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The Mineral Industries of Africa

By Omayra Bermúdez-Lugo, Philip M. Mobbs, Harold R. Newman, Mowafa Taib, Glenn J. Wallace, David R. Wilburn, and Thomas R. Yager

Mineral production and foreign direct investment in the mineral sector played a significant role in the economies of many of the 57 independent nations, territories, and adjacent islands that make up the continent of Africa. In 2011, Sub-Saharan Africa was home to 5 (Eritrea, Ghana, Liberia, Rwanda, and Zimbabwe) of the world's 20 fastest growing economies. The estimated 2011 annual average gross domestic product (GDP) growth rates for these countries were estimated to be 14.4% in Ghana, 9.4% in Zimbabwe, 8.7% in Eritrea, 8.6% in Rwanda, and 8.2% in Liberia. Mining played a key role in the economic growth of most of these countries. Zimbabwe's mineral sector, for example, accounted for about 12% of the GDP; in Ghana, for 5.5%; and in Liberia, for about 4%. Mining was significant in terms of output and it played an important role in the total trade in goods; in Rwanda, for example, exports of cassiterite (tin ore) accounted for 21% of the value of total exports; columbite-tantalite, 8%; and wolframite (tungsten ore), 3% in 2011. Ghana, Rwanda, and Zimbabwe were also globally significant producers of various minerals. Ghana was among the world's top 10 producers of gold; Zimbabwe accounted for about 7% of world diamond production (by volume), 5% of the world's platinum production, and about 4% of the world's palladium output; and Rwanda accounted for about 14% of world tantalum mine production. In Eritrea, an impending mining boom and the development of metallic deposits in the near future could have a positive effect on the country's economy. Minerals were also central to the economies of many other nations within the continent. In 2011, the mineral sector accounted for about 50% of the GDP of the Republic of the Congo [Congo (Brazzaville)] and Gabon, respectively; 40% of the GDP of Botswana; more than 30% of the GDP of Mauritania; more than 25% of the GDPs of Egypt and Guinea; about 15% or more of the GDPs of the Democratic Republic of the Congo [Congo (Kinshasa)], Namibia, Nigeria, and Sierra Leone; and more than 5% of the GDP of South Africa. The African continent is also richly endowed with mineral reserves and ranks first or second in terms of the volume of world reserves of bauxite, chromite, cobalt, industrial diamond, manganese, phosphate rock, platinum-group metals (PGMs), soda ash, and zirconium (Bray, 2012; Corathers, 2012; Gambogi, 2012; International Monetary Fund, 2012b; Jasinski, 2012; Kostick, 2012; Loferski, 2012; Olson, 2012; Papp, 2012; Shedd, 2012).

Civil unrest and internal armed conflicts (for example, in Côte d'Ivoire), drought (throughout the Sahel region), and strikes (most notably in South Africa), were deterrents to mineral exploration and production and to foreign direct investment in the mineral sector in 2011. In Côte d'Ivoire, a political stalemate that resulted from contested Presidential elections in November 2010 brought the country's economy to a near standstill during the first quarter of the year, which resulted in a decrease in the GDP of nearly 5% in 2011 and a temporary suspension of mining operations throughout the country (International Monetary Fund, 2012b). In South Africa, mining was constrained by strikes at the country's coal, diamond, gold, and platinum mines. More than 300,000 miners demanding higher wages were estimated to have participated in these strikes. Weak infrastructure—in particular, a lack of installed capacity to meet domestic demand for electricity—was another factor undermining the further development of the mineral sector in many Sub-Saharan Africa nations, and particularly in West Africa.

The mineral sector continued to be an important source of export earnings for many African nations in 2011. To promote exports, groups of African countries had formed numerous trade blocs, which included the Common Market for Eastern and Southern Africa (COMESA), the East African Community (EAC), the Economic Community of Central African States, the Economic Community of West African States, the Mano River Union, the Southern African Development Community (SADC), and the West African Economic and Monetary Union. Algeria, Angola, Libya, and Nigeria were members of the Organization of the Petroleum Exporting Countries (OPEC). The African Union, which had 54 African countries as members, was formed to accelerate socioeconomic integration and promote peace, security, and stability on the continent.

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For mineral production statistics—

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- Ethiopia—Ministry of Mines;
- Ghana—Minerals Commission;
- Malawi— Ministry of Natural Resources, Energy, and Environment;
- Mauritania—National Office of Statistics;
- Mauritius—Central Statistics Office and Ministry of Energy and Public Utilities;
- Morocco—Ministry of Energy, Mines, Water, and the Environment;
- Mozambique—Ministry of Mineral Resources;
- Seychelles—Seychelles Energy Commission;
- South Africa—Department of Mineral Resources;

- Sudan—Geological Research Authority of Sudan;
- Swaziland—Central Statistical Office;
- Tanzania—Ministry of Energy and Minerals;
- Togo—Ministry of Mines and Energy; and
- Tunisia—National Institute of Statistics.

For basic economic data—International Monetary Fund.

For mineral consumption data—BP p.l.c.

For exploration and other mineral-related information—Metals Economics Group (MEG) in Canada.

General Economic Conditions

In 2011, Sub-Saharan Africa's GDP increased by 5.2%; however, economic performance varied across the region. In Sub-Saharan oil-exporting countries, which included Angola, Cameroon, Chad, Congo (Brazzaville), Equatorial Guinea, Gabon, and Nigeria, real GDP increased by 6.3%; in middle-income countries, which included Botswana, Cape Verde, Ghana, Lesotho, Mauritius, Namibia, Senegal, Seychelles, South Africa, Swaziland, and Zambia, it increased by 4.5%; in low-income countries, which included Benin, Burkina Faso, Ethiopia, Gambia, Kenya, Madagascar, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, Tanzania, and Uganda, it increased by 5.5%; and in fragile countries (as categorized by the International Monetary Fund and World Bank country classification systems), which included Burundi, Central African Republic, Comoros, Congo (Kinshasa), Côte d'Ivoire, Eritrea, Guinea, Guinea-Bissau, Liberia, Sao Tome e Principe, Togo, and Zimbabwe, it increased by 2.3% (International Monetary Fund, 2012a, p. 2).

The mineral sector's share of the GDP in Sub-Saharan Africa has changed considerably in the past 10 to 15 years. Significant increases in mining output during this time period were reported in fragile countries, in particular in Congo (Kinshasa), Côte d'Ivoire, Liberia, and Zimbabwe; in low-income countries, most notably in The Gambia, Mali, and Tanzania; in middle-income countries, in particular, Lesotho and Zambia; and in oil-exporting countries, of which only Equatorial Guinea reported an increase. In Congo (Kinshasa), for example, mining as a percentage of the GDP increased to 14.7% in 2010 from 10.4% in 2000; in Côte d'Ivoire, to 1.6% in 2010 from 0.2% in 1995; in Liberia, to 1.6% in 2010 from 0.3% in 2000; and in Zimbabwe, to 12.6% in 2010 from 4.7% in 1995. Mining as a percentage of the GDP also increased in The Gambia to 2.8% in 2010 from 1.6% in 2004; in Mali, to 6.4% in 2010 from 1.9% in 1995; in Tanzania, to 2.4% in 2010 from 1.5% in 1998; in Lesotho, to 4.9% in 2010 from 0.1% in 1995; in Zambia, to 10.3% in 2010 from 6.8% in 2000; and in Equatorial Guinea, to 55.6% in 2010 from 32.3% in 1995. The mineral sector's share of the GDP in Sub-Saharan Africa's oil-exporting countries (with the exception of Equatorial Guinea) decreased as follows: in Angola, it decreased to 41.3% in 2010 from 47.8% in 2000; in Congo (Brazzaville), to 28.3% in 2008 from 37.8% in 2002; in Nigeria, to 26.4% in 2010 from 48.5% in 1995; in Chad, to 22.3% in 2010 from 32.7% in 2005; in Gabon, to 21.2% in 2010 from 38.1% in 1995; and in Cameroon, to 5.2% in 2010 from 11.7% in 2000 (International Monetary Fund, 2012a, p. 56).

Investment Data

Foreign direct investment (FDI) inflows to the Africa region as a whole decreased in 2011 to $42.7 billion from $43.1 billion in 2010. This decrease was attributable mostly to divestments from North Africa—in particular, from Egypt and Libya as a result of political instability in those two countries. Inflows into Sub-Saharan Africa, however, increased to $37 billion from $29.5 billion in 2010. These investments were broad-based and included not only investments in the mineral sector but also in the banking, communications, and retail sectors. At a global scale, in 2011, investments in mining were the dominant form of FDI in the least developed countries (LDCs); India was the leading investor in LDCs followed by China and South Africa. In 2011, Africa received about 28% of the world's FDI in new (greenfield) mining projects; South Africa was the leading recipient of these investments. Cross-border mergers and acquisitions and greenfield investments by foreign transnational corporations in Africa, however, decreased during the year.

FDI inflows to North Africa decreased by 50%; by contrast, FDI inflows increased by 36% in West Africa. Ghana and Nigeria were the primary recipients of FDI inflows, although a significant increase in FDI was also reported in Guinea, which was expected to receive about $6 billion from China for investment in the development of Guinea's bauxite and alumina resources. Most FDI in Central Africa went to the oil-exporting countries of Congo (Brazzaville) and Equatorial Guinea; however, weak FDI inflows in Congo (Kinshasa) resulted in an overall decrease of 10.2% in FDI in Central African countries. FDI in the southern Africa region more than doubled in 2011, mostly as a result of an increase in FDI to South Africa. The discovery of natural gas in East Africa is expected to cause FDI inflows in the East African region to increase. Nigeria accounted for 20% of all FDI flows to Africa, which made it the leading recipient of FDI flows to the region (United Nations Conference on Trade and Development, 2012, p. 4–5, 38–41, 64).

Significant investments in the nonfuel and fuel mineral sectors were expected to contribute to future FDI growth in Africa. Some of these projects included investments by China Power Investment Corp. (about $6 billion) to develop bauxite resources in Guinea; Essar Group of India ($4 billion), ArcelorMittal of Luxembourg ($800 million), and Sundance Resources of Australia ($620 million) to develop iron ore mining projects in Zimbabwe, Liberia, and Congo (Kinshasa), respectively; Rare Metal Industries ($2 billion) to develop a manganese-titanium-silicon-zirconium polymetallic deposit in South Africa; Tullow Oil plc of the United Kingdom ($2 billion), Eni S.p.A of Italy and Sasol Petroleum International of South Africa ($1.8 billion), and Noble Energy of the United States ($1.6 billion) to develop petroleum and natural gas projects in Uganda, Mozambique, and Equatorial Guinea, respectively; and Mineral Deposits Ltd. of Australia and ERAMET S.A of France ($516 million) and Sierra Rutile ($52 million) to develop titanium mineral resources in Senegal and Sierra Leone, respectively.

