

MOZAMBIQUE

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In recent years, the mineral industry of Mozambique has produced aluminum and gold and such industrial minerals as bauxite, bentonite and other clays, gemstones, graphite, and salt. The country has also produced coal, natural gas, and such building materials as cement, gravel, marble, and sand. Deposits of asbestos, copper, diatomite, feldspar, fluorspar, gypsum, iron ore, limestone, manganese, mica, nepheline syenite, perlite, phosphate rock, rare earths, silica sand, tantalum, and titanium are also known to occur in Mozambique.

The International Monetary Fund (2002b, p. 174) estimated that Mozambique's gross domestic product (GDP) grew by 13.9% in 2001 compared with 1.6% in 2000, 7.5% in 1999, and 12.6% in 1998. Construction accounted for 11.7% of the GDP; manufacturing, 10.7%; electricity and water, 2.1%; and mining, 0.3%. The GDP at purchasing power parity amounted to \$17.8 billion in 2001, and the per capita GDP at purchasing power parity was about \$1,000. The GDP at market exchange rates was nearly \$3.6 billion (International Monetary Fund, 2002a, p. 6; 2002a§¹-c§).

The value of output in the mining sector increased by 11.8% in 2001 after decreasing by 29.4% in 2000 and 6.3% in 1999. The contraction of the mining sector in 1999 and 2000 was partially attributable to the closure of the Ancuabe graphite mine and severe flooding. In 2001, the construction sector grew by 53.6% after growing by 1.5% in 2000, 3.5% in 1999, and 26.1% in 1998. The rapid growth of the construction sector in 2001 was partially attributable to the recovery from the floods in 2000 (International Monetary Fund, 2002a, p. 7; Mozambique News Agency, 2002§).

Commodity Review

Metals

Aluminum.—The Mozal aluminum smelter, which used alumina imported from western Australia as raw material, increased output to 266,000 metric tons (t) in 2001 from 53,800 t in 2000 (table 1). Mozal was jointly owned by BHP Billiton plc (47.11%), Mitsubishi Corporation (25%), Industrial Development Corporation of South Africa Ltd. (IDC) (24.04%), and the Government of Mozambique (3.85%).

The smelter has had substantial effects on the economy of Mozambique. In 2001, exports of aluminum ingots produced at Mozal amounted to \$383.5 million; this was about 54% of total export earnings. Without Mozal, total exports would have increased by 5.4% instead of 93.3% in 2001. A new port was constructed at Matola to handle Mozal's exports, as well as a new road and bridge. The construction of the first phase of

Mozal consumed about 25,000 t of steel and 235,000 cubic meters of concrete. Work on the second phase of Mozal (the Mozal 2 project) contributed to the high rate of growth in the construction sector in 2001 (Engineering & Mining Journal, 2001; Mozambique News Agency, 2002§).

The Mozal 2 project was expected to double Mozal's rated capacity to 506,000 metric tons per year (t/yr) by late 2003. International loans accounted for \$600 million of the financing for this project, including \$250 million from South Africa and \$150 million from France. Billiton provided the remaining \$400 million (Africa Mining Intelligence, 2001a).

A small bauxite mine in Manica Province was operated by E.C. Meikles (Pty.) Ltd., Zimbabwe. In 2001, output increased to 8,600 t from 8,130 t in 2000 (table 1). All of Mozambique's bauxite production was exported in 1999 and 2000 (Afonso Mabica, Mozambique National Directorate of Mines, written commun., 2001).

Gold.—Mozambique's gold resources were located in lode and placer deposits throughout the country. Gold was produced in Manica, Nampula, Niassa, and Tete Provinces by artisanal miners. Officially reported production of gold increased to 23 kilograms (kg) in 2000 from 6 kg in 1997 (table 1). Exports of gold amounted to 8 kg in 1999 and 17.4 kg in 2000. From 1997 to 2000, about 60% of officially reported gold production originated in Manica. Most of Mozambique's gold production was not included in official figures; actual output was estimated to be about 360 kilograms per year (kg/yr) to 480 kg/yr (Dreschler, 2001, p. 46, 48; Afonso Mabica, Mozambique National Directorate of Mines, written commun., 2001).

