

BRAZIL

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The Brazilian census of 2000 revealed that the population grew from 147 million in 1991 to 170 million in 2000 at an annual growth rate of 1.63%, lower than the 1.93% of the 1980s, the 2.48% of the 1970s, the 2.89% of the 1960s or the 2.99% of the 1950s. This is an important relief to the demographic pressure on the country's social infrastructure and means a consequent improvement in the living conditions of the population. That tendency should continue and the benefits will be felt more in the future. The fall seen in the rate of population growth is due to the reduction of the fertility rate. In 1984 each woman had 3.5 children on average and in 2000, 2.2 children.

The Brazilian economy in 2000, after the alteration of the exchange policy in 1999, increased by 4.2% exceeding the most optimistic expectations. The internal conditions should allow, in 2001, continued small reductions in interest rates and a GDP expansion of 4 to 4.5%. Brazil's preliminary GDP grew from US\$508 billion to US\$601 billion last year. The inflation rate for 2000 was 5.97%, below the 6% target and significantly lower than the 9% of 1999. The trade balance showed a deficit of US\$700 million, lower than the 1999 deficit of US\$1.2 billion, with exports worth US\$55 billion, 14.5% up on 1999 and imports, up 13%, at US\$55.7 billion. In December 1999, the exchange rate was R\$1.789 to the dollar and in December 2000 the rate was R\$1.955. The Brazilian monetary reserves that were US\$36.345 billion at the end of 1999, at the end of 2000 were US\$33.011 billion. The amount of gold in this reserve reduced from US\$2.66 billion in 1999 to US\$577 million in 2000.

The privatisation programme in 2000, after a long judicial dispute, placed at auction and privatised Banco Banespa, the state bank of São Paulo for R\$7.05 billion. That auction will

facilitate the privatisation of six other small state banks, scheduled for the years of 2001-2002. The programme of privatisation includes, among other companies, three major electricity-generating companies belonging to the federal government (Furnas, Eletronorte and Chesf) and three such companies belonging to state governments (Cesp/Paraná, Celg/Goias and Copel/Paraná).

Brazilian mining, reflecting reorganisation in the international mining and metallurgy industry, the national programme of privatisation and deregulation in the steel and mining industries, is also seeing a lot of changes. The search for increased scale, a more precise focus of performance and better positioning in the market has caused changes in the control of companies through merger and acquisition, whose results cannot yet be appraised. The iron ore, steel, fertilisers, cement and industrial minerals sectors are among the ones subject to constant modifications.

In respect of government regulations, several measures seeking to activate the process of concession of mineral rights, now in place, are showing good results. Consideration is being given to a more powerful structure to lead the mineral industry in the same way as the agencies of petroleum, electric power and water, among others. The National Department of Mineral Production (DNPM) will become the National Agency of Mining and the Company of Research of Mineral Resources (CPRM) will become the National Geological Service, in this latter case accomplishing a constitutional precept. The law that will see that modification is open to public analysis on the website of the Ministry of Mines and Energy (www.mme.gov.br).

DNPM in 2000 issued 21,200 exploration licences, an increase of 178% over the 7,600

issued in 1999. DNPM estimated that mineral exploration investment in 2000 reached US\$104 million, 136% higher than the US\$44 million in 1999.

Aluminium

Bauxite production in 2000 rose 2.5% from the previous year to an estimated 14.1 Mt. Mineração Rio do Norte (MRN), a joint venture between state-owned CVRD-Aluvalle (40%), Billiton (14.8%), Alcoa (13.2%), Alcan (12%), Cia Brasileira de Alumínio-CBA (10%), Norsk Hydro (5%) and Reynolds (5%), accounted for 11.2 Mt of the total, a record output. The remainder was produced by the mines of CBA, Alcoa, Alcan, Mineração Curimbaba and MSL Minerais SA. About 400,000 t of this production was refractory grade bauxite produced mainly by Mineração Curimbaba and MSL. Bauxite exports in 2000 were 4.17 Mt, 7.6% down on 1999, valued at US\$113.1 million, 2.2% lower than in 1999.

