 404	13 182	2 175	9 855	4 488	3 924	429	1 212	2 314
Metal	tonnes	5 240	6 771	4 781	4 119	4 611	5 219	7 703	11 544	5 526	5 709
Coal											
Anthracite	tonnes	3 145 563	3 887 055	7 651 072	6 605 001	7 367 537	6 383 716	5 645 079	5 175 450	5 254 880	6 074 234
Other coal	tonnes	3 426 109	51 158 908	82 701 117	77 232 112	86 517 087	80 273 374	66 030 655	58 059 424	47 837 465	39 213 136
Lignite	tonnes	...	198	4 293	1 554	2 106	1 677	4 063	2 640	5 010	3 901
Briquettes	tonnes	1 584	8 428	4 543	9 478	44 458	52 378	51 626	62 839	76 439	146 797
Cobalt											
Metal	tonnes	123	191	222	353	1 393	1 979	1 745	3 383	2 829	2 915
Oxides	tonnes	238	155	111	70	557	1 518	2 318	2 391	2 982	3 159

Table 15 Mineral exports from China between 1999 and 2008 *(continued).*

China exports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Copper											
Ores & concentrates	tonnes	54	39 830	22 320	35 781	61 978	14 431	923	101	611	2 410
Unwrought, unrefined	tonnes	3 495	2 430	2 371	3 411	1 455	1 304	3 653	2 750	8	6 147
Unwrought, refined	tonnes	94 586	114 525	50 972	76 588	64 380	123 847	140 172	243 029	125 914	96 115
Unwrought alloys	tonnes	4 956	1 784	782	1 330	1 246	1 124	846	978	662	463
Scrap	tonnes	11 162	10 154	9 934	7 775	7 632	8 735	6 403	6 724	4 977	3 257
Diamond											
Unsorted	carats	205	9 790	250	4 865	4 610	86 040	56 277	71 677	62 365	51 996
Gem, rough	carats	342 900	677 070	669 595	681 524	579 788	277 161	427 205	970 017	547 343	864 276
Gem, cut	carats	1 252 785	1 445 740	1 512 815	1 815 225	2 067 254	2 401 093	2 402 341	2 651 164	2 767 633	2 827 153
Industrial	carats	6 714 690	9 834 845	11 702 980	7 152 296	1 601 939	73 097	410 721	7 559	126 170	3 211 869
Dust	carats	43 798 030	105 481 230	141 123 135	120 001 423	92 394 958	261 690 386	407 111 483	613 694 929	847 070 344	1 232 633 081
Diatomite	tonnes	73 003	74 161	83 696	76 829	56 346	61 460	63 493	66 255	27 720	36 865
Feldspar	tonnes	539 040	607 067	557 243	637 664	598 889	928 581	853 299	858 527	1 021 699	935 158
Fluorspar	tonnes	1 221 491	1 198 478	1 109 384	1 007 026	952 135	834 181	728 257	643 360	535 440	657 529
Gold											
Metal (b)	kilograms	* 1 200	* 6 500	* 30 200	* 5 600	* 24 800	* 16 500	* 11 000	* 14 500	* 38 500	* 39 700
Graphite	tonnes	205 891	333 440	374 116	321 795	339 611	451 393	493 747	465 608	670 388	597 344