Other significant projects included investments of $850 million by Freeport McMoRan Copper and Gold Inc. of the United States and $700 million by Non-Ferrous China Africa (NFCA) of China to develop copper, lead, nickel, and zinc projects in Congo (Kinshasa) and Zambia, respectively.

Millions of dollars in investments were also planned for the development of an aluminum smelter ($3 billion) and copper deposits (more than $400 million) in Congo (Kinshasa); iron ore resources (more than $6 billion) in Cameroon, Guinea, Liberia, and Sierra Leone; phosphoric and sulfuric acid plants ($671 million) in Jordan; natural gas resources ($900 million) in Kuwait; and a steel plant ($672 million), tantalum-tin-feldspar deposit ($225 million), and petroleum refinery ($3.7 billion) in Egypt. FDI projects in Africa also included investments in the rehabilitation or new construction of infrastructure to support mining activities, such as ports, railways, and roads (ArcelorMittal, 2011; 2012, p. 29, 206; Camara, 2011; Nedbank Group Ltd., 2011; Sierra Rutile Ltd., 2011; Mineral Deposits Ltd., 2012, p. 11–14; United Nations Conference on Trade and Development, 2012, p. 65, 69).

Legislation

The prospects for large-scale investments in mining prompted legislative reform in a number of African countries in 2011. Several countries, including Angola, Congo (Kinshasa), Ghana, Guinea, Namibia, and Sierra Leone introduced new mining legislation during the year.

In Angola, a new Mining Code for nonfuel minerals was enacted on September 23, 2011. Under the new law, the Government will no longer request majority equity in mining projects but rather will retain a minimum 10% free-carried interest in all mining projects. The law also makes a distinction between minerals qualified as ordinary and those considered by the Government to be strategic. Diamond, gold, and radioactive minerals are designated as strategic minerals under the new law, although the Council of Ministers is also granted the power to qualify other minerals as strategic. The Code also provides for the establishment of mining zones with restricted access of persons and (or) goods. A new Private Investment Law, which would require foreign companies to negotiate all tax benefits, was expected to be enacted soon (Clifford Chance LLP, 2011).

In Ghana, the Government introduced new tax measures for mining companies, which were to become effective in 2012, and established a National Renegotiation Team to review all mining agreements in the country. Changes to the tax law were also underway and included an increase in the corporate income tax for mining companies to 35% from 25%, the introduction of a windfall tax of 10%, and a new capital allowance rate of 20% from a previous 80% deduction (Ghana Web, 2011).

A new Mining Code was also passed into law in Congo (Kinshasa), which encouraged private sector development of the mineral sector. The Government also passed Article 33 of Law 11/009, which banned petroleum exploration or production in national parks. In March 2011, the Government lifted the ban on mining in the eastern Provinces of Maniema, Nord-Kivu, and Sud-Kivu, which accounted for most domestic niobium, tantalum, tin, and tungsten production. The ban had been imposed in September 2010 in an attempt to remove military and rebel groups from the local mineral trade. The ban was reportedly removed because of Government-backed efforts to improve oversight of illegal mining in this region and improvements in the traceability of local supplies. In the United States, conflict mineral legislation, as provided by Section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act, requires companies registered with the U.S. Securities and Exchange Commission (SEC) to disclose annually whether or not conflict minerals (which are necessary to the functionality or production of the company's manufactured goods) originated in Congo (Kinshasa) or an adjoining country. These conflict minerals include cassiterite, columbite-tantalite, gold, wolframite, or their derivatives, and any other mineral or its derivatives determined by the Secretary of State to be financing conflict in Congo (Kinshasa) or an adjoining country (De Koning, 2011, p. 31; Thomson Reuters, 2011a; International Crisis Group, 2012, p. 15–16; U.S. Securities and Exchange Commission, 2012). The Government of Katanga Province in Congo (Kinshasa) and the International Tin Research Institute (ITRI) started a certification scheme for domestically produced tantalum, tin, and tungsten to meet end users' requirements of the Dodd-Frank Act (International Tin Research Institute, 2011a, b).

A new Mining Code was also passed into law in Guinea, which replaced the country's 1995 Mining Code. Under the new Code, the Government is entitled to a 15% free-carried interest in all mining projects and has the option to acquire, on a fully paid basis, an additional 20% interest up to a maximum of 35%. The new Code also requires all mining companies to sign a code of conduct and to invest a minimum of $1 billion to obtain a mining concession. Changes to the tax and royalties regime include an increase on the import tax for mining supplies, machinery, and equipment to 8% from 5.6% under the previous Code, a reduction in the tax on dividends to 10% from 15%, and the elimination of certain tax and duties exemptions previously granted to mining companies during the first 5 or 8 years of operation (Le Conseil National de la Transition, 2011, p. 17, 32, 69–70).

In Namibia, the Government announced plans to introduce new legislation that would allow an increase in state participation with respect to the mining of strategic minerals. Under the proposed law, coal, copper, diamond, gold, rare-earth minerals, and uranium would be designated as strategic minerals. The Government also proposed amendments to the tax law, which include a tax rate of 15% on the value of supplied or imported goods, a 5% export levy, and an increase in corporate taxes to 44% from 37.5% (Chamber of Mines of Namibia, 2011, p. 2–3; Maylie, 2011).

In Sierra Leone, the Government signed into law The Petroleum (Exploration and Production) Act (2011). It was also in the process of drafting a Precious Minerals Trading Act that would establish rules concerning diamond cutting and polishing, diamond trading, and taxes on the export of diamond by artisanal miners (Sierra Leone Government Printing Office, 2011, p. 9–15, 23–24, 31).

In South Africa, the Government approved the development of a beneficiation strategy for 11 mineral commodities that was designed to strengthen the value-added component of the mineral sector. The minerals to be included in this plan were chromium, coal, diamond, gold, iron, manganese, nickel, platinum, titanium, uranium, and vanadium. Presently, up to 89% of the potential value of South Africa's raw minerals is reported lost through premature exports (Lazenby, 2011).

The Government of Zambia suspended issuing mining licenses in preparation for an audit of the existing licenses and reviewing the mining tax structure in Zambia. In its 2012 budget, the Government proposed doubling the royalty rate for base metals to 6% and increasing the rate for precious metals to 5% to pay for budgeted social programs (England, 2011; Topf, 2011).

Socio-economic policies aimed at increasing the number of underrepresented or previously disadvantaged black populations in Africa were revised in Namibia and Zimbabwe. In Namibia, new legislation was put in place to replace the country's Black Economic Empowerment policy with the New Equitable Economic Empowerment Framework (NEEEF), which was aimed at promoting the participation of previously disadvantaged Namibians (PDNs) in the country's economic activities. Under the new law, state-owned financial institutions would assist PDNs in buying shares in private firms of existing businesses on commercial or near-commercial terms to be negotiated between buyers and sellers. Special emphasis was to be given to assisting women, youth, and people with disabilities. The new policy also required that financial institutions report to the Government their level of assistance to businesses owned by PDNs (Government of the Republic of Namibia, undated, p. 4–5, 9–11).

In Zimbabwe, the Government published a new regulation under the National Indigenisation and Economic Empowerment Act (IEEA), which requires that 51% of the shares of mining companies operating in Zimbabwe that have a net asset value above $1 be conceded to indigenous Zimbabweans. Under the previous regulation, companies with a net asset value of less than $500,000 were exempt from this requirement. Companies had 45 days from March 25, 2011, to submit indigenization implementation plans to the Ministry of Youth Development, Indigenisation and Empowerment, for approval. The legislation also states that every nonindigenous-majority-owned mining business should achieve the minimum indigenization and empowerment quota (51% interest controlled by approved indigenous entities) through the divestment of shares or interest to designated entities by no later than September 25, 2011. The Government also planned to increase in 2012 mining royalties for gold to 7% from 4.5% and royalties for platinum to 10% from 5%, and to increase exploration fees for coal to $100,000 and diamond to $1 million (Mining Review, 2011; Ministry of Youth Development, Indigenisation and Empowerment, 2011; Thomson Reuters, 2011c, d; Verma, 2011; Government of Zimbabwe, undated).

On April 28, 2011, the United Nations Security Council, pursuant to resolution 1980 (2011), decided to renew the measures preventing the importation by any nation of rough diamond from Côte d'Ivoire as, allegedly, Ivorian diamond continued to reach international markets in violation of the United Nations sanctions regime. The measure was to be reviewed again on April 30, 2012. Reported human rights violations in and around the Marange diamondfields continued to fuel disputes regarding Zimbabwe's membership in the Kimberley Process Certification Scheme (Global Witness, 2011a, b; United Nations Security Council, 2011a, p. 13; 2011b, p. 54–55).

During 2011, Presidential elections were held in Benin, Cameroon, Cape Verde, Central African Republic, Chad, Congo (Kinshasa), Djibouti, Egypt, The Gambia, Liberia, Madagascar, Niger, Nigeria, Sao Tome e Principe, Seychelles, Uganda, and Zambia. South Sudan gained independence from Sudan on July 9, 2011.

Exploration

Exploration activity, as defined by African exploration budgets reported by the MEG, increased by 69% to about $2.4 billion in 2011 from about $1.4 billion in 2010. Based on site data compiled by the USGS, active gold and silver projects in 2011 accounted for approximately 51% of the number of reported African exploration projects; base-metal projects, for about 10%; uranium projects, about 9%; iron projects, about 7%; diamond and PGM projects, about 6% each; and other minerals, the remaining 17%. Early-stage projects made up about 70% of the 2011 activity whereas producing projects accounted for about 17%; feasibility-stage projects, about 8%; and developing projects, about 5%. Exploration was focused primarily in (in descending order based on the number of sites) South Africa, Burkina Faso, Ghana, Namibia, Mali, Tanzania, Congo (Brazzaville), and Guinea, but activity also took place in a number of other countries (Metals Economics Group, 2011).

Exploration activity in Africa in 2011 varied by country as improving commodity prices and renewed investor interest stimulated activity in some areas while mineral development and supply concerns related to electricity shortages and regional unrest limited activity in other areas. Power costs remained a concern in South Africa and Zambia. Electricity prices in South Africa doubled from 2008 through 2011 in nominal terms, and the South African utility Eskom Holdings SOC Ltd. asked the top 500 electricity users, including mining companies, to reduce usage by 10% to avoid power blackouts. Zambia raised the price of electricity for mining companies by 30% (Thomson Reuters, 2011b; England, 2012).