The Alunorte alumina plant, operated by a consortium led by Aluvalle (49.29%), Norsk Hydro (26.71%), MRN (12.6%), Nippon Amazon Aluminium (5.90%), CBA (3.62%) and JAIC (1.86%) produced a record 1.63 Mt of calcined alumina, 6.5% up on the previous year. Total Brazilian production of alumina in 2000 was about 3.65 Mt. Alumina exports in 2000 were 1.24 Mt, valued at US\$234.6 million. Alunorte began an expansion that should increase capacity by 55%, to 2.3 Mt/y by June 2003.

National primary aluminium production rose by 1.5% to 1.27 Mt. The Albrás facility at Vila do Conde, Pará (Aluvalle 51% and Japanese companies 49%) produced some 369,200 t of primary metal, Alcoa 294,300 t, CBA 240,100 t, Billiton 217,500 t, Alcan 106,900 t and Aluvalle 49,400 t. The Alumar plant (Alcoa and Billiton) at São Luiz, Maranhão, reported production of 370,900 t, CBA's (Votorantim group) plant at Mairinque, São Paulo 240,100 t, the Valesul plant (Aluvalle 54.5% and Billiton 45.5%) at Santa Cruz, Rio de Janeiro 95,400 t, the Alcoa plant at Poços de Caldas, Minas Gerais 94,900 t, and the Alcan plants

at Ouro Preto, Minas Gerais 50,300 t and Aratu, Bahia 56,600 t.

To meet domestic demand of almost 520,000 t in 2000 (12% higher than 1999), Brazilian imports of aluminium in all forms in 2000 totalled 111,197 t (worth US\$376 million), 17% less than the previous year, whilst exports fell by 0.1% to 894,199 t (worth US\$1.49 billion – 17.5% higher). The Alumar refinery at Maranhão is investing US\$550 million in an expansion programme. CBA has been waiting since 1994 for an environmental permit to build a hydroelectric generating plant at Tijuco Alto (144 MW) to increase production from 240,000 t/y to 300,000t/y. In 2000, Brazil's goal to recycle 80% of its aluminium cans was not achieved. However, the 78% that was achieved could see the country in first place in the world, depending on the result achieved by Japan

Coal

Brazilian run-of-mine (ROM) coal production rose 50% to 13.8 Mt and marketable output rose 19% to 6.8 Mt in 2000. Copelmi was the largest producer with ROM output of 4.61 Mt, followed by CRM at 2.19 Mt, Rio Deserto at 1.99 Mt, Metropolitana at 1.61 Mt and Criciuma at 1.60 Mt. In 2000, domestic coal (6.3 Mt) was used in power stations in the three southernmost states: Santa Catarina (56.5%), Rio Grande do Sul (42.1%) and Parana (1.4%). Brazil's requirements for metallurgical coal imports increased from 13.4 Mt to 14.8 Mt in 2000, valued at US\$521 million, 1.4% lower than in 1999, and bought mainly from the US (35.6%), Australia (33.4%), Canada (8.8%), South Africa (5.8%) and Venezuela (4.7%).

The consumption of electricity in Brazil is reaching the capacity of the hydroelectric generating stations and in drought periods can lead to rationing. For this reason a priority Termoeletricidade programme has been developed that involves 49 power stations, based mainly on natural gas. However, three of them to be built in Rio Grande do Sul state will be coal-fired - the

250 MW Seival Plant of Copelmi, the 350 MW Candiota II of Eletrobras and the 350 MW Jacui plant. CRM is investing US\$3 million to supply coal to the Candiota and Jacui plants. Another 400 MW Sul Catarinense plant will be constructed in Santa Catarina state with Metropolitan and Criciuma mines as partners. Copel's coal-fired Figueira plant will be upgraded from 25 MW to 125 MW, with expanded operation beginning in December 2002. All 49 new plants are part of the government's 17 GW emergency plan to cope with increase demand for electricity.