Gypsum											
Crude	tonnes	110 362	90 767	102 632	124 534	127 571	240 944	262 372	314 040	333 617	339 502
Calcined	tonnes	10 830	10 757	11 578	14 417	20 543	28 543	32 559	32 872	53 331	77 414
Iodine	kilograms	1 323	8 020	12 120	12 000	23 126	28 380	26 256	10 217	13 841	6 809
Iron ore											
Iron ore	tonnes	9 306	327	545	590	730	4 629	843	4 520	78 014	59 792
Burnt pyrites	tonnes	6 972	277	41	108	711	1 267	1 072	19	28	179
Iron, steel & ferro-alloys											
Pig iron	tonnes	1 621 161	3 332 747	682 465	396 762	714 700	1 290 680	2 243 286	867 028	689 182	250 829
Sponge & powder	tonnes	56 472	60 804	17 001	23 614	33 806	77 921	46 844	47 944	51 882	43 879
Ferro-chrome	tonnes	73 813	133 505	89 655	51 952	95 452	71 645	59 558	49 176	330 086	437 030
Ferro-silico-chrome	tonnes	17 465	23 628	16 463	12 156	19 745	28 028	21 890	3 022	19 386	19 222
Ferro-manganese	tonnes	122 257	189 746	155 416	173 751	227 707	301 611	169 662	284 393	251 750	184 407
Ferro-silico-manganese	tonnes	298 511	362 717	353 445	450 900	498 577	694 326	376 385	518 099	844 187	740 638
Ferro-molybdenum	tonnes	38 535	44 370	37 545	29 609	32 960	42 402	25 177	18 598	21 133	5 824
Ferro-nickel	tonnes	167	1	1	92	129	63	4	103	13 157	5 140
Ferro-silicon	tonnes	349 231	491 627	494 009	539 299	842 761	931 266	941 004	1 330 513	1 543 651	1 277 128
Ferro-titanium & ferro-silico-titanium	tonnes	746	1 356	933	1 465	1 124	3 425	3 779	10 930	11 709	3 341
Ferro-tungsten & ferro-silico-tungsten	tonnes	4 111	5 127	6 264	5 133	6 434	6 701	6 071	6 144	6 638	4 835
Ferro-vanadium	tonnes	2 125	3 073	2 070	1 679	1 745	2 829	3 599	4 696	2 079	5 859
Other ferro-alloys	tonnes	569 341	60 735	124 865	64 571	91 924	106 408	128 887	133 321	166 900	161 871
Silicon metal	tonnes	268 229	328 844	324 693	388 317	481 076	547 403	538 212	617 180	703 726	698 603
Ingots, blooms, billets	tonnes	2 328 264	5 089 204	2 729 389	1 351 555	1 490 940	6 155 337	7 235 741	9 077 618	6 457 130	1 318 875
Scrap	tonnes	62 873	47 280	9 673	5 981	3 849	5 813	1 940	39 763	32 162	204 217
Kaolin	tonnes	892 785	871 042	777 033	708 072	838 723	1 127 665	1 188 794	1 281 319	1 319 376	1 276 591
Lead											
Ores & concentrates	tonnes	22 906	2 766	210	13	0	20	2	80	1	—
Unwrought	tonnes	468 368	467 810	472 072	418 281	453 314	464 751	465 034	552 093	264 332	44 964