In Manica and parts of Niassa, mercury was used intensively to recover fine particles of gold; this caused air and water pollution. Other environmental problems associated with artisanal gold mining included soil erosion and water siltation. The Government is attempting to train miners to use less environmentally harmful methods of gold recovery (Dreschler, 2001, p. 42, 44, 54).

In 2000, Twigg Minerals plc carried out geochemical soil sampling in the Namama Belt near Majele. In March 2001, the Government awarded Twigg a prospecting license for the Majele area. The company already held several reconnaissance licenses in the Namama Belt. In June, Twigg announced its intention to raise additional working capital to fund further gold exploration in Mozambique (Resource Information Unit, 2001).

Kenmare Resources plc held two exploration licenses in the Niassa Province. In 1998, the company deferred work on these licenses owing to low gold prices and logistical difficulties. Kenmare searched for a joint-venture partner, but in September 2001, the company announced its intention to dedicate all remaining resources to the Moma Titanium Minerals project (Africa Mining Intelligence, 2001b; Resource Information Unit,

¹References that include a section twist (§) are found in the Internet References Cited section.

2001).

Iron and Steel.—The Maputo Iron & Steel Project (MISP) was a joint venture between Enron Corp. and a consortium of five steel and engineering companies to build a steel plant in Maputo. Enron held a 50% stake in the project, and the remaining 50% was shared by Duferco SA of Switzerland, Kobe Steel Ltd., Midrex Technologies, Inc., Tecnica Internazionale SpA of Italy, and Voest-Alpine Industrieanlagenbau GmbH & Co. of Austria. The MISP was expected to produce 2 million metric tons per year of semimanufactured steel slabs from imported iron ore. Construction was expected to start at the beginning of 2002 and be completed in early 2005 (Metal Bulletin, 2001a).

In May 2001, Enron signed an implementation agreement with the Government for the MISP. However, the consortium disbanded, and Enron suspended development on the MISP in November. Enron filed for bankruptcy in December, and no other company expressed an interest in the project (Metal Bulletin, 2001a, 2002).

In 2001, India's Tata Iron & Steel Company Ltd. discussed the possibility of setting up a project for high carbon ferrochrome in Mozambique. The cost of the project was estimated to be \$64 million (Metal Bulletin, 2001c).

Tantalum.—Hegemony Resources operated the Naquissupa open pit tantalite mine, which was located in the Gilé District of Zambezia Province. The Naquissupa Mine employed 195 workers and had a capacity of 120 tons per hour of ore. The mine was expected to have a life of 15 years. In 2001, the Government announced that the Marropino, the Morrua, and the Muiane tantalite mines would be reopened by 2003. These mines occurred in pegmatites in the Alto Ligonha district (Mozambique on-line, 2001§).

Twigg Minerals plc explored for tantalum on its properties in the Namama Belt and was seeking a joint-venture partner. Alvorada de Mozambique Lda also explored for tantalum. In 2001, Longreach Gold Oil Ltd. reached a conditional option agreement with a company holding tantalum mining and exploration licenses. Longreach would be able to acquire a 25% interest in the tantalum projects (Minerals Gazette, 2001; Resource Information Unit, 2001).

Titanium and Zirconium.—The Corridor Sands project was based upon 10 deposits of heavy-mineral sands near Chibuto in southern Mozambique. Western Mining Corp. (WMC) of Australia held a 60% interest in the project, and Southern Mining Corp. of Johannesburg, 40%. WMC indicated that its feasibility study on Corridor Sands was likely to be completed in the first half of 2002. If the results of the study were favorable, production would start in the first half of 2005. WMC hoped to produce 375,000 t/yr of titanium slag, 195,000 t/yr of iron, 30,000 t/yr zircon, and 12,000 t/yr rutile from 2005 through 2008. By 2017, the company planned to produce 1 million metric tons per year (Mt/yr) of titanium slag, 520,000 t/yr of iron, 110,000 t/yr zircon, and 32,500 t/yr rutile (Smith, 2002, p. 16, 25, 27).