Copper

Brazilian production of copper in concentrates was unchanged from the previous year, at an estimated 31,000 t, at Brazil's only copper mine, Mineração Caraiba (MSB group) in Bahia State. Total primary metal production fell by 4.4% to 184,564 t. Caraiba Metais (Paranapanema group) is the sole electrolytic copper producer and approved a US\$300 million expansion programme to increase its capacity from 220,000 to 380,000 t/y in 2004. Caraiba Metais is expected to announce in the first quarter of 2001 a new partner that will probably become one of its principal suppliers of concentrate.

In 2000, 487,000 t of concentrates were imported for smelting and refining, a decrease of 16.4% over 1999, valued at US\$264 million. To meet primary copper demand of around 330,000 t/y, imports of copper in all forms in 2000 totalled 186,000 t, an increase in volume terms of 32.8%, compared with 1999, and 47.9% higher in value (US\$404 million). With copper exports of just 70,828 t, this sector of the mining industry recorded a trade deficit of US\$266 million.

Brazil could occupy a prominent position in world production of copper beginning in 2005-2008. The Sossego copper-gold joint venture between Cia Vale do Rio Doce (CVRD) (50%) and Phelps Dodge (50%) in Carajás had its feasibility study completed in May 2000 and awaits the decision to go ahead,

which could come in 2001. The project envisages producing 500,000 t/y of concentrate and could yield 150,000 t/y of copper and 3.5 t/y of gold. The Cristalino project, also in Carajás, has CVRD associated with BNDES - National Bank of Economical and Social Development (50%), an association that prevails in all other projects in Carajás. The Cristalino project is quite similar to that of Sossego, also aiming to produce 150,000 t/y copper and 3.5 t/y of gold. The Alemão project, in association with BNDES, will be an underground operation and could produce 80,000 t/y copper and 4 t/y of gold. The orebody should be reached soon, by a decline that has already passed 900 m. The 118 project, with reserves of 100-120 Mt at 0.8% Cu in oxide ore, is still under investigation and a feasibility study should be completed in 2002. Salobo, the other major copper project, a joint venture between CVRD (33.3%), Anglo American (33.3%) and BNDES (33.3%) is being evaluated for using hydrometallurgic processing, which shows exciting results. Another copper-related project is the US\$300 million Chapada mine of Mineração Santa Elina that has already received US\$180 million from BNDES to produce 160,000 t/y of copper concentrate containing 2.8 t gold and 6 t silver starting in 2004.

Gold

Gold production in 2000 is estimated to have been around 48,000 kg; 42,000 kg from mining companies and about 6,000 kg from *garimpo* operations. This represents an increase of 5,000 kg compared with 1999. Exports rose last year by 2,517 kg from 39,026 kg in 1999 to 41,545 kg in 2000. The output of CVRD, the biggest producer, rose by 266 kg to 17,387 kg. AngloGold, the second largest gold producer, reported production of 6,558 kg from Mineração Morro Velho and 5,998 kg from Mineração Serra Grande (Anglo and TVX). Rio Paracatu Mineração (Rio Tinto 51%, Autram 49%) continues to be the third largest gold producer with around 7,122 kg. São Bento Mineração (Eldorado Gold Corp.) was the

fourth largest producer with an estimated output of 4,000 kg in 2000. With the growth of Brazilian copper production, gold production will also rise.

Iron Ore

In 2000, after occupying first place in Brazilian exports for more than a decade, iron ore lost that place to aircraft manufacturing. The export of planes generated revenue of US\$3,054 billion, while iron ore generated US\$3,048 billion corresponding to 5.5% of total exports. Marketable iron-ore production rose during the year, probably passing the 200 Mt mark, whilst exports increased by 12.2% to about 158 Mt. Exports went to 40 countries, the biggest customers being Japan (taking about 15% of total shipments), Germany (14%), China (8.9%) and Italy (7.8%). Six companies account for 90% of production: CVRD, Mineração Brasileiras Reunidas (MBR), Mineração Trindade (Samitri), Ferteco, Samarco Mineração and Cia Siderúrgica Nacional (CSN).