Table 15 Mineral exports from China between 1999 and 2008 *(continued).*

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Lithium											
Oxides	tonnes	2 195	2 302	2 438	1 722	2 116	1 396	1 576	1 379	3 986	2 875
Carbonate	tonnes	602	861	1 335	1 165	1 284	1 362	1 364	3 174	3 107	2 490
Magnesite & magnesia											
Magnesite	tonnes	33 131	43 807	109 267	97 779	74 040	73 564	63 630	28 117	2	120
Magnesia	tonnes	2 068 708	1 993 826	1 997 547	1 914 330	1 974 940	1 866 777	1 743 878	2 076 769	2 278 921	2 314 586
Manganese											
Ores & concentrates	tonnes	7 206	5 196	3 300	4 374	3 944	2 463	2 140	1 943	3 908	2 290
Metal	tonnes	80 626	97 200	126 784	136 900	174 219	279 086	297 497	338 536	319 582	305 346
Mercury	kilograms	2 088	4 242	50 005	300	200	30	—	—	—	—
Mica	tonnes	40 714	43 332	52 219	54 018	66 218	92 047	89 287	94 364	92 842	138 568
Molybdenum											
Ores & concentrates	tonnes	9 300	14 172	22 582	34 425	35 303	29 478	27 603	28 889	25 211	23 626
Metal	tonnes	1 029	1 639	1 744	1 744	1 826	2 217	2 664	4 862	4 518	7 406
Oxides	tonnes	7 976	4 221	4 107	2 675	2 143	629	764	1 895	2 189	203
Natural gas	tonnes	2 446 938	2 274 568	2 201 827	2 321 053	1 357 830	1 768 171	2 151 180	2 100 070	1 883 865	2 351 102
Nickel											
Ores & concentrates	tonnes	...	...	27	0	—	...	...	13	85	4 211
Mattes, sinters etc.	tonnes	1 943	680	123	0	5	20	26	759	1 980	3 241
Unwrought (c)	tonnes	14 455	9 218	5 382	4 468	10 422	15 442	15 210	22 633	16 930	6 552
Scrap	tonnes	861	444	180	258	248	455	811	854	411	116
Oxides	tonnes	325	443	289	281	807	805	698	666	394	113
Crude petroleum	tonnes	7 167 271	10 437 779	7 550 605	7 208 063	8 133 323	5 491 571	8 066 870	6 337 217	3 829 216	3 732 892
Phosphate rock	tonnes	2 503 019	3 448 985	4 912 606	3 527 667	3 572 958	3 144 128	2 114 058	951 709	975 806	2 000 919
Platinum group metals											
Platinum & platinum metals	kilograms	2 443	6 473	6 591	4 035	28 846	2 767	2 645	4 900	435	291
Waste & scrap	kilograms	...	2	...	5 006	1 083	13	598	5 875	27 506	139 338
Potash											
Sulphate	tonnes	1 397	5 709	14 210	32 281	30 659	44 405	49 955	52 907	59 667	26 078
Chloride	tonnes	860 051	590 258	330 781	371 287	298 851	100 001	87 208	300 337	58 910	129 153
Other potassic fertilisers	tonnes	399	624	2 504	1 018	1 233	2 021	4 317	1 997	4 125	4 268
Rare earths											
Cerium compounds	tonnes	17 534	19 861	20 987	22 823	27 096	27 630	25 209	21 981	16 737	17 887
Other rare earth compounds	tonnes	38 129	36 648	28 522	26 890	34 804	29 858	27 015	30 249	25 156	30 136
Ferro-cerium & other pyrophoric alloys	tonnes	523	166	...	186	149	...	134	137	139	267
Metals	tonnes	8 293	12 537	8 090	8 982	11 622	12 241	12 990	13 677	12 528	6 952
Salt	tonnes	392 355	552 033	946 517	968 703	1 144 460	811 371	684 660	834 338	769 046	967 624
Silliminite minerals											
Kyanite, silliminite & andalusite	tonnes	6 612	5 139	8 547	5 879	2 805	1 474	7 852	7 424	4 373	5 397
Mullite	tonnes	5 851	9 368	38 665	51 193	104 088	71 284	3 112	3 393	5 177	72 390
Silver											
Ores & concentrates	kilograms	…	80	...	...	5 000	40	11 500	57 520	—	—
Metal	kilograms	308 335	191 399	1 225 380	2 214 415	2 965 432	3 559 234	4 279 244	4 711 869	4 677 081	4 185 840
Sulphur & pyrites											
Pyrites	tonnes	6 229	9 107	15 850	11 116	72 015	17 425	48 196	59 769	41 407	25 670
Sulphur	tonnes	3 120	5 065	7 329	3 305	5 115	4 867	10 029	9 088	3 323	35 902
Sulphur, sublimed & precipitated	tonnes	935	1 713	1 994	3 337	2 459	3 442	3 375	3 192	4 856	4 881