Kenmare Resources plc held a mining license for the Moma mineral sands. According to the company's feasibility study

completed in 2001, the Moma project was likely to require an investment of \$160 million and to produce a cash flow of more than \$50 million per year. Kenmare planned to start production in 2004 and produce 625,000 t/yr of ilmenite, 24,000 t/yr of zircon, and 12,500 t/yr of rutile. Resources at Moma were capable of sustaining the project at this rate of production for at least 20 years. Kenmare was negotiating with potential customers and planned to seek funding from institutions and commercial banks (Mining Journal, 2001; Kenmare Resources plc, 2002, p. 5-6).

Industrial Minerals

Bentonite and Other Clays.—Bentonite was mined at Boane in southern Mozambique by Cia Desenvolvimento Mineira, which was operated by a group of local investors. Production of crude bentonite increased to 16,144 t in 2000 from 12,625 t in 1997 (table 1). Exports of processed bentonite amounted to 480 t in 1999 and 172 t in 2000 (Afonso Mabica, Mozambique National Directorate of Mines, written commun., 2001). Mozambique also had deposits of kaolin and other clays.

Cement.—Cimentos de Portugal, SGPS, SA held a 51% stake in Cimentos de Mocambique SARL, which was the country's only cement producer. The Dondo, Matola, and Nacala plants had a combined clinker grinding capacity of 585,000 t/yr. In 2001, Cimentos de Portugal started the construction of a new clinker grinding facility at the Matola plant. Other planned upgrades at Matola included the overhaul of the crushing plant, the remodeling of the cement silos, and the construction of new bagging facilities and hangers to store clay and limestone. The capacity expansions at Matola were expected to increase domestic cement capacity to nearly 900,000 t/yr (International Cement Review, 1998; Cimentos de Portugal, SGPS, SA, 2002, p. 3, 61).

Mozambique's consumption of cement was estimated to have increased to 504,000 t in 2001 from 415,000 t in 2000, 360,000 t in 1999, and 313,000 t in 1998. Cimentos de Portugal's share of the domestic market was 84%. Nearly one-half of domestic cement demand was met through imports (Cimentos de Portugal, SGPS, SA, 2001, p. 78; 2002, p. 62).

Diamond.—The Portuguese company TAMEGA held a diamond prospecting license in the Niassa Province. TAMEGA also indicated an interest in exploring for diamonds along the Limpopo and Pafuri Rivers (Mining Annual Review, 2001).

Gemstones.—Alvorada de Mozambique Lda held mining licenses for the Maria III and Maria Norte Mines, which produced aquamarine, emerald, garnet, and tourmaline. Operations started at the Maria III mine in October 2000 and continued through at least December 2000. Other gemstone production in recent years included amethyst, emerald, and rose quartz from Alto Ligonha; aquamarine from Macula, Mocuba, Monapo, and Muiane; garnet from Cuamba; and tourmaline from Muiane, Nacala, and Naipa (Alvorada de Mozambique Lda, [undated]a, b; Shigley and others, 2000, p. 311, 318, 320-322).

Most of Mozambique's gemstones were produced by artisanal miners and were sold to unlicensed traders. The gemstone trade

was dominated by dealers from South Africa and some West African countries; other dealers came from Germany, Taiwan, and the United States (Dreschler, 2001, p. 47).

Graphite.—The Ancuabe graphite mine in Cabo Delgado Province was placed on care and maintenance by Kenmare in October 1999. Kenmare had been attempting to secure the working capital needed to reopen the mine, but in September 2001, the company announced plans to dedicate all its remaining resources to developing the Moma Titanium Minerals project (Africa Mining Intelligence, 2001b).