In 2000 CVRD purchases included Socoimex (for US\$48.2 million) an iron-ore mining company with capacity to produce 7 Mt/y; 50% of GIIC—Gulf Industrial Investment Co., (for US\$91.5) owner of a pellet plant with an annual capacity of 4 Mt/y and facilities in Bahrain; and Samitri (for US\$710.5 million). The auction of CAEMI, the company that controls MBR, was won by BHP with the offer of US\$332 million and where this article was being prepared (March 2001) it was awaiting the reaction of Mitsui which has preference rights. BHP has also bid to purchase Ferteco, belonging to Thyssen. CVRD was separated from its cross participation in Cia Siderúrgica Nacional and put up for sale its assets in paper and cellulose to focus on mining. In 2001, CVRD plans to invest US\$1.75 billion in a very diversified portfolio. This year should, probably, see completion of the restructuring of the Brazilian iron-ore mining industry.

Nickel

Production of electrolytic nickel, nickel in ferro-nickel alloys and nickel in matte reached 31,991 t in 2000, 0.9% lower than the 32,268 t reported a year earlier. Production by Cia Niquel Tocantins (Votorantim group) reached 16,906 t of electrolytic nickel, while Codemin (Anglo American) produced 6,347 t. Rio Tinto's Mineração Serra da Fortaleza produced 8,738 t of contained nickel in matte, a 6.4% decrease on the 9,335 t of 1999. Matte exports decreased to 16,330 t worth US\$57.7 million, compared with 19,014 t worth US\$41.6 million in 1999. The fall in Fortaleza's production was due to preparing the mine for the transition from open pit to underground operation.

There are programmed investments of about US\$1.4 billion in nickel projects in Brazil, increasing the installed capacity by 214% from 34,000 t/y to 107,000 t/y starting from 2003. CVRD, with its Vermelho project in Carajas, state of Pará, intends to invest US\$600 million in a deposit with reserves of about 100 Mt at 1.5% Ni and Co, to produce about 30,000 t/y nickel. Anglo American also intends to begin the development of the Barro Alto mine in Goiás, investing US\$750 million to produce 40,000 t/y nickel from a deposit with total reserves of 117 Mt at 1.5% Ni. Cia Niquel Tocantins is investing US\$50 million to increase production from 17,000 t/y of electrolytic nickel to 20,000 t/y in Niquelandia, Goiás.

Tin

Production of tin-in-concentrate increased by 4.3% to 13,773 t. Mamoré (Paranapanema group) produced 8,827 t, Ebesa 3,279 t, Cesbra 707 t and small miners 970 t. Refined output increased by 8% to 13,823 t. Mamoré produced 11,126 t, Cesbra 1,226 t, Best 531 t and small companies 940 t. Exports rose 9.8% to 7,124 t, and were shipped mainly to the US (80%), Argentina (10%), Chile (5%), Belgium (2%) and Israel (1%). Accordingly, earnings from tin exports rose by US\$3.28 million to US\$35 million. Mamoré should begin the construction of a 26 MW

hydroelectric plant at its Pitinga mine in Amazon.

Zinc

Zinc metal output rose in 2000 by 2.5% to 192,000 t. Cia Mineira de Metais (Votorantim group) produced 110,684 t (57.7% of the total) up 1.2% from 1999, mainly from domestic concentrate, in the Tres Marias metallurgical plant. Output from Cia Paraibuna de Metais at its Juiz de Fora complex in Minas Gerais rose by 4.5% to 81,100 t (42.3% of the total) but relied wholly on imported concentrate. To meet primary zinc demand of about 190,000 t/y, imports of zinc in all forms in 2000 totalled 26,575 t a 25% increase in volume compared with 1999 and 25.5% higher in value (US\$31 million). With zinc exports in 2000 totalling 24,548 t the trade deficit was 2,027 t valued at US\$2.06 million. Imports of zinc concentrate decreased 13.6% to 186,945 t worth US\$64.4 million, compared with 216,287 t worth US\$72.9 million in 1999.