Table 15 Mineral exports from China between 1999 and 2008 *(continued).*

China exports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Talc	tonnes	732 480	804 431	799 297	739 219	748 633	645 460	564 938	654 835	663 884	699 326
Tantalum & niobium											
Tantalum	tonnes	239	308	211	149	214	316	335	357	399	531
Tin											
Unwrought	tonnes	54 159	62 418	45 803	32 181	31 285	38 915	22 928	19 982	23 477	517
Unwrought alloys	tonnes	10 424	15 314	11 446	10 419	9 935	6 883	4 085	1 544	106	43
Titanium											
Titanium minerals	tonnes	12 144	31 028	16 193	19 959	72 321	26 648	26 344	5 821	14 789	1 831
Metal	tonnes	1 399	1 045	1 317	1 169	1 470	2 140	4 115	9 120	16 297	17 998
Oxides	tonnes	44 772	62 072	65 507	85 817	101 630	122 880	188 582	226 807	185 813	104 079
Tungsten											
Tungsten ores & concentrates	tonnes	80	0	—	13	—	...	42	31	20	140
Metal	tonnes	1 946	2 738	4 379	2 398	3 458	3 551	3 684	4 423	3 641	4 433
Ammonium paratungstate	tonnes	10 507	9 276	...	6 078	8 548	...	8 012	7 699	5 526	5 421
Vanadium											
Pentoxide	tonnes	6 167	6 872	5 077	5 881	6 948	4 966	7 847	10 430	19 530	15 057
Metal	tonnes	0	0	0	0	0	76	197	259	...	...
Zinc											
Ores & concentrates	tonnes	233 150	138 891	13 366	3 515	...	...	...	...	109	0
Unwrought	tonnes	507 501	574 630	543 856	472 769	451 028	224 085	123 375	325 405	275 649	71 318
Unwrought alloys	tonnes	19 641	18 766	20 108	23 218	33 203	38 940	23 592	16 060	1 065	2
Scrap	tonnes	5 955	2 098	1 865	2 588	1 615	350	390	300	137	42
Zirconium											
Ores & concentrates	tonnes	330	158	1 084	1 113	1 305	1 615	777	2 800	901	190
Metal	tonnes	94	22	5	5	74	412	276	521	1 236	1 853

Note(s):-
(a) May include some fluorine
(b) BGS estimates, based on known imports into certain countries
(c) Including alloys

Table 15 Mineral exports from China between 1999 and 2008.