Interest in exploring for African mineral resources continued to increase. Australian companies were involved with nearly 650 mines and in exploration projects in 43 African countries. The International Finance Corp. intended to invest $300 million in mining companies operating in Africa during the next 3 years. Both China and India were investing in natural resource projects in Africa. Chinese investment in the mineral resources of Africa in 2011 was expected to reach $110 billion, primarily through mineral-related infrastructure projects in Angola (2004), Congo (Kinshasa) (2007), Gabon (2006), Guinea (2009), Zimbabwe (2009), and South Africa (2011). Another indication of increasing Chinese activity in Africa is reflected in the increased number of prospecting licenses held by Chinese companies in Botswana. In 2010, three Chinese companies collectively held 143 prospecting licenses in Botswana compared with a very small number in 2008. Indian investment increased from about $1 billion in 1991 to about $35 billion in 2008. A survey of institutional investors conducted by the Economist Intelligence Unit found that two-thirds of the respondents listed Africa as having the greatest opportunity for investment in global frontier markets in spite of its macroeconomic and political risk (Campbell, 2011;

Davenport, 2011; Mguni, 2011; Sergeant, 2011; Swanepoel, 2011; Els, 2012; Juma, 2012).

Exploration activity has increased in Guinea and Sudan. In Guinea, a joint venture between Rio Tinto plc of the United Kingdom and the Aluminum Corporation of China Ltd. was formed to explore and develop mineral properties. Vale S.A. of Brazil formed a joint venture with BSG Resources Ltd. of Guernsey, Channel Islands [United Kingdom], to explore for iron in the Simandou Range of southeastern Guinea. Mineral exploration in northern Sudan was strengthened with the signing of 47 exploration agreements in 2010 for copper, gold, lead, iron, and zinc, to diversify the nation's crude-oil-dependent economy (Thomson Reuters, 2010).

Commodity Overview

In tables 5 through 18, estimates for the production of major mineral commodities for 2014 and beyond have been based upon supply-side information, such as announced plans for increased production/new capacity construction and bankable feasibility studies. The outlook tables in this summary chapter show historic and projected production trends; therefore, no indication is made about whether the data are estimated or reported and revisions are not identified. Data on individual mineral commodities in tables in the individual country chapters are labeled to indicate estimates and revisions. The outlook segments of the mineral commodity tables are based on projected trends that could affect current (2011) producing facilities and on planned new facilities that operating companies, consortia, or Governments have projected to come online within indicated timeframes. Forward-looking information, which includes estimates of future production, exploration, mine development, cost of capital projects, and timing of the start of operations, are subject to a variety of risks and uncertainties that could cause actual events or results to differ significantly from expected outcomes. Projects listed in the following section are presented as an indication of industry plans and are not a USGS prediction of what will take place.

Metals

Aluminum and Bauxite and Alumina.—*Production.—* African bauxite production increased slightly (by 1%) in 2011. Guinea, which was ranked 5th among the world's leading producers of bauxite, accounted for 88% of African bauxite production; Sierra Leone, 8%; and Ghana, 2% (table 5). In 2011, Africa's share of world bauxite production was 7% (table 4).

Despite the reopening of Ghana's aluminum smelter, which operated at 20% of capacity in 2011, African production of refined aluminum remained at the same level as that of 2010. Cameroon, Mozambique, and South Africa also reported small increases in production. South Africa accounted for about 40% of African aluminum output followed by Mozambique (28%) and Egypt (26%) (table 6). Africa accounted for 4% of the world's aluminum production in 2011 (table 4).

*Outlook.—*African bauxite production is likely to increase by an average of nearly 17% per year from 2011 to 2018. Guinea is likely to remain a world leading producer of bauxite and to account for more than 75% of projected African bauxite production for the period between 2014 and 2018. Projected production for Guinea is attributable to the expected opening of the Sangaredi Mine in 2012, the Dian-Dian Mine in 2015, and the Boffa and Koumbia Mines in 2016. Projected production for Ghana is based on the expansion of the Awaso Mine in 2014, and that for Sierra Leone, to the opening of the Porto Loko Mine in 2016 (table 5).

Production of refined aluminum is expected to increase by an average of 1.4% per year from 2011 to 2018. In Ghana, most of the projected increase is attributable to the planned rampup to full capacity of the Valco smelter. Plans to open a new smelter in Ghana remained at an early stage. Projected refined aluminum production for Nigeria is based on production reaching its nominal capacity by 2016 (table 6).

Copper.—*Production.—*Africa's copper mine production increased by about 8% in 2011 compared with that of 2010. In 2011, Zambia accounted for 48% of African copper mine production; Congo (Kinshasa), 39%; and South Africa, 7% (table 7). Africa's share of world copper mine production was 7% in 2011 (table 4). The increase in African copper production was mostly attributable to the opening of the Kipoi Mine and to ramped-up production from mines in Congo (Kinshasa), as well as to the reopening of the Matchless and the Otjihase Mines in Namibia. Output decreased at the Mufulira and the Nkana Mines in Zambia and at the Palabora Mine in South Africa.

Africa's refined copper production increased by about 11% from 2010 to 2011. In 2011, Zambia accounted for 53% of African refined copper production; Congo (Kinshasa), 37%; and South Africa, 9% (table 8). The increase in the production of refined copper was mostly attributable to increased production from the Luilu, the Luita, the Ruashi, and the Tenke Fungurume Mines in Congo (Kinshasa). Egypt was the only producer of secondary refined copper in Africa; primary production accounted for most African production.

*Outlook.—*African copper mine production is expected to increase by an average of about 11% per year from 2011 to 2018 mostly as a result of expansions of copper mine output capacities in Congo (Kinshasa) and Zambia. These expansions include the opening of the Kapulo Mine and the rampup to full capacity of the Kinsevere Mine in Congo (Kinshasa) in 2012, and planned expansions at the Mutanda Mine in 2012, the Katanga Mine in 2013, the Tenke Fungurume Mine in 2013, the Kipoi Mine from 2012 to 2014, and the KTO and Mukondo Mountain Mines from 2012 to 2017 (table 8).

In Zambia, expansions of copper mine output capacities could result in annual copper production exceeding 1 million metric tons per year (Mt/yr) if all planned projects reach their full proposed production levels. Some of these projects included the expansion of the Kansanshi Mine, the Konkola Deep Mine, the Konkola North underground mine, and the Lumwana Mine (table 8).

In Botswana, Discovery Metals Ltd. planned to bring the Boseto Mine into production in 2012 and to further expand production capacity of the mine in 2014. In Eritrea, Nevsun Resources planned to open the Bisha Mine in 2013. In Namibia, the rampup of production at the Matchless and the Otjihase Mines, together with the development of the Tschudi Mine, are expected to account for the projected increase in Namibian

copper production in 2014 and 2016. South Africa's Palabora Mine reserves are expected to be depleted by 2016; however, plans to extend the mine life to 2030 were underway and are expected to counterbalance some of the loss in production by 2018. Additional production in South Africa is expected to come from the expansion of the Nkomati Mine (table 8).

The production of refined copper is expected to increase by an average of about 7% per year from 2011 to 2018. In Congo (Kinshasa), increased production is expected from the expansion of the Luilu Mine in 2013, a new copper solvent extraction and electrowinning (SX/EW) plant at the Kinsevere Mine, and a new SX/EW plant to be built by Eurasian Natural Resources Corp. plc of the United Kingdom. New SX/EW plants are also expected to open at the Mutanda Mine in 2012 and at the Tiger Mine in 2014. Increased production is also expected from the Etoile Mine and the expansion of the Usoke Avenue SX/EW plant. By 2014, Congo (Kinshasa), which did not produce refined copper in 2005, could displace Zambia as the leading producer of refined copper in Africa and could account for more than one-half of the Africa's refined copper output by 2018. Zambia's output is likely to increase as a result of the opening of the Chambishi SX/EW plant (table 9).

Gold.—*Production.*—Africa's gold mine production was about 514,000 kilograms (kg) in 2011, which was an increase of about 7% compared with that of 2010. African gold production, which had decreased significantly in the early 2000s mostly because of the long-term decline in South African gold production, was slowly returning to its 2005 output level. This was mostly the result of the opening of new gold mines and of expansion projects in the West Africa region as well as in Eritrea, Ethiopia, Tanzania, and Zimbabwe (table 9). In 2011, Africa's share of world gold mine production was about 19% (table 4).

In the West Africa region, the increase in production was partly the result of greater output from the Essakane, Inata, Mana, Taparko-Boroum, and Youga Mines in Burkina Faso; the Ahafo, Chirano, Damang, and Iduapriem Mines in Ghana; the Lefa Mine in Guinea; and the Morila, Sadiola Hill, Syama, and Tabakoto Mines in Mali. Additional production came from the opening of the Gounkoto Mine in Mali and the Tongon Mine in Côte d'Ivoire. Guinea's Kiniero Mine was temporarily closed in September 2011 as a result of civil unrest. The Bibiani Mine in Ghana remained closed throughout the year. In South Africa, the long-term decline in the country's gold output continued in 2011. Average ore grades at South Africa's producing mines decreased to about 2.8 grams per metric ton (g/t) gold in 2011 from 4.1 g/t in 2001. In eastern Africa, the increase in gold production was mostly attributable to the commissioning of the Bisha Mine in Eritrea, which added 11,800 kg of gold to Africa's total gold production in 2011, and to an increase in output from artisanal mining operations in Ethiopia (table 9).

In 2011, South Africa accounted for 35% of African gold production; Ghana, 16%; Tanzania, 9%; Mali, 7%; Burkina Faso, 6%, and Sudan, about 5%. South Africa's share of continental gold production decreased to 35% in 2011 from 56% in 2005; that of Mali, to about 7% from 8%; and that of Tanzania, to about 9% from 8%. Burkina Faso's share of continental gold production however, increased to 6% from less than 1% in 2005; that of Ghana, to 16% from 13%; Sudan, to 5% from less than 1%; and Togo, to 3% from 1% (table 9).

Outlook.—Gold mine production in Africa is expected to increase by an average of about 5% per year from 2011 to 2018. The majority of this increase is likely to be attributable to countries in West Africa, in particular Burkina Faso, Côte d'Ivoire, Guinea, Liberia, Mali, Senegal, Sierra Leone, and Togo; and to other countries in the continent, such as Central African Republic, Congo (Kinshasa), Egypt, Mauritania, Namibia, Sudan, and Tanzania. Significant decreases in production are expected to take place by 2018 in Chad and Eritrea.

Burkina Faso is expected to produce about 43,500 kg of gold by 2018 mostly as a result of the opening of a new gold mine in 2014 and the rampup of production at the Bissa, Essakane, and Mana Mines. The Passendro Mine in Central African Republic, which could open in the next 3 to 4 years, is expected to increase African gold production by more than 6,000 kilograms per year (kg/yr). In Côte d'Ivoire, the Agbaou Mine is expected to open in 2014 and the Tongon Mine could ramp up production to about 9,300 kg in 2014. A new gold mine is also expected to open in Gabon in 2012. In Ghana, at least three mines are scheduled to open between 2014 and 2015, and production is expected to increase at the Ahafo, the Damang, and the Tarkwa Mines from 2014 to 2018. The New Liberty gold mine in Liberia could be commissioned in 2014, and a new gold mine, the Kourousa Mine, could open in Guinea in 2016. Excluding production from artisanal mining, gold production in Mali is expected to increase to 49,200 kg by 2014 but to decrease by 8% to 45,300 kg in 2018 partly owing to a projected decrease in production at the Sadiola Mine and the depletion of the Yatela Mine. Gold production in Namibia could increase by 35% once the Otjikoto Mine opens in 2015; production at the mine is expected to ramp up and reach 5,800 kg by 2016. Gold production in Senegal is expected to triple by 2014 following the commissioning of the OJVG Mine, which is expected to come online in 2013, and because of expansion projects at the Sabodala Mine. Production is expected to increase further in 2016 and 2018 when the Masawa Mine is expected to be brought online. Additional production from West Africa is expected to come from the commissioning of the Baomahun and Komahun Mines in Sierra Leone and the Passendro Mine in Togo in 2016 (table 9).