Cia Mineira de Metais continues with its US\$160 million expansion programme, started in 1998, at the Vazante and Morro Agudo mines and the Tres Marias plant, which will increase capacity from the current 114,000 t/y to 160,000 t/y by the end of 2001. Feasibility studies for a second expansion stage aiming for 240,000 t/y have already started. Cia Paraibuna de Metais, with the inauguration of its 60 MW Sobragi hydroelectric plant completed, will start construction of the 50 MW Picada hydroelectric plant (that should be completed in 2005), and an expansion programme of US\$120 million to increase capacity from the current 90,000 t/y to 190,000 t/y.

The growth of zinc consumption in Brazil in the 1990s has been higher than the growth of GDP and it should continue growing at 3.2% annually up to 2005. In 2000, two continuous galvanising lines were commissioned to assist the automobile industry: Galvasud of Cia Siderurgica

Nacional/Thyssen and Unigal of Usiminas/Nippon Steel. In 2001, a new line should be inaugurated by Cisa of Cia Siderurgica Nacional in Araucaria, Paraná, to assist with the market for domestic utilities. In Brazil, in 1997, 4.1 kg of zinc were used by each automobile, while in the US the consumption was 8.2 kg. The forecast is that starting from the year 2000 Brazilian usage will increase to 6.8 kg.

Phosphate

Domestic production of phosphate rose 9% in 2000 to an estimated 4.7 Mt of concentrate. Four companies account for 94% of production: Fosfertil (Fertifos group) 34%, Fertilizantes Serrana (Bunge International group) 30%, Ultrafertil (Fertifos group) 15%

| Brazilian Mineral Production (*000t except where stated) | | | |
|--------------------------------------------------------------------|-------------------------|-------------------------|-------------------------|
| Commodity | 1998^r | 1999^r | 2000^p |
| Iron ore | 207,000 | 194,000 | 200,000 |
| Bauxite | 11,900 | 13,800 | 14,100 |
| Coal ¹ | 5,570 | 5,720 | 6,790 |
| Phosphate ² | 4,420 | 4,300 | 4,700 |
| Manganese ² | 2,150 | 1,640 | 2,100 |
| Copper ³ | 34.4 | 31.4 | 31.0 |
| Tin ³ | 14.2 | 13.2 | 13.8 |
| Chromium ⁴ | 161 | 190 | 190 |
| Nickel ⁵ | 26.4 | 32.3 | 32.0 |
| Niobium ⁶ | 33.8 | 42.7 | 42.0 |
| Potassium ⁷ | 326 | 348 | 336 |
| Zinc ³ | 87.5 | 98.6 | 99.0 |
| Gold (kg) | 49,000 | 43,000 | 48,000 |
| Asbestos | 198.3 | 188.4 | 200.0 |
| Kaolin ² | 1,370 | 1,520 | 1,800 |
| Fluorite | 61.0 | 38.2 | 35.0 |
| Gypsum | 1,630 | 1,450 | 1,700 |
| Magnesite ² | 308 | 260 | 300 |
| Natural gas (Mm ³) | 10,411 | 11,456 | 12,810 |
| Petroleum (*000 m ³) | 57,321 | 64,614 | 72,587 |

^r Revised; ^p Provisional

¹ Marketable Coal, ² Concentrated or Beneficiated,

³ Metal content, ⁴ Cr₂O₃ content,

⁵ Electrolytic nickel and metal content in ferro-nickel alloy,

⁶ Nb₂O₅ content, ⁷ K₂O content

Source: 1998/1999-DNPM/DEM ;

