



# 2012 Minerals Yearbook

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## AFRICA

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# THE MINERAL INDUSTRIES OF AFRICA

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The 57 independent nations and other territories of continental Africa and adjacent islands covered in this volume encompass a land area of 30.3 million square kilometers, which is more than three times the size of the United States, and were home to 1.08 billion people in 2012. Nigeria had a population of 169 million in 2012; Ethiopia, 91.8 million; Egypt, 80.7 million; the Democratic Republic of the Congo [Congo (Kinshasa)], 65.7 million; and South Africa, 52.3 million (table 1). For many of these countries, mineral exploration and production constitute significant parts of their economies and remain keys to future economic growth. Africa is richly endowed with mineral reserves and ranks first or second among the continents in share of world reserves of bauxite, chromite, cobalt, ilmenite, industrial diamond, manganese, phosphate rock, platinum-group metals (PGM), rutile, soda ash, vermiculite, and zirconium (Bedinger, 2013; Bray, 2013; Corathers, 2013; Jasinski