In East Africa, Tanzania's production is likely to decrease to about 39,000 kg by 2014, mostly as a result of the shutdown of the Golden Pride and Tulawaka Mines in 2013. The opening of the Luika Mine in 2012 and the Golden Ridge Mine in 2013 and expansion plans at the Bulyanhulu and the North Mara Mines, however, are likely to counterbalance the loss in production from these two mines. Other new sources of production could include the Nyazaga project, which could open in 2017. In Ethiopia, increased production is likely to be attributable to artisanal miners and the opening of the Tulu Kapi Mine in 2015. The Lega Dembi open pit mine is scheduled to shut down in 2014. Gold-rich zones in the Bisha Mine in Eritrea are planned to be mined in 2012, but production is expected to decrease from 2013 to 2018 as mining shifts to a copper-rich zone. The Koka Mine is also likely to open in late 2013 and to reach a peak production of 4,200 kg by 2015, but production from the

Koka Mine is expected to decrease to about 3,300 kg/yr by 2017 and to remain at that level throughout 2018 (table 9).

In southern Africa, the long-term decline in South Africa's production could be reversed from 2014 to 2018 owing to planned expansions at the Doornkop, the Kusasalethu, the Modder East, the Phakisa, the South Deep, and the Target 1 Mines, among others. These expansions are likely to counterbalance the loss in gold production of about of 37,000 kg from AngloGold Ashanti's South Africa mines. The Savuka Mine was placed on care-and-maintenance status in 2011. Sudan's gold output is expected to increase as a result of the expansion of the Hassai Mine in 2013, and that of Egypt's gold output, to expansions at the Sukari Mine in 2012 and 2013. The Dunrobin and the Matala gold deposits in Zambia could be brought online by 2014. Gold production is also likely to increase in Zimbabwe (table 9).

In Congo (Kinshasa), Banro Corp. of Canada started production at a new gold mine in Twangiza, Sud-Kivu Province, and plans to start production of a new mine in Sud-Kivu Province in mid-2013. AngloGold Ashanti Ltd. of South Africa and Randgold Resources Ltd. of the United Kingdom also plan to open a new mine at Kibali by 2014 (table 9). Gold production could continue to increase significantly in Africa in the next 7 years as dozens of international exploration companies continue to explore for gold throughout the continent.

Iron and Steel.—*Production.*—African production of crude steel decreased by about 7% in 2011 compared with that of 2010. Output increased in Congo (Kinshasa), Morocco, Tunisia, Zambia, and Zimbabwe and decreased in Algeria, Egypt, Libya, Nigeria, and South Africa. South Africa accounted for 47% of regional crude steel production; Egypt, 40%; and Algeria and Nigeria, about 3% each (table 11). Africa's share of world crude steel production amounted to 1% in 2011 (table 4).

Outlook.—Crude steel production is expected to increase by an average of about 9% per year from 2011 to 2018. Nigeria could more than double its production with the reopening of the Ajaokuta plant. Steel production is likely to start in Tanzania with the opening of the Liganga iron ore mine in late 2015, and production is likely to increase in Kenya following the opening of the Devki plant in 2014. Production could also increase in Zimbabwe from 2013 to 2017 as Zimbabwe Iron and Steel Co. restores its capacity and in Algeria as the Government plans to build a 5-Mt/yr steel mill in the Bellara Industrial Zone of Jijel Province. Egypt opened a new steel mill in Suez (table 11).

Iron Ore.—*Production.*—In 2011, the iron content of iron ore produced in Africa was 46.3 million metric tons (Mt), which represented a 2% increase from that of 2010. This increase was attributable to the beginning of iron ore operations in Liberia and Sierra Leone, from increased production in Morocco and Tunisia, and from the reprocessing of the Ngwenya iron ore mine dumps in Swaziland (table 10).

Production in Liberia came from the redevelopment of the western iron ore deposits of an abandoned mine in Nimba County. Production in Sierra Leone came from the resumption of operations at the Marampa Mine after nearly 30 years of being idle and the opening of the Tonkolili Mine.

South Africa was the leading iron ore producer in Africa and accounted for about 80% of continental output followed by Mauritania, which accounted for 16% of production. The slight decrease in production in South Africa was mostly the result of heavy rains, which hindered mining activities at the Kolomela and the Sishen Mines, and to a decrease in production at the Mapoch Mine. Production also decreased in Algeria, Egypt, and Mauritania. Output however, increased at the Beeshoek, the Khumani, and the Palabora Mines in South Africa (table 10).

Outlook.—Africa is expected to nearly double iron ore output by 2014 and to quadruple production by 2018. Most of the increase is likely to be attributable to new production from countries in West Africa—in particular, from Guinea, Liberia, and Sierra Leone—and to the opening of new mines in Tanzania (2013), Kenya (2014), South Africa (2015 and 2016), and Gabon and Mozambique (2016). The balance of the share of iron ore produced in Africa could begin to shift in 2014 as the lead in the share of production moves from southern Africa to Western Africa. In 2014, Guinea could displace Mauritania to become Africa's second-ranked iron ore producer despite Mauritania's own projected substantial increase in domestic production, and Sierra Leone could displace Liberia as the third-ranked producer (table 10).

Production in Guinea is expected to come from the opening of the Forecariah and Zogota Mines in 2012 and the Kalia and Simandou Mines in 2014 and 2016, respectively. The Bong Mine in Liberia is expected to open during the second half of 2013, and the development of the Bomi Hills iron ore deposit is expected to come online in 2014. A bankable feasibility study for the Putu Range was expected to be completed by 2014, and first iron ore production was expected to begin between 2017 and 2018. Several companies explored for iron ore in other areas of Liberia, but these projects were at an early stage of development. The development of the Faleme Mine in Senegal remained on hold (table 10).

In South Africa, production is expected to increase following the completion of expansion projects at the Beeshok and the Khumani Mines in 2012, the opening of the Zandrivierspoort Mine in 2015, the development of the Phoenix project at the Thabazimbi Mine in 2016, and the expansion of the Kolomela Mine in 2017. Production is also likely to increase at the Mapoch, the Palabora, and the Shishen Mines. Mauritania could open five new mines in the next 5 years. Other production is expected to come from expansion projects at the Guleb el Rhein, the Kedia d'Idjill, and the M'Haoudat Mines in 2014, and from the opening of the Liganga Mine in Tanzania in 2013; the Devki Mine in Kenya in 2014, and the Tete Mine in Mozambique in 2016 (table 10). Because of the projected developments in West Africa's iron ore sector, South Africa's share is likely to decline to about 50% in 2014 from about 79% in 2010. South Africa's share of production is likely to decline further to 31.7% and 26.8% in 2016 and 2018, respectively, despite the projected substantial increase in domestic production (table 10).

The extent to which iron ore projects in Sub-Saharan Africa are or are not developed will largely depend on the financing and development of road, railway, and port infrastructure. Establishing a rail corridor to transport iron ore to major ports remains one of the greatest challenges to the development of iron ore projects. Although many iron-rich countries in Africa have existing railways and ports that can be used to transport

mineral goods, segments of these railways are in need of repair, and some ports require capacity expansions to accommodate new production. Therefore, significant infrastructure requirements, including the rehabilitation of connecting roads, have to be met before many of these projects can come online. In Guinea, for example, although the Simandou project has the potential to improve the Guinean economy, this project alone would require the development of about 670 km of the Trans-Guinean railway and the construction of a new deepwater port south of Conakry. Many of the other iron ore projects under consideration would also require similar types of investments and development.

Platinum-Group Metals.—*Production.*—From 2010 to 2011, Africa's production of palladium and platinum increased by 2% and 1.3%, respectively. South Africa accounted for about 91% of regional palladium production and 93% of platinum production, and Zimbabwe, for about 9% and 7%, respectively. In South Africa, the increased palladium and platinum production in 2011 was mostly attributable to the Everest, the Nkomati, the Pilanesburg, the Smokey Hills, the Western Platinum, and the Zondereinde Mines (tables 12, 13).

Labor disputes in South Africa hindered various palladium and platinum operations during the year and were reportedly responsible for a 30% decrease in platinum production at the Crocodile River Mine and for damaged equipment at the Pilanesburg Mine. Plans to reopen the Blue Ridge Mine were canceled in June 2011 (tables 12, 13).

Outlook.—African mine production of palladium and platinum is expected to increase by an average of 2% and 1.2% per year, respectively, from 2011 to 2018. In South Africa, the increase is likely to be broad based, with many producers planning expansions. These projects include the opening of the Mareesburg Mine and increased production at the Pilanesburg and the Zondereinde Mines in 2012; the opening of the Booysedal, the Rooderport, and the Western Bushveld Mines and the expansion of the Marula and the Western Platinum Mines in 2013; the opening of the Styldrift Mine and the expansion of the Impala, the Nkomati, and the Smokey Hills Mines in 2014; and the expansion of the Elandsfontein Mine in 2015. The opening of the Wesizwe Mine and planned expansions at the Bokoni Mine are expected to be completed by 2018. In Zimbabwe, the Unki Mine is expected to ramp up production to about 2,200 kg of palladium and 2,100 kg of platinum by 2013, and phase II of the Zimplats expansion project is expected to be completed in 2014 (tables 12, 13).

Tin.—*Production.*—In 2011, African tin mine production decreased by about 30% compared with that of 2010. Most of Africa's tin mine production in 2011 came from the mining of cassiterite in Congo (Kinshasa), which accounted for about 53% of the regional output. Tin was also produced in Rwanda, which accounted for 40% output; in Nigeria, which accounted for about 7%; and in small quantities in Burundi and Niger. In Congo (Kinshasa), tin mine production at the artisanal and small-scale level was hindered by flooding at open pit mines in Maniema, Nord-Kivu, and Sud-Kivu Provinces (table 14). Africa did not produce refined tin in 2011. Reported production of tin metal ceased in Nigeria and in Rwanda in 2005 and 2006, respectively (table 15).