Imports

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Primary aggregates	tonnes	13 704	86 680	17 284	26 469	22 447	20 274	21 526	28 404	91 376	17 578
Bauxite, alumina & aluminium											
Bauxite	tonnes	243 489	403 516	320 771	402 825	616 954	882 070	2 166 468	9 255 847	23 280 312	25 909 030
Alumina	tonnes	1 623 186	1 881 714	3 346 019	4 571 076	5 605 165	5 871 739	7 008 624	6 911 590	5 099 193	4 586 017
Alumina hydrate	tonnes	9 605	8 257	5 316	13 068	9 417	18 711	11 752	29 693	21 474	17 011
Unwrought	tonnes	380 626	614 823	226 360	270 563	545 087	698 125	427 514	289 853	111 363	121 647
Unwrought alloys	tonnes	153 378	299 306	303 278	311 193	335 649	335 138	209 439	222 124	170 791	138 421
Scrap	tonnes	399 268	804 629	367 802	447 280	653 422	1 200 009	1 687 139	1 766 002	2 090 516	2 155 018
Antimony											
Ores & concentrates	tonnes	144	80	217	13 073	22 734	18 006	21 956	20 326	18 688	19 377
Metal	tonnes	1 246	472	188	139	275	526	8 640	6 464	231	402
Oxide	tonnes	1 312	1 206	316	410	937	1 496	3 307	4 498	4 519	1 554
Arsenic											
Metallic arsenic	tonnes	—	1	1	9	2	4	4	9	8	15
Asbestos											
Unmanufactured	tonnes	69 391	72 004	110 489	117 351	143 476	189 539	169 995	191 424	250 418	299 911
Barytes	tonnes	326	497	457	688	1 028	1 021	1 281	795	903	961
Bentonite & fuller's earth											
Bentonite	tonnes	5 583	5 319	6 775	11 829	16 793	23 001	41 782	38 335	48 681	51 191
Fuller's earth	tonnes	457	234	287	2 619	503	388	837	843	...	...
Bismuth											
Metal	tonnes	95	78	214	220	1 919	64	128	524	493	1 412
Bromine	kilograms	2 538 086	4 015 225	* 4 600 000	9 553 650	23 074 833	* 27 000 000	25 380 116	16 232 134	13 136 114	16 256 682
Cadmium											
Metal	tonnes	869	2 739	3 456	5 195	6 752	7 469	8 278	11 024	6 854	5 757
Cement											
Cement clinkers	tonnes	442 076	1 389 554	2 700 291	1 794 574	1 883 579	1 565 761	342 678	347 510	112 544	51 049
Portland cement	tonnes	53 449	28 220	93 010	573 475	647 117	1 094 800	812 351	759 316	525 589	557 614
Other	tonnes	4 139	8 044	7 655	4 330	6 999	8 829	8 470	11 172	7 062	8 504
Chromium											
Ores & concentrates	tonnes	816 230	1 112 791	1 090 441	1 142 740	1 779 103	2 147 691	3 023 998	4 324 747	6 090 839	6 844 790
Metal	tonnes	969	751	250	672	601	542	388	722	409	318
Coal											
Anthracite	tonnes	143 044	213 178	443 617	2 768 763	3 383 034	7 819 262	12 789 619	22 625 904	28 414 218	19 387 101
Other	tonnes	1 528 002	1 903 630	2 049 653	8 042 103	7 377 894	10 777 882	13 338 306	15 618 045	22 590 585	21 406 164
Lignite	tonnes	...	0	220	290 048	71 902	164 030	45 223	116 513	585 624	2 837 183
Cobalt											
Ores & concentrates	tonnes	7 573	16 038	29 222	41 123	83 468	143 594	199 072	165 696	118 353	254 744
Metal	tonnes	1 348	2 077	3 107	4 380	3 385	1 682	2 874	13 230	19 973	23 626
Oxides	tonnes	98	87	221	888	1 479	1 604	926	1 592	518	475