Salt.—Producers of salt in Mozambique included Afrisal do Mar SARL, Industria Salineira De Hiozazane, Salina Fragoso, Salina Raio Solar, and Salina Zacarias. Mozambique exported salt to Lesotho, Malawi, Swaziland, and Zimbabwe. In 2000 and 2001, damage to equipment and the loss of evaporation ponds from flooding caused the salt industry to shut down. The United Nations Industrial Development Organization and the Government aided salt producers with the rehabilitation of equipment and the long-run development of the industry.

Mineral Fuels

Coal.—Mozambique had substantial deposits of coal, including Maniamba, Minjova, Moatize, and Mucanha-Vuzi. Small amounts of coal were mined from Moatize by Carbomoc, which was a state-owned company, and exported to Malawi. Exports of coal amounted to 20,502 t in 1999 and 29,010 t in 2000 (Afonso Mabica, Mozambique National Directorate of Mines, written commun., 2001).

The Government planned to raise nearly \$1 billion to rehabilitate the Moatize coal mines, repair the Sena railway line, and build facilities in the port of Beria. The Brazilian iron ore producer Companhia Vale do Rio Doce was approached by the Government for a loan (Africa Mining Intelligence, 2001c).

Natural Gas.—The Pande gasfield was exploited on a small-scale basis for domestic consumption. In 2001, Sasol Ltd. signed deals with the Government regarding construction and ownership of a \$1.2 billion pipeline to transport gas from Mozambique to South Africa. The project would also develop the Pande and Temane gasfields. Sasol would hold a 50% stake in the project and the Governments of Mozambique and South Africa would hold 25% each.

Production of gas would reach a rate of 5.7 million cubic meters per day in 2004; the Temane field would be the first field to go into large-scale production. Revenues from the project were expected to be about \$400 million per year. Roughly 10% of the gas produced from the Pande and Temane fields was expected to be consumed domestically (Africa Energy & Mining, 2000a). The collapse of Enron and the Maputo Iron and Steel Project forced Sasol to seek alternative customers.

Petroleum.—Mozambique produced neither crude petroleum nor refined petroleum products and relied on imports, which were sourced mainly from South Africa. The country consumed an estimated 3.29 million barrels of petroleum products in 2000.

Infrastructure

Mozambique had installed electrical generating capacity of 2,313 megawatts (MW); the Cabora Bassa dam accounted for 2,075 MW. Another dam was to be built on the Zambezi River at Mepanda Uncua with a capacity of 1,200 MW to 2,400 MW. Mozambique's exploitable potential hydroelectric energy has been estimated to be 14,000 MW. In 2001, exports of electricity fell to \$57.3 million from \$67 million in 2000 and \$62.9 million in 1999. Exports of electricity amounted to 8% of Mozambique's total exports (Africa Energy & Mining, 2000b; International Monetary Fund, 2002a, p. 35).

MOTRACO (a consortium formed by Electricidade de Mozambique, Eskom, and the Swaziland Electricity Board) provided the power for the Mozal smelter. South Africa had been the source of power for Mozal; Mozambique would provide most of the electricity in the future. Mozal was expected to consume 900 MW of capacity after its expansion in 2003. The smelter's demand for power was expected to accelerate the development of new hydropower projects in Mozambique, including the dam at Mepanda Uncua (Mozambique News Agency, 2001§).

Mozambique had about 30,400 kilometers (km) of roads, of which approximately 5,700 km was paved; the rail network covered about 3,100 km. The country had 306 km of crude petroleum pipelines and 289 km of petroleum products pipelines; the pipeline from Beira to Harare carried petroleum products to Zimbabwe. Ports and harbors were Beira, Inhambane, Maputo, Nacala, Pemba, and Quelimane; navigable waterways covered about 3,750 km.