Outlook.—African tin mine production is expected to increase by about 30% from 2011 to 2014 as a result of the opening of the Abu Dabbab tin and tantalum mine in Egypt in 2013. The ban imposed in late 2010 on tin mine production in Maniema, Nord-Kivu, and Sud-Kivu Provinces in Congo (Kinshasa) was lifted in March 2011. Provisions of the Dodd-Frank Wall Street Reform and Consumer Protection Act could affect the demand for Congolese tin. Egypt is likely to open the Abu Dabbab tin and tantalum mine by 2013. Plans to open a tin refinery in Congo (Kinshasa) could result in Africa resuming tin metal production by 2014 (table 14, 15).

Industrial Minerals

Diamond.—*Production.*—In 2011, Africa's rough diamond production increased by about 3% compared with that of 2010, and its share of world rough diamond production, by volume, was 56% (table 4). Botswana, Congo (Kinshasa), and Zimbabwe were the continent's leading producers of rough diamond by volume. Based on Kimberley Process Certification Scheme (KPCS) statistics for 2011 (which may differ slightly from data reported in table 4 owing to rounding), these countries accounted for 18%, 16%, and 7%, respectively, of world rough diamond production by volume. Botswana also accounted for 27% of world production by value. Angola was also a significant African rough diamond producer and, in 2011, accounted for 8% of world production of rough diamond by value. Other significant producers in Africa included South Africa and Namibia, which in 2011 accounted for 6.6% and 1%, respectively, of world rough diamond production by volume. In terms of dollars per carat, Lesotho's production of rough diamond far exceeded that of any other country in the world. In 2011, the value of Lesotho's rough diamond was $1,602 per carat compared with Namibia's $695 per carat, South Africa's $211 per carat, Botswana's $170 per carat, Angola's $140 per carat, Zimbabwe's $56 per carat, and Congo (Kinshasa)'s $9 per carat. By volume, however, Lesotho's production of rough diamond accounted for less than 1% of world production (Kimberley Process Rough Diamond Statistics, 2012a, b).

The KPCS was established in 2003 to stop the trade in conflict diamond, which had been used in Angola, Liberia, and Sierra Leone during the 1980s and 1990s to finance violence by rebel movements in their attempt to undermine legitimate Governments. As of yearend 2011, more than 50 countries were participants in the certification scheme, including Angola, Botswana, Central African Republic, Congo (Brazzaville), Congo (Kinshasa), Ghana, Guinea, Lesotho, Liberia, Mauritius, Namibia, Sierra Leone, South Africa, Swaziland, Tanzania, and Togo (Israeli Diamond Industry, The, 2011; Kimberley Process Certification Scheme, undated).

Diamond output increased in Botswana, Central African Republic, Congo (Kinshasa), Liberia, and Zimbabwe. It decreased in all other African countries, however, with the exception of Lesotho, where production remained at about the same level as in 2010 (table 16).

Outlook.—The production of rough diamond in Africa is expected to increase by an average of nearly 3% per year from 2011 to 2018, with output projected to double

in Zimbabwe by 2014; to increase by 3.7 million carats in Congo (Kinshasa) by 2016; and to increase by more than 3 million carats in South Africa and 1.7 million carats in Angola by 2018. The projected output in Botswana is expected to come from the reopening of the Damtshaa Mine in 2012 and the development of several primary diamond deposits in the Orapa region in the next few years. Increased production in Congo (Kinshasa) is expected to come from the rampup of production at the Tshibwe Mine and the opening of the Sankuru Mine in 2013. Diamond production in Zimbabwe is expected double as companies operating in the Marange fields ramp up production. Production is expected to increase in South Africa because of expansion plans at the Cullinan, the Finsch, the Kimberley underground, and the Koffiefontein Mines, and in Tanzania owing to expansion plans at the Williamson Mine. Output is also expected to increase in Angola, Ghana, and Namibia (table 16).

Lithium.—*Production.*—Zimbabwe was Africa's only producer of lithium minerals. In 2011, production increased by about 7% (table 17).

Outlook.—Zimbabwe's lithium mineral production is likely to reach 900 metric tons (t) by 2014 from 750 t in 2011. Production is expected to remain at that level through 2018 as production from the Bikita Mine returns to pre-2000 levels following the recovery of the country's hyperinflationary period during the economic crisis (table 18).

Mineral Fuels

Coal.—*Production.*—African coal production decreased slightly to 258 Mt in 2011 from 259 Mt in 2010; output was mainly from South Africa, which accounted for 98% of regional coal production. In 2011, production at most coal mining companies in South Africa decreased during the year including those of Anglo American plc, Exxaro Resources Ltd., and Xstrata plc. South Africa faced increasing freight costs to finance state-owned Transnet SOC Ltd.'s expansion of the railways dedicated to coal exports.

Consumption.—Africa accounted for 2.7% of world coal consumption in 2011. Within the region, South Africa accounted for 93% of African coal consumption. From 2010 to 2011, Africa's consumption of coal increased by about 2% (BP p.l.c., 2012, p. 41).

Outlook.—African coal production is expected to increase at a rate of about 5% per year from 2011 to 2018. South Africa is likely to be responsible for the majority of the increase; its production could increase to 333 Mt by 2018 (table 18). Increased output would be attributable to the opening of the Goedgevonden, the Penumbra, and the Vele Mines in 2012; the opening of the De Wittekrans, the Kangala, the New Largo, the Vlakfontein, and the Wonderfontein Mines and expansion of the Grootegeluk and the Vlakfontein Mines in 2013; the opening of the Belfast and the Brakfontein Mines and expansion of the Tweefontein Mine in 2014; the opening of the Boikarabelo Mine in 2015; the expansion of the Wescoal Mine in 2016; and the opening of the Elders and the Thabametsi Mines in 2017. Increases in South Africa's coal output will depend upon increased capacity of country's rail network. The Dorsfontein West Mine is expected to shut down in 2012 (table 18).

Mozambique is expected to become the second ranked coal producer in Africa with the opening of the Benga Mine in 2012, the expansion of the Beacon Hill Mine and the Moatize Mine from 2012 to 2014, and the opening of the Ncondezi and the Revuboe Mines in 2015. Tanzania is likely to become the third-ranked producer with the opening of the Mchuchuma Mine in 2015 and the expansion of the Atomic Mine in 2016. In Zimbabwe, restored demand for coal was expected to account for the rampup of production in 2014. Zambia's production is likely to increase because of the restoration of capacity at the Maamba Mine by 2012. Coal mining is also expected to increase in Nigeria (table 18).

Environment

Deforestation for fuel use and land-intensive agricultural production continued to be a significant environmental issue in many African countries. Other causes of deforestation included artisanal mining of diamond and gold, and production of bricks, lime, and sand and gravel. The use of mercury by artisanal gold miners has led to serious air and water pollution in many countries, although in Ghana, new methods to carry out gold mining using direct smelting instead of mercury amalgamation were introduced to artisanal and small-scale miners (Ministry of Finance and Economic Planning, 2011, p. 82). Also in Ghana, to help reduce environmental degradation, the Government planned to relocate (to areas not yet specified) about 50,000 artisanal and small-scale miners (Ministry of Finance and Economic Planning, 2011, p. 83–84). In August, the Ghanaian Parliament approved a $3 billion loan from China Development Bank to finance a number of infrastructure projects, which included a gas pipeline that the Government considered to be urgently needed to avoid the significant risk of damage to the Jubilee oil wells and the environment from gas flaring or reinjection (Felix, 2011; Okine, 2011).

In Congo (Kinshasa), about 52% of Block 5 is located in Virunga National Park; the Government suspended petroleum exploration activities in March 2011 because of environmental concerns. The Government reversed its decision and awarded an exploration license to Soco International plc of the United Kingdom and its partners in September (International Crisis Group, 2012, p. 15–16).

In South Africa, acid mine drainage from gold mines in the Witswatersrand Mining Basin reportedly contaminated the Crocodile and the Vaal River systems with increased levels of heavy metals and radioactive particles. The Government planned to spend about $190 million during 10 years on alleviating acid mine drainage and the other problems that resulted from the 6,000 abandoned mines in South Africa (Prinsloo, 2010; Zeelie, 2010).

Trade Review and Outlook

Africa is vulnerable to spillovers from the world economy, particularly from Europe owing to the many underlying economic, historical, and political linkages between these two regions. The International Monetary Fund estimates that although aggregate output in Sub-Saharan Africa is expected to expand by about 5.25% in both 2012 and 2013, deteriorating conditions in the world economy could quickly

affect the continent, resulting in slower growth in Sub-Saharan Africa at a rate of about 1% per year, depending on both the severity and the duration of the global downturn. The resulting slower growth might be more severe on individual countries where exports are undiversified and policy buffers are low (International Monetary Fund, 2012a, p. 1–2).

Spillovers from civil unrest within the region are also of significance and can be deterrents to mineral output as was evidenced by the post-electoral crisis in Côte d'Ivoire, which saw the infiltration of mercenary forces from Liberia interfere with mining operations in the north of the country and accounted for the temporary shutdown of many gold mining operations during the first half of 2011. Worker strikes at South Africa's coal, diamond, gold, and platinum mines also had ripple effects in the region, as South Africa is host to a large number of immigrant laborers from sub-Saharan Africa. Lesotho's economy, which was highly dependent on remittances from miners working in South Africa's gold and platinum mines, could be greatly affected by the continuation of civil unrest at these mines. The International Monetary Fund estimates that mine worker's remittances from South Africa account for about 20% of Lesotho's GDP. In Swaziland, remittances from migrant work in South Africa account for about 3% of the GDP (International Monetary Fund, 2012a, p. 32).

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TABLE 1
AFRICA: AREA AND POPULATION IN 2011

Country	Area[1] (square kilometers)	Estimated population[2] (thousands)
Algeria	2,381,741	35,980
Angola	1,246,700	19,618
Benin	112,622	9,100
Botswana	581,730	2,031
Burkina Faso	274,200	16,968
Burundi	27,830	8,575
Cameroon	475,440	20,030
Cape Verde	4,033	501
Central African Republic	622,984	4,487
Chad	1,284,000	11,525
Comoros	2,235	754
Congo (Brazzaville)	342,000	4,140
Congo (Kinshasha)	2,344,858	67,758
Côte d'Ivoire	322,463	20,153
Djibouti	23,200	906
Egypt	1,001,450	82,537
Equatorial Guinea	28,051	720
Eritrea	117,600	5,415
Ethiopia	1,104,300	84,734
Gabon	267,667	1,534
Gambia, The	11,295	1,728
Ghana	238,533	24,966
Guinea	245,857	10,222
Guinea-Bissau	36,125	1,547
Kenya	580,367	41,610
Lesotho	30,355	2,194
Liberia	111,369	4,129
Libya	1,759,540	6,423
Madagascar	587,041	21,315
Malawi	118,484	15,381
Mali	1,240,192	15,840
Mauritania	1,030,700	3,542
Mauritius	2,040	1,286
Mayotte	374 [3]	204
Morocco	446,550	32,273
Mozambique	799,380	23,930
Namibia	824,292	2,324
Niger	1,267,000	16,069
Nigeria	923,768	162,471
Reunion	2,517 [3]	NA
Rwanda	26,338	10,943
Sao Tome e Principe	964	169
Senegal	196,722	12,768
Seychelles	455	86
Sierra Leone	71,740	5,997
Somalia	637,657	9,557
South Africa	1,219,090	50,587
South Sudan	644,329	10,314
Sudan	1,861,484	34,318
Swaziland	17,364	1,068
Tanzania	947,300	46,218
Togo	56,785	6,155
Tunisia	163,610	10,674
Uganda	241,038	34,509

See footnotes at end of table.