Table 16 Mineral imports to China between 1999 and 2008 *(continued).*

China imports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Copper											
Ores & concentrates	tonnes	1 250 148	1 813 288	2 255 252	2 065 413	2 668 761	2 882 164	4 036 724	3 631 568	4 528 238	5 196 359
Matte & cement	tonnes	262	423	82	2 874	9 119	9 307	11 056	80 493	274 109	101 156
Unwrought, unrefined	tonnes	129 960	124 710	91 237	105 449	123 323	114 363	129 357	88 542	173 220	197 719
Unwrought, refined	tonnes	404 764	667 623	834 971	1 181 004	1 357 331	1 200 095	1 222 031	827 045	1 495 565	1 456 628
Unwrought alloys	tonnes	13 012	19 813	27 959	43 693	31 599	66 582	63 540	53 934	59 649	48 157
Scrap	tonnes	1 701 391	2 501 168	3 332 533	3 080 126	3 161 792	3 952 568	4 820 940	4 943 186	5 584 835	5 577 020
Diamond											
Unsorted	carats	167 255	260 565	421 265	946 083	512 435	201 982	22 290	2 441	**(a)* 2 000**	**(a)* 11 400**
Gem, rough	carats	2 677 240	3 170 885	3 285 620	4 293 691	4 625 871	5 163 124	5 246 828	6 258 592	6 469 025	5 814 031
Gem, cut	carats	1 907 060	3 607 675	4 138 235	5 542 819	6 880 315	8 766 351	9 881 124	9 726 152	11 260 564	10 460 791
Industrial	carats	624 500	474 910	988 810	567 739	718 521	976 262	992 478	416 034	597 837	666 079
Dust	carats	3 432 070	1 950 515	2 666 165	5 064 603	35 825 097	23 534 141	28 880 282	35 411 471	54 156 869	56 649 775
Diatomite	tonnes	3 668	3 053	2 775	1 910	2 391	4 149	4 139	3 126	3 485	3 172
Feldspar	tonnes	11 253	6 205	3 446	3 360	3 789	4 845	5 340	12 297	15 261	27 697
Fluorspar	tonnes	...	...	25	1 792	3 653	5 155	17 002	40 321	34 202	47 497
Gold											
Metal (a)	kilograms	* 16 700	* 22 400	* 41 600	* 51 900	* 40 600	* 16 700	* 10 000	* 13 200	* 38 500	* 29 700
Graphite	tonnes	1 239	740	2 844	741	1 605	4 610	22 045	49 445	67 358	61 573
Gypsum											
Crude	tonnes	21 243	35 153	6 041	16 852	15 528	50 638	11 421	5 515	6 586	6 747
Calcined	tonnes	20 404	27 335	18 064	7 011	6 788	6 718	5 828	5 751	7 570	6 589
Iodine	kilograms	748 671	793 731	630 163	1 134 000	1 403 068	2 110 457	1 991 836	2 161 336	2 712 032	3 029 593
Iron ore											
Iron ore	tonnes	55 272 881	69 970 779	92 392 677	111 423 424	148 119 451	207 978 254	275 214 471	326 323 344	383 617 790	444 040 878
Burnt pyrites	tonnes	1 123	63	84	70 371	0	97 938	30 110	6 953	51 437	105 892
Iron, steel & ferro-alloys											
Pig iron	tonnes	58 811	17 514	4 801 128	648 181	512 967	814 592	269 580	169 772	694 955	355 881
Sponge & powder	tonnes	43 922	145 859	721 677	1 335 047	1 731 298	1 615 524	810 309	351 804	379 664	675 465
Ferro-chrome	tonnes	1 075	1 740	24 041	71 642	115 744	313 422	250 655	449 417	1 388 567	1 120 820
Ferro-silico-chrome	tonnes	...	...	...	...	...	0	18	1 370	18 326	19 419
Ferro-manganese	tonnes	1 580	381	183	9 926	27 056	28 737	13 505	17 202	596	1 315
Ferro-silico-manganese	tonnes	95	13	223	108	56	11 694	12 911	24 611	25 132	19 986
Ferro-molybdenum	tonnes	108	15	35	63	80	109	223	141	479	718
Ferro-nickel	tonnes	354	882	1 244	1 256	13 704	32 963	60 576	73 471	67 741	64 291
Ferro-niobium	tonnes	980	1 241	1 435	1 644	3 189	3 604	9 622	11 873	15 082	23 585
Ferro-silicon	tonnes	3 256	2 103	4 082	4 090	5 217	7 529	11 796	9 549	11 395	11 486
Ferro-titanium & ferro-silico-titanium	tonnes	240	617	217	361	328	679	249	384	840	1
Ferro-vanadium	tonnes	274	120	260	181	104	1 253	346	3	6	27
Other ferro-alloys	tonnes	1 041	2 165	4 473	4 468	3 157	5 379	9 927	29 196	23 152	51 647
Silicon metal	tonnes	924	1 176	1 568	1 813	4 692	9 876	6 018	9 772	18 384	113 871
Ingots, blooms, billets	tonnes	2 134 955	4 901 107	8 362 336	4 686 979	5 934 542	3 860 320	1 352 694	506 822	389 872	280 467
Scrap	tonnes	3 339 073	5 100 952	9 786 854	7 853 208	9 293 121	10 224 821	10 135 704	5 386 136	3 394 964	3 590 389
Kaolin	tonnes	105 182	182 763	190 967	232 851	273 922	351 059	418 976	415 958	344 792	363 052
Lead											
Ores & concentrates	tonnes	169 669	311 395	397 116	389 184	679 043	825 338	1 030 313	1 202 849	1 266 795	1 445 669
Unwrought	tonnes	15 774	16 261	28 788	57 886	58 177	87 616	58 659	56 824	44 933	58 690