2000 several sources assembled by the author

and Copebras (Anglo American) 15%. Fosfértil and Ultrafértil were reorganised at the end of 2000, seeking integration into one administration only, which will be responsible for the production of 50% of Brazilian output of phosphate concentrate, among other products. The principal shareholders are Fertifós (79%) and CVRD (11%). Fertifós is controlled by the Bunge group controller of Serrana (52%), Cargill (33%) and Fertibrás (13%). In July 2000, Adubos Trevo transferred control to Norsk Hydro. This solved its financial problems and saved it from insolvency. In 2001, the company intends to increase its participation in the fertiliser market from 7% to 8.5%. The potential for demand growth in the Brazilian fertiliser market is enormous. The country (16 Mt/y) should soon take third place in the world behind China (34 Mt) and the US (20 Mt). In 2000, fertiliser production increased by about 5% to 7.9 Mt, and imports also increased, by 47%, to 10,335 Mt. Fertiliser sales totalled 16 Mt, 17% above the previous year, and in 2001 they are forecast to reach 16.7 t.

Oil

Agencia Nacional do Petróleo (ANP) staged its second auction of oil exploration permits and the results were considered, as in the first, very good. A total of 48 oil companies (42 foreign companies) participated in bidding for 23 areas (13 offshore and 10 land). No offers were received for 2 blocks, BT-AM-1 in the Amazon basin and BM-S-11 in the Santos basin, offshore. Some US\$468.2 million was bid for the 21 sold, a 45% increase from the previous auction.

In 2000, average production was 1.27 Mbb/d, 6.7% higher than in 1999 and 2% lower than the target

of 1.3 Mbb/d. Petrobrás registered (December 30, 2000) a new national record of daily production of petroleum, reaching 1,531,635 bbl. The previous record was on December 14 when production passed 1.5 Mbb/d. The output of Petrobrás, in the last days of 2000, was 1,744,000 bbl/d (equivalent) if one considers its domestic production of natural gas and the production of 68,000 bbl of equivalent oil originating from its international operations. The US\$2 billion, 3,300 km natural gas pipeline from Bolivia to Brazil started operation and will increase the supply of natural gas to southern and south-eastern states to 8 million m³/d up to 2005, to 16 million m³/d from 2005 and to 30 million m³/d from 2010. At present, the natural gas share of Brazil's energy mix is 2.6%, but in 2010 it will be around 12 %.

| Brazilian Mineral Exports ('000t and US\$ million) | | | | |
|----------------------------------------------------|-------------------|---------|-------------------|---------|
| Commodity | 1999 ^r | | 2000 ^p | |
| | Volume | Value | Volume | Value |
| <i>Metallic:</i> | | | | |
| Iron ore | 139,800 | 2,746.0 | 158,000 | 3,048.2 |
| Bauxite | 4,500 | 115.7 | 4,170 | 113.1 |
| Manganese | 510 | 26.1 | 1,020 | 46.5 |
| <i>Non-metallic</i> | | | | |
| Asbestos | 49.4 | 24.3 | 63.1 | 27.5 |
| Kaolin | 1,160 | 123.2 | 1,390 | 151.5 |
| Graphite | 11.3 | 17.9 | 18.0 | 19.0 |
| Magnesite | 66.9 | 9.0 | 79.0 | 10.5 |
| <i>Semi-Finished:</i> | | | | |
| Iron-steel | 10,032 | 2,397 | 9,617 | 2,752.0 |
| Aluminium | 890 | 1,266.8 | 890 | 1,488.7 |
| Tin | 6.5 | 31.71 | 7.1 | 34.99 |
| Copper | 77.3 | 127.5 | 70.8 | 137.45 |
| Silicon metal | 123.2 | 136.7 | 154.0 | 167.16 |
| Nickel ¹ | 32.3 | 115.0 | 28.5 | 161.68 |
| Ferro-manganese | 82.0 | 32.5 | 133.4 | 57.94 |
| Ferro-chrome | 4.8 | 4.7 | 0.135 | 0.26 |
| Ferro-niobium | 26.6 | 234.0 | 28.0 | 244.04 |
| Ferro-silicon | 160 | 104.8 | 182 | 112.09 |
| Zinc | 26.5 | 28.97 | 24.5 | 28.90 |

^r revised, ^p provisional, ¹ Except nickel content in ferro-nickel.
Source: MME/SMM; SECEX-MDIC