TABLE 1—Continued
AFRICA: AREA AND POPULATION IN 2011

Country	Area[1] (square kilometers)	Estimated population[2] (thousands)
Western Sahara	266,000 [3]	NA
Zambia	752,618	13,475
Zimbabwe	390,757	12,754
Total	30,315,134	1,044,512
World	148,940,000	6,950,405

NA Not available.
[1]Source: U.S. Central Intelligence Agency, The World Factbook 2012.
[2]Source: The World Bank, 2011 World Development Indicators Database.
[3]2010 data.

TABLE 2

AFRICA: GROSS DOMESTIC PRODUCT[1, 2]

Country	Gross domestic product in 2011 based on purchasing power parity		Real gross domestic product growth rate (percentage)		
	Gross value (billion dollars)	Per capita (dollars)	2009	2010	2011
Algeria	263.3	7,325	2.4	3.3	2.4
Angola	116.3	5,924	2.4	3.4	3.9
Benin	14.7	1,620	2.7	2.6	3.5
Botswana	29.8	16,105	-4.7	7.0	5.1
Burkina Faso	22.1	1,302	3.0	7.9	4.2
Burundi	5.2	605	3.5	3.8	4.2
Cameroon	47.3	2,259	2.0	2.9	4.2
Cape Verde	2.1	3,947	3.7	5.2	5.0
Central African Republic	3.6	767	1.7	3.0	3.3
Chad	19.6	1,867	-1.2	13.0	1.8
Comoros	0.8	1,232	1.8	2.1	2.2
Congo (Brazzaville)	18.1	4,543	7.5	8.8	3.4
Congo (Kinshasha)	25.3	349	2.8	7.2	6.9
Côte d'Ivoire	36.1	1,590	3.8	2.4	-4.7
Djibouti	2.2	2,641	5.0	3.5	4.5
Egypt	519.0	6,455	4.7	5.1	1.8
Equatorial Guinea	26.1	19,321	4.6	-0.5	7.8
Eritrea	4.0	735	3.9	2.2	8.7
Ethiopia	94.8	1,092	10.0	8.0	7.5
Gabon	24.8	16,313	-1.4	6.6	6.6
Gambia, The	3.5	1,943	6.7	5.5	3.3
Ghana	75.7	3,113	4.0	8.0	14.4
Guinea	11.5	1,086	-0.3	1.9	3.9
Guinea-Bissau	1.9	1,144	3.0	3.5	5.3
Kenya	71.2	1,741	2.7	5.8	4.4
Lesotho	3.7	1,918	3.8	5.2	4.9
Liberia	2.4	627	5.3	6.1	8.2
Libya	39.0	6,017	-1.4	3.7	-59.7
Madagascar	20.6	944	-4.1	0.4	1.8
Malawi	13.8	851	9.0	6.5	4.3
Mali	17.9	1,128	4.5	5.8	2.7
Mauritania	7.1	2,008	-1.2	5.1	4.0
Mauritius	19.3	14,962	3.0	4.2	4.1
Mayotte	NA	NA	NA	NA	NA
Morocco	163.5	5,080	4.9	3.7	4.9
Mozambique	24.0	1,090	6.3	7.1	7.3
Namibia	15.9	7,451	-0.4	6.6	4.9
Niger	11.6	771	-0.9	8.0	2.3
Nigeria	414.0	2,582	7.0	8.0	7.4
Reunion	NA	NA	NA	NA	NA
Rwanda	13.6	1,334	4.1	7.2	8.6
Sao Tome e Principe	0.4	2,252	4.0	4.5	4.9
Senegal	25.2	1,970	2.1	4.1	2.6
Seychelles	2.3	25,357	0.5	6.7	5.1
Sierra Leone	6.8	1,132	3.2	5.3	6.0
Somalia	5.9 [3, 4]	600 [3, 4]	2.6	2.6	NA
South Africa	555.0	10,970	-1.5	2.9	3.1
South Sudan	21.1	2,134	XX	XX	1.4
Sudan	89.2	2,730	4.6	2.2	-4.5
Swaziland	6.2	5,301	1.2	2.0	0.3
Tanzania	67.9	1,610	6.0	7.0	6.4
Togo	6.5	1,048	3.5	4.0	4.9

See footnotes at end of table.

TABLE 2—Continued

AFRICA: GROSS DOMESTIC PRODUCT[1, 2]

Country	Gross domestic product in 2011 based purchasing power parity		Real gross domestic product growth rate (percentage)		
	Gross value (billion dollars)	Per capita (dollars)	2009	2010	2011
Tunisia	100.0	9,389	3.1	3.1	-1.8
Uganda	47.8	1,385	7.0	6.1	5.1
Western Sahara	0.9 [3, 4]	2,500 [3, 4]	NA	NA	NA
Zambia	21.9	1,611	6.4	7.6	6.6
Zimbabwe	6.5	515	6.3	9.6	9.4
Total	3,169.1	XX	XX	XX	XX
World total	78,970	XX	-2.2	4.1	2.8

NA Not available. XX Not applicable.

[1]Source: International Monetary Fund, World Economic Outlook Database, October 2012.

[2]Gross domestic product listed may differ from that reported in individual country chapters owing to differences in the source or date of reporting.

[3]Source: U.S. Central Intelligence Agency, The World Factbook.

[4]2010 estimate.

TABLE 3
SELECTED SIGNIFICANT AFRICAN EXPLORATION ACTIVITY IN 2011

Country	Type [1]	Site	Commodity[2]	Company	Resource [2, 3]
Burkina Faso	E	Bombore	Au	Orezone Gold Corp.	1.59 Moz Au (D).
Do.	P	Essakane	Au	IAMGOLD Corp.	4.49 Moz Au (R).
Do.	P	Inata	Au	Avocet Mining plc.	1.46 Moz Au (R).
Do.	E	Karma	Au	Riverstone Resources Inc.	1.77 Moz Au (ID).
Do.	E	Kiaka	Au	Volta Resources Inc.	3 Moz Au (D).
Do.	E	Konkera	Au	Ampella Mining Ltd.	1.27 Moz Au (ID).
Congo (Brazzaville)	E	Zanaga	Fe	Xstrata plc.	980 Mt Fe (D).
Côte d'Ivoire	F	Tengrela	Au	Perseus Mining Ltd.	655,000 oz Au (R).
Ghana	E	Enchi	Au	Edgewater Exploration Ltd.	748,000 oz Au (IF).
Do.	E	Obotan	Au	PMI Gold Corp.	2.26 Moz Au (R).
Do.	F	Wa-Lawra	Au	Azumah Resources Ltd.	646,000 oz Au (ID).
Guinea	F	Kalia	Fe	Bellzone Mining plc.	300 Mt Fe (ID).
Liberia	E	Putu Range	Fe	OAO Severstal Group	640 Mt Fe (ID).
Mali	P	Tabakoto	Au	Avion Gold Corp.	913,000 oz Au (R).
Do.	E	Yanfolia/Komana	Au	Gold Fields Ltd.	744,000 oz Au (IF).
Mauritania	P	Tasiast	Au	Kinross Gold Corp.	7.55 Moz Au (R).
Namibia	F	Husab (Rossing South)	U	Extract Resources Ltd.	145,000 t U_3O_8 (R).
Do.	E	Okjikoto	Au	B2Gold Corp.	1.1 Moz Au (ID).
Niger	E	Madaouela	U	Cameco Corp.	23,500 t U_3O_8 (ID).
Senegal	P	Sabodala	Au	Teranga Gold Corp.	1.5 Moz Au (R).
South Africa	E	Platreef	PGM	Ivanhoe Nickel & Platinum Inc.	Data not released.
Sudan	P	Hassai	Au	La Mancha Resources Inc.	1.1 Moz Au (R).
Tanzania	E	Magambazi	Au	Canaca Resources Inc.	721,000 oz Au (ID).

Do. Ditto.

[1]E—Active exploration; F—Feasibility work ongoing/completed; P—Exploration related to existing producing operation.

[2]Abbreviations used in this table for commodities include the following: Au—gold; Fe—iron ore; PGM—platinum-group metals; U—uranium; U_3O_8—uranium oxide.

Abbreviations used in this table for units of measure include the following: Moz—million troy ounces; Mt—million metric tons; oz—troy ounces; t—metric tons.

[3]Based on 2011 data reported from various sources; D—measured + indicated; ID—indicated; IF—inferred; R—proven + probable.

Resource data are not verified by the U.S. Geological Survey.

TABLE 4

AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2011[1]

(Thousand metric tons unless otherwise specified)

	Metals									
	Aluminum						Iron and steel			
Country	Bauxite	Metal[2]	Chromite, mine output, gross weight	Cobalt, mine output, Co content (metric tons)	Copper, mine output, Cu content	Gold, mine output (kilograms)	Iron ore, gross weight	Steel, crude	Lead, mine output, Pb content (metric tons)	Manganese ore, mine output, Mn content
Algeria	--	--	--	--	--	340	1,400	440	--	--
Angola	--	--	--	--	--	--	--	--	--	--
Benin[e]	--	--	--	--	--	20	--	--	--	--
Botswana[e]	--	--	--	300	22	1,800	--	--	--	--
Burkina Faso[e]	--	--	--	--	--	31,774 [3, 4]	--	--	--	22
Burundi[e]	--	--	--	--	--	750	--	--	--	--
Cameroon[e]	--	69	--	--	--	1,600	--	--	--	--
Cape Verde	--	--	--	--	--	--	--	--	--	--
Central African Republic	--	--	--	--	--	53	--	--	--	--
Chad[e]	--	--	--	--	--	100	--	--	--	--
Congo (Brazzaville)[e]	--	--	--	--	--	150	--	--	--	--
Congo (Kinshasa)[e]	--	--	--	60,000	540	3,500	--	120	--	--
Côte d'Ivoire	--	--	--	--	--	9,871	--	--	--	20
Djibouti	--	--	--	--	--	--	--	--	--	--
Egypt[e]	--	540	--	--	--	7,000 [4]	250	6,486 [4]	--	4
Equatorial Guinea[e]	--	--	--	--	--	200	--	--	--	--
Eritrea[e]	--	--	--	--	--	11,800	--	--	--	--
Ethiopia[e]	--	--	--	--	--	10,700	--	130	--	--
Gabon	--	--	--	--	--	--	--	--	--	1,872
Gambia, The	--	--	--	--	--	--	--	--	--	--
Ghana	408	35	--	--	--	82,993	--	--	--	484 [e]
Guinea	15,300	--	--	--	--	15,695 [5]	--	--	--	--
Kenya[e]	--	6	--	--	--	2,100	(6)	250	--	--
Lesotho	--	--	--	--	--	--	--	--	--	--
Liberia	--	--	--	--	--	469	1,300	--	--	--
Libya	--	--	--	--	--	--	--	100	--	--
Madagascar	--	--	67	500 [e]	--	--	--	--	--	--
Malawi	--	--	--	--	--	--	--	--	--	--
Mali	--	--	--	--	--	35,728	--	--	--	--
Mauritania	--	--	--	--	40	8,172	11,160	5 [e]	--	--
Mauritius	--	--	--	--	--	--	--	--	--	--
Morocco and Western Sahara	--	--	--	2,159	13	520	79	460 [e]	30,675	23 [e]
Mozambique	10	562	--	--	--	111	--	--	--	--
Namibia	--	--	--	--	4	2,053	--	--	8,000	48 [e]
Niger	--	--	--	--	--	1,879	--	--	--	--
Nigeria[e]	--	18	--	--	--	100	70	400	NA	--
Reunion	--	--	--	--	--	--	--	--	--	--

See footnotes at end of table.