Table 16 Mineral imports to China between 1999 and 2008 *(continued).*

China imports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Lithium											
Oxides	tonnes	182	15	31	200	45	34	161	555	205	119
Carbonate	tonnes	3 543	4 479	4 687	4 437	5 994	8 360	8 572	6 402	3 832	4 306
Magnesite & magnesia											
Magnesite	tonnes	88	201	88	64	34	23	149	21	91	1 201
Magnesia	tonnes	5 207	7 807	9 372	24 817	14 000	19 158	15 046	25 348	43 889	96 993
Manganese											
Ores & concentrates	tonnes	1 056 874	1 202 466	1 711 506	2 080 150	2 849 509	4 660 484	4 587 179	6 212 552	6 643 481	7 577 587
Metal	tonnes	79	75	36	82	133	158	414	198	241	900
Mercury	kilograms	883 201	774 820	488 679	224 560	175 506	353 727	180	...	128 237	169 677
Mica	tonnes	1 090	5 400	5 325	7 803	19 144	25 108	30 429	34 755	49 323	78 167
Molybdenum											
Ores & concentrates	tonnes	15 680	18 769	24 577	17 240	20 275	20 363	40 685	24 713	13 876	4 133
Metal	tonnes	189	178	216	173	191	197	330	263	209	241
Oxides	tonnes	166	781	146	42	177	626	160	17	32	64
Natural gas	tonnes	9 700	2 510	1 219	0	0	400	483	687 543	2 913 123	3 336 406
Nickel											
Ores & concentrates	tonnes	79	1 232	6 986	7 074	9 297	42 590	483 884	3 788 228	15 626 176	12 372 667
Mattes, sinters etc.	tonnes	640	2 672	3 645	19 593	13 944	12 247	42 323	64 727	69 695	86 496
Unwrought (b)	tonnes	4 498	11 951	37 406	38 422	80 779	64 989	90 117	97 306	105 297	118 102
Scrap	tonnes	138	34	165	212	242	9	...	449	1 972	1 422
Oxides	tonnes	2 154	3 281	2 984	4 743	7 725	7 091	6 613	6 731	4 081	3 037
Crude petroleum	tonnes	36 613 687	70 134 276	60 255 355	69 407 720	91 020 116	122 815 469	127 083 186	145 180 329	163 175 452	178 892 323
Phosphate rock	tonnes	62	1 699	1 640	69	22	242	443	81 487	42 629	1 249
Platinum group metals											
Platinum & platinum metals	kilograms	6 476	7 041	10 586	10 678	32 184	36 578	39 222	41 003	55 903	62 355
Waste & scrap	kilograms	...	...	...	—	1	385	0	35	141	1 142
Potash											
Sulphate	tonnes	197 238	190 835	257 243	302 415	332 842	168 651	189 645	246 737	178 982	105 206
Chloride	tonnes	5 195 481	5 991 250	5 168 203	6 648 138	6 233 296	7 182 784	8 833 727	7 053 371	9 413 057	5 141 294
Other potassic fertilisers	tonnes	1	2	1	12	358	25 491	134 543	132 873	101 528	163 32**4**
Rare earths											
Ores & concentrates	tonnes	2 854	3 416	...	4 856	1 979	...	3 089	525	1 306	3 659
Rare earth compounds	tonnes	1 415	1 030	706	2 338	1 160	2 510	2 231	5 604	4 604	2 861
Ferro-cerium & other pyrophoric alloys	tonnes	493	69	...	23	32	...	36	65	99	98
Metals	tonnes	162	384	201	30	61	48	61	33	333	208
Salt	tonnes	3 532	2 660	3 999	170 938	375 686	2 156 346	4 212 887	2 011 430	1 595 704	1 944 006
Silliminite minerals											
Kyanite, silliminite & andalusite	tonnes	391	350	640	1 329	2 566	2 870	4 292	5 258	10 645	23 264
Mullite	tonnes	3 724	1 169	2 466	3 183	4 577	5 450	6 127	6 267	6 332	4 982
Silver											
Ores & concentrates	kilograms	551 020	290 645	1 442 835	2 108 565	7 944 710	17 427 023	47 608 872	67 637 596	188 903 619	69 818 580
Metal	kilograms	299 830	283 739	315 523	407 288	538 612	677 993	1 344 579	3 656 669	5 795 681	6 153 373
Sulphur & pyrites											
Pyrites	tonnes	68	5	4	34	1	2	5	6 169	15 096	160 869
Sulphur	tonnes	1 979 401	2 732 944	3 370 050	4 092 151	4 991 848	6 765 413	8 306 477	8 812 513	9 646 836	8 414 903
Sulphur, sublimed & precipitated	tonnes	154 811	89 474	9 542	2 646	2 951	3 395	4 704	2 161	2 905	4 837
Talc	tonnes	10 274	14 171	9 833	12 725	16 396	21 409	19 686	23 519	27 114	34 503