Outlook

The International Monetary Fund (2002b, p. 174) predicted that Mozambique's GDP would increase by 9% in 2002 and 5.6% in 2003. The mining sector was expected to grow by 15% per year from 2002 to 2005. In 2002, rapid growth was likely to continue in the construction sector; most of this increase would be attributable to the Mozal 2 project. By 2003, Mozal's cash costs were expected to be among the lowest in the world due to low electricity costs and economies of scale. Global primary aluminum consumption was expected to fall by about 0.8% in 2002 and increase by 4.9% in 2003. Worldwide primary aluminum smelter capacity was expected to increase by 1.9% per year in 2002 and 2003. Consumption of cement was expected to reach 1 Mt/yr by 2005, and demand for other building materials, such as clays, gravel and crushed rock, limestone, and marble, would be likely to increase as well. Coal production could increase significantly if the rail link between the Moatize Mine and the port of Beira were restored (International Cement Review, 2001; International Monetary Fund, 2001, p. 34; Metal Bulletin, 2001b; SG Securities, 2001, p. 5).

The outlook for gold and titanium minerals depended heavily upon global market trends. Modest decreases in gold mine production by 2003 were likely to be offset by falling demand. Demand for titanium dioxide pigment is expected to increase by about 3% to 4% per year from 2002 to 2006 (Gambogi, 2001; SG Securities Ltd., 2001, p. 22).

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TABLE 1
MOZAMBIQUE: PRODUCTION OF MINERAL COMMODITIES 1/

(Metric tons unless otherwise specified)

Commodity 2/	1997	1998	1999	2000	2001 e/
Aluminum:					
Bauxite	8,218	6,130	7,883	8,130	8,600 3/
Metal, refined	--	--	--	53,800	266,000 3/
Cement, hydraulic thousand tons	220	212 r/	216 r/	270 r/	265 3/
Clays, bentonite:					
Crude	12,625	10,448	10,828	16,144	17,700
Processed	NA	NA	360	274	300
Coal, bituminous	-- r/	-- r/	8,573	16,115	17,700
Gemstones, semiprecious:					
Cut stones, all types carats	5,168	5,303	5,000 r/ e/	3,500 r/ e/	3,900
Rough stones kilograms	1,091	1,465	1,400 r/ e/	1,000 e/	1,100
Gold 4/ do.	6	17	19	23	25
Graphite, concentrates	5,125	5,889	4,007	--	--
Gravel and crushed rock cubic meters	123,532	282,832	265,000 r/ e/	187,000 r/ e/	209,000
Marble:					
Block do.	251	117	110 r/ e/	75 r/ e/	85
Slab square meters	13,820	2,736	2,600 r/ e/	1,800 r/ e/	2,000
Natural gas million cubic meters	--	60 3/	60 r/ 3/	60 r/ e/	60
Salt, marine e/	73,000 r/	88,000 r/	82,000 r/	7,000 r/	10,000

e/ Estimated; estimated data are rounded to no more than three significant digits. r/ Revised. NA Not available. -- Zero.

1/ Data available through September 5, 2002.

2/ In addition to the commodities listed, construction materials (other clays, sand and gravel, and stone) and tantalum were produced. However, output is not reported quantitatively, and information was insufficient to make reliable estimates.

3/ Reported figure.

4/ Does not include unreported production; total output of gold was estimated to be roughly 360 to 480 kilograms per year.

TABLE 2
MOZAMBIQUE: STRUCTURE OF THE MINERALS INDUSTRY IN 2001

(Metric tons unless otherwise specified)

Commodity	Major operating companies	Location of main facilities	Annual capacity
Aluminum	Mozal SARL (BHP Billiton plc, 47%; Mitsubishi Corporation, 25%; Industrial Development Corporation, 25%; Government, 4%)	Maputo	253,000
Bauxite	E.C. Meikles (Pty.) Ltd.	Monte Snuta	8,500
Bentonite 1/	Cia Desenvolvimento Mineiro	Boane	NA
Cement	Cimentos de Mocambique, SARL (Cimentos de Portugal, SGPS, SA, 51%)	Dondo, Matola, and Nacala	585,000
Coal, bituminous	Carbomoc	Moatize	60,000
Graphite 2/	Kenmare Resources plc	Ancuabe	10,000
Marble, block cubic meters	Marmonte E.E.	Montepuez	1,500

NA Not available.

1/ Capacity of crude bentonite was estimated to be at least 18,000 metric tons per year based on recent production data.

2/ Production ceased in 1999; on care and maintenance in 2001.