TABLE 4—Continued

AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2011[1]

(Thousand metric tons unless otherwise specified)

	Metals									
	Aluminum						Iron and steel			
Country	Bauxite	Metal[2]	Chromite, mine output, gross weight	Cobalt, mine output, Co content (metric tons)	Copper, mine output, Cu content	Gold, mine output (kilograms)	Iron ore, gross weight	Steel, crude	Lead, mine output, Pb content (metric tons)	Manganese ore, mine output, Mn content
Rwanda	--	--	--	--	--	3 [e]	--	--	--	--
Senegal	--	--	--	--	--	4,089	--	--	--	--
Seychelles	--	--	--	--	--	--	--	--	--	--
Sierra Leone	1,457	--	--	--	--	164	1,300	--	--	--
Somalia	--	--	--	--	--	--	--	--	--	--
South Africa	--	809	10,721	1,600 [e]	97	180,184	58,056	7,546	54,460	3,421
South Sudan	--	--	--	--	--	--	--	--	--	--
Sudan	--	--	57	--	--	23,739	--	--	--	186
Swaziland	--	--	--	--	--	--	80	--	--	--
Tanzania	130 [e]	--	--	--	5	44,000	--	--	--	--
Togo	--	--	--	--	--	16,469	--	--	--	--
Tunisia	--	--	--	--	--	--	171	119	--	--
Uganda	--	--	--	--	--	--	2	7 [e]	--	--
Zambia[e]	--	--	--	6,600	668	3,500	--	50	--	40
Zimbabwe[e]	--	--	599 [4]	86	6	12,824 [4]	--	15	--	--
Total	17,300	2,040	11,400	71,200	1,390	514,000	73,900	16,100	93,100	6,120
Share of world total	7%	4%	38%	67%	9%	19%	2%	1%	2%	39%
United States	NA	5,100	--	--	1,110	234,000	54,700	86,400	334,000	--
Share of world total	NA	9%	--	--	7%	9%	2%	6%	7%	--
World total	252,000	56,500	29,900	106,000	15,900	2,670,000	2,980,000	1,520,000	4,730,000	15,800

See footnotes at end of table.

TABLE 4—Continued

AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2011[1]

(Thousand metric tons unless otherwise specified)

Country	Metals—Continued	Industrial minerals				Mineral fuels		
	Zinc, mine output, Zn content (metric tons)	Cement, hydraulic	Diamond, natural (thousand carats)[7]	Graphite (metric tons)	Phosphate rock, gross weight	Coal, anthracite and bituminous	Petroleum, crude (thousand 42-gallon barrels)	Uranium, U_3O_8 content (metric tons)
Algeria	--	20,000	--	--	1,287	--	510,918	--
Angola	--	1,500 [e]	8,329 [8, 9]	--	--	--	637,290	--
Benin[e]	--	1,300	--	--	--	--	--	--
Botswana[e]	--	--	24,000 [10]	--	--	900	--	--
Burkina Faso[e]	--	450	--	--	2	--	--	--
Burundi[e]	--	35	--	--	--	--	--	--
Cameroon[e]	--	1,100	10	--	--	--	22,046 [4]	--
Cape Verde	--	160 [e]	--	--	--	--	--	--
Central African Republic	--	--	324	--	--	--	--	--
Chad[e]	--	10	--	--	--	--	44,000	--
Congo (Brazzaville)[e]	--	70	77 [4]	--	--	--	108,000	--
Congo (Kinshasa)[e]	19,035 [4]	458 [4]	19,700	--	--	--	8,558 [4]	--
Côte d'Ivoire	--	99	--	--	--	--	14,800	--
Djibouti	--	--	--	--	--	--	--	--
Egypt[e]	--	43,884 [4]	--	--	4,700 [4]	300	246,375 [4]	--
Equatorial Guinea[e]	--	--	--	--	--	--	72,000	--
Eritrea[e]	--	230	--	--	--	--	--	--
Ethiopia[e]	--	230	--	--	--	--	--	--
Gabon	--	200 [e]	--	--	--	--	89,425	--
Gambia, The	--	--	--	--	--	--	--	--
Ghana	--	2,550 [e]	302	--	--	--	24,100	--
Guinea	--	322	304	--	--	--	--	--
Kenya[e]	--	3,969 [4]	--	--	--	--	--	--
Lesotho	--	--	100 [e]	--	--	--	--	--
Liberia	--	61	42	--	--	--	--	--
Libya	--	3,500 [e]	--	--	--	--	174,835	--
Madagascar	--	410 [e]	--	3,573	--	--	--	--
Malawi	--	203	--	--	--	83	--	998
Mali	--	--	--	--	20 [e]	--	--	--
Mauritania	--	565	--	--	--	--	2,824	--
Mauritius	--	--	--	--	--	--	--	--
Morocco and Western Sahara	45,065	14,000 [e]	--	--	28,052	--	1,500 [e]	--
Mozambique	--	976	--	--	--	648	--	--
Namibia	48,950	390 *	1,256	--	--	--	--	3,746
Niger	--	40 [e]	--	--	--	250 [e]	--	5,131

See footnotes at end of table.

TABLE 4—Continued

AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2011[1]

(Thousand metric tons unless otherwise specified)

Country	Metals—Continued	Industrial minerals				Mineral fuels		
	Zinc, mine output, Zn content (metric tons)	Cement, hydraulic	Diamond, natural (thousand carats)[7]	Graphite (metric tons)	Phosphate rock, gross weight	Coal, anthracite and bituminous	Petroleum, crude (thousand 42-gallon barrels)	Uranium, U_3O_8 content (metric tons)
Nigeria[e]	NA	11,600	--	--	--	39	866,245 [4]	--
Reunion	--	400 [e]	--	--	--	--	--	--
Rwanda	--	94	--	--	--	--	--	--
Senegal	--	4,677	--	--	1,411	--	403	--
Seychelles	--	--	--	--	--	--	--	--
Sierra Leone	--	311	357	--	--	--	--	--
Somalia	--	--	--	--	--	--	--	--
South Africa	36,629	11,234	7,047	--	2,565	252,757	591	656
South Sudan	--	--	--	--	--	--	67,000	--
Sudan	--	5,200	--	--	--	--	110,000	--
Swaziland	--	--	--	--	--	121	--	--
Tanzania	--	2,409	28 [11]	--	18	83	--	--
Togo	--	1,780 [e]	(6)	--	866	--	--	--
Tunisia	--	7,530	--	--	2,480	--	25,500	--
Uganda	--	1,666	--	--	--	--	--	--
Zambia[e]	--	1,200	--	--	--	220	--	--
Zimbabwe[e]	--	1,000	8,503 [4]	5,000	60	2,560 [4]	--	--
Total	150,000	146,000 *	70,400	8,570	41,500	258,000	3,030,000	10,500
Share of world total	1%	4% *	56%	1%	21%	4%	11%	17%
United States	769,000	68,600	--	--	28,100	920,000	2,060,000	1,810
Share of world total	6%	2%	--	--	14%	14%	7%	3%
World total	12,300,000	4,040,000	125,000	1,130,000	196,000	6,460,000	27,600,000	63,000

[e]Estimated; estimated data, U.S. data, and world totals are rounded to no more than three significant digits. NA Not available. -- Zero or zero percent.

[1]Totals may not add owing to independent rounding. Percentages are calculated on unrounded data. Table includes data available as of January 31, 2013.

[2]Primary and secondary production.

[3]Includes artisanal mining, which was estimated to be 1,600 kilograms.

[4]Reported figure.

[5]Does not include artisanal mining production, which has historically ranged between 1,500 and 5,000 kilograms per year.

[6]Less than ½ unit.

[7]Gemstones and industrial diamond.

[8]Does not include smuggled production.

[9]Production was approximately 90% gem and 10% industrial grade.

[10]Assumed to contain about 70% gem and near gem.

[11]Diamond figures are estimated to represent 85% gem-quality or semigem-quality and 15% industrial-quality stones. Does not include smuggled artisanal production.

*Correction posted May 12, 2014.

TABLE 5

AFRICA: HISTORIC AND PROJECTED BAUXITE MINE PRODUCTION, 2005–2018[1]

(Thousand metric tons)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Ghana	727	600	408	1,500	1,500	1,500
Guinea	14,600	15,300	15,300	17,000	31,100	39,000
Mozambique	10	11	10	11	11	11
Sierra Leone	--	1,090	1,457	1,500	7,500	11,500
Tanzania	2	130	130	130	130	130
Total	15,300	17,100	17,300	20,100	40,200	51,800

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 6

AFRICA: HISTORIC AND PROJECTED ALUMINUM PRODUCTION, 2005–2018[1]

(Thousand metric tons)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Cameroon	87	60	69	70	70	70
Egypt[2]	244	539	540	500	500	500
Ghana	--	--	35	200	200	200
Kenya[2]	2	6	6	6	6	6
Mozambique	555	557	562	560	560	560
Nigeria	--	21	18	30	96	96
South Africa	846	807	809	810	810	810
Total	1,700	2,000	2,000	2,200	2,200	2,200

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Egypt produced primary and secondary refined aluminum; primary production in all other African aluminum-producing countries, with the exception of Kenya, which also produced secondary refined aluminum.