Table 16 Mineral imports to China between 1999 and 2008 *(continued).*

China imports continued

Commodity	Units	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Tantalum & niobium											
Tantalum	tonnes	257	356	219	58	31	111	168	169	196	196
Tin											
Ores & concentrates	tonnes	871	2 077	3 475	3 155	2 739	8 929	7 507	7 113	20 699	7 154
Unwrought	tonnes	1 291	1 629	2 812	3 627	4 941	9 617	19 019	15 913	12 888	9 924
Unwrought alloys	tonnes	2 498	3 306	3 674	4 405	5 183	8 694	10 897	6 586	4 044	3 304
Scrap	tonnes	...	18	229	547	234	1	—	—	—	—
Titanium											
Titanium minerals	tonnes	15 540	39 647	59 210	47 238	251 112	592 918	500 820	708 351	1 223 011	1 067 035
Metal	tonnes	2 269	2 297	5 148	5 206	7 677	7 182	9 130	8 221	5 480	7 741
Oxides	tonnes	120 037	157 013	177 065	216 157	260 714	283 090	252 386	283 266	305 396	276 545
Tungsten											
Tungsten ores & concentrates	tonnes	1 950	563	791	1 853	1 303	2 851	6 145	12 279	9 304	10 131
Metal	tonnes	312	404	411	598	882	761	1 325	1 447	845	1 211
Vanadium											
Pentoxide	tonnes	143	457	1 950	1 983	2 110	3 060	98	57	45	6
Metal	tonnes	37	41	83	300	527	928	365	277	...	...
Zinc											
Ores & concentrates	tonnes	44 003	77 942	652 996	785 425	744 433	612 719	568 087	837 532	2 153 872	2 395 247
Unwrought	tonnes	16 091	19 496	18 513	68 898	135 721	239 165	387 374	318 208	149 391	182 454
Unwrought alloys	tonnes	91 347	110 477	122 614	143 303	174 500	219 629	227 990	213 968	168 434	148 311
Scrap	tonnes	42 127	47 784	35 395	51 041	67 521	73 835	76 484	72 483	42 171	27 886
Zirconium											
Ores & concentrates	tonnes	130 688	161 007	165 135	219 596	257 018	270 260	342 998	375 510	466 818	511 892
Metal	tonnes	888	1 053	979	630	570	393	473	759	721	1 034

Note(s):-
(a) BGS estimates, based on known exports from certain countries
(b) Including alloys

Table 16 Mineral imports to China between 1999 and 2008.