TABLE 7

AFRICA: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 2005–2018[1]

(Metal content in thousand metric tons)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Botswana	31	21	22	40	48	58
Congo (Kinshasa)	97	430	540	850	980	1,000
Eritrea	--	--	--	81	33	17
Mauritania	--	37	40	40	40	40
Morocco	4	14	13	14	14	14
Namibia	10	--	4	7	11	11
South Africa	89	103	97	96	83	93
Tanzania[2]	4	5	5	6	7	7
Zambia	447	686	668	900	1,000	1,600
Zimbabwe	3	5	6	6	6	6
Total	690	1,300	1,400	2,000	2,200	2,800

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Copper contained in concentrates and dore.

TABLE 8

AFRICA: HISTORIC AND PROJECTED REFINED COPPER PRODUCTION, 2005–2018[1]

(Thousand metric tons)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Congo (Kinshasa)	--	265	366	670	790	870
Egypt[2]	3	3	3	4	4	4
South Africa	99	81	86	79	68	77
Zambia	399	530	516	600	600	600
Zimbabwe	7	5	4	5	5	5
Total	510	880	980	1,400	1,500	1,600

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Egypt produced secondary refined copper; primary production in all other African countries.

TABLE 9

AFRICA: HISTORIC AND PROJECTED GOLD MINE PRODUCTION, 2005–2018[1]

(Metal content in kilograms)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Algeria	--	723	340	500	500	500
Benin[2]	--	20	20	20	20	20
Botswana	4	1,800	1,800	1,800	1,800	1,800
Burkina Faso[3]	625	22,939	31,774	40,000	41,000	43,500
Burundi	--	750	750	750	750	750
Cameroon[2]	1,000	1,800	1,600	1,800	1,800	1,800
Central African Republic[4]	15	60	53	4,000	6,400	6,400
Chad	150	100	100	50	50	50
Congo (Brazzaville)	120	150	150	200	200	200
Congo (Kinshasa)	7,200	3,500	3,500	23,500	27,500	28,000
Cote d'Ivoire[3]	1,335	5,310	9,871	14,800	18,000	20,000
Egypt	--	9,847	7,000	8,000	15,500	15,000
Equatorial Guinea	200	200	200	150	150	150
Eritrea	25	21	11,800	2,100	4,400	3,800
Ethiopia	4,376	5,936	10,700	10,900	13,100	13,200
Gabon[2]	300	300	--	1,200	1,200	1,200
Ghana[3]	66,852	76,332	82,993	100,000	110,000	110,000
Guinea[3]	25,097	15,217	15,695	16,100	18,600	19,000
Kenya	616	2,035	2,100	2,100	2,100	2,100
Liberia[2]	27	666	469	2,000	3,700	3,700
Madagascar	10	70	--	--	--	--
Mali[3]	44,230	36,360	35,728	49,200	49,000	45,000
Mauritania	--	8,305	8,172	10,500	31,000	31,000
Morocco	1,786	650	520	600	600	600
Mozambique	63	106	111	111	111	111
Namibia	2,703	2,683	2,053	2,700	5,800	5,800
Niger	4,962	1,929	1,879	2,000	2,000	2,000
Nigeria	30	100	100	600	600	600
Rwanda	10	3	3	5	5	5
Senegal	600	4,381	4,089	11,800	19,800	20,000
Sierra Leone[4]	53	270	164	200	5,800	5,800
South Africa	294,671	188,702	180,184	196,000	215,000	220,000
Sudan	3,625	26,317	23,739	28,000	27,000	26,000
Tanzania	47,270	39,448	44,000	39,000	44,000	48,000
Togo	6,179	10,452	16,469	16,500	23,000	23,000
Uganda	46	--	--	--	--	--
Zambia	440	3,400	3,500	3,500	4,000	5,000
Zimbabwe	14,024	9,100	12,824	20,000	20,000	20,000
Total	529,000	480,000	514,000	611,000	714,000	724,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]From artisanal mining.

[3]Excludes production from artisanal mining.

[4]From artisanal mining for the years 2000, 2005, and 2010 only.

TABLE 10

AFRICA: HISTORIC AND PROJECTED IRON ORE MINE PRODUCTION, 2005–2018[1]

(Fe content in thousand metric tons)

Country	Average grade	2005	2010	2011	2014[e]	2016[e]	2018[e]
Algeria	50%	800	735	700	1,000	1,500	1,500
Egypt	55%	880	141	138	150	150	150
Gabon	64%	--	--	--	--	640	3,200
Guinea	58% to 65%	--	--	--	18,600	69,500	93,500
Kenya	54%	--	--	--	50	300	400
Liberia	34% to 61%	--	--	787	7,200	8,900	16,000
Mauritania	59% to 72%	7,000	7,500	7,250	8,500	10,000	10,000
Morocco	54%	4	24	43	45	45	45
Mozambique	68%	--	--	--	--	220	1,300
Nigeria	36%	20	23	25	--	50	50
Senegal	58%	--	--	--	--	--	4,000
Sierra Leone	58% to 65%	--	--	754	11,200	14,900	16,100
South Africa	62% to 65%	24,900	36,900	36,500	48,400	50,100	54,000
Swaziland	44.5%	--	--	36	40	40	40
Tanzania	52%	--	--	--	1,000	1,600	1,600
Tunisia	54%	108	94	90	90	90	90
Uganda	61% to 67%	--	2	1	3	3	3
Zambia	65%	--	--	--	--	100	200
Zimbabwe[2]	51%	185	--	--	--	100	200
Total	XX	33,900	45,400	46,300	96,000	158,000	202,000

[e]Estimated. XX Not applicable. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more thaN three significant digits.

[2]Average iron content for Zimbabwe prior to 1996 was 61%. Since 1996, the average grade has been 51%.

TABLE 11

AFRICA: HISTORIC AND PROJECTED CRUDE STEEL PRODUCTION, 2005–2018[1]

(Thousand metric tons)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Algeria	1,007	688	440	3,500	6,000	7,400
Congo (Kinshasa)	110	104	120	120	120	120
Egypt	5,565	6,700	6,486	8,000	8,000	8,000
Ethiopia	60	110	130	110	110	110
Kenya	--	250	250	380	1,000	1,250
Libya	1,255	825	100	1,000	2,000	2,000
Mauritania	1	5	5	5	5	5
Morocco	205	455	460	460	460	460
Nigeria	100	410	400	500	500	1,000
South Africa	9,494	7,617	7,546	7,600	7,600	7,600
Tanzania	--	--	--	--	450	1,100
Tunisia	66	115	119	200	200	200
Uganda	30	7	7	7	7	7
Zambia	--	40	50	100	100	100
Zimbabwe	107	14	15	20	200	200
Total	17,600	17,300	16,100	22,000	26,800	29,600

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 12

AFRICA: HISTORIC AND PROJECTED PALLADIUM MINE PRODUCTION, 2005–2018[1]

(Metal content in kilograms)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
South Africa	82,961	82,222	82,731	85,600	90,500	93,100
Zimbabwe	3,879	7,000	8,241	10,000	11,000	11,000
Total	88,800	89,000	91,000	95,600	102,000	104,000

[e]Estimated.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 13

AFRICA: HISTORIC AND PROJECTED PLATINUM MINE PRODUCTION, 2005–2018[1]

(Metal content in kilograms)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Ethiopia	--	8	--	--	--	--
South Africa	163,711	147,790	148,008	146,000	156,000	160,000
Zimbabwe	4,834	8,800	10,826	12,000	13,000	13,000
Total	169,000	157,000	159,000	158,000	169,000	173,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 14

AFRICA: HISTORIC AND PROJECTED TIN MINE PRODUCTION, 2005–2018[1]

(Metal content in metric tons)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Burundi	4	12	12	12	12	12
Congo (Kinshasa)	4,400	8,600	4,500	4,800	4,800	4,800
Egypt	--	--	--	2,200	2,200	2,200
Niger	14	6	6	10	10	10
Nigeria	1,300	520	570	600	600	600
Rwanda	170	3,000	3,400	3,400	3,400	3,400
Total	5,900	12,100	8,500	11,000	11,000	11,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 15

AFRICA: HISTORIC AND PROJECTED TIN METAL PRODUCTION, 2005–2018[1]

(Metric tons)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Congo (Kinshasa)	--	--	--	2,400	3,500	3,500
Nigeria	25	--	--	--	--	--
Rwanda	200	--	--	--	--	--
Total	230	--	--	2,400	3,500	3,500

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

TABLE 16

AFRICA: HISTORIC AND PROJECTED DIAMOND MINE PRODUCTION, 2005–2018[1]

(Thousand carats)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Angola	7,079	8,362	8,329	8,500	9,000	10,000
Botswana	31,890	22,091	24,000	24,000	24,000	24,000
Cameroon	12	12	10	12	12	12
Central African Republic	383	302	324	320	320	320
Congo (Brazzaville)	--	381	77	100	150	150
Congo (Kinshasa)	35,207	16,900	19,700	21,900	23,400	23,400
Côte d'Ivoire	300	--	--	--	--	--
Gabon	(2)	(2)	(2)	(2)	(2)	(2)
Ghana	1,013	334	302	250	500	1,000
Guinea	549	374	304	300	300	300
Lesotho	52	100	100	100	100	100
Liberia	NA	27	42	50	50	50
Namibia	1,902	1,693	1,256	1,300	1,500	1,500
Sierra Leone	669	438	357	300	300	300
South Africa	15,776	8,868	7,047	8,200	9,300	10,100
Tanzania	220	80	28	610	610	610
Togo	41	(2)	(2)	(2)	(2)	(2)
Zimbabwe	251	8,435	8,503	17,000	17,000	17,000
Total	95,300	68,400	70,400	82,900	86,500	88,800

[e]Estimated. NA Not available. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Less than 1 unit.

TABLE 17

AFRICA: HISTORIC AND PROJECTED LITHIUM PRODUCTION, 2005–2018

(Metric tons)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Zimbabwe	1,100	700	750	900	900	900

[e]Estimated data are rounded to no more than three significant digits.

TABLE 18

AFRICA: HISTORIC AND PROJECTED SALABLE COAL PRODUCTION, 2005–2018[1]

(Thousand metric tons)

Country	2005	2010	2011	2014[e]	2016[e]	2018[e]
Botswana	985	988	900	1,200	1,200	1,200
Congo (Kinshasa)	120	--	--	--	--	--
Egypt	300	300	300	300	300	300
Ethiopia	--	20	20	20	20	20
Malawi	52	65	83	85	85	85
Morocco	(2)	--	--	--	--	--
Mozambique	3	39	648	8,800	20,500	20,500
Niger	182	247	250	250	250	250
Nigeria	8	46	39	50	50	50
South Africa	244,940	254,522	252,757	295,000	320,000	333,000
Swaziland	222	146	121	120	120	120
Tanzania	31	(2)	83	360	2,300	3,800
Zambia	240	200	220	300	300	300
Zimbabwe	2,891	2,660	2,560	4,000	4,000	4,000
Total	250,000	259,000	258,000	310,000	349,000	364,000

[e]Estimated. -- Negligible or no production.

[1]Estimated data and totals are rounded to no more than three significant digits.

[2]Less than 1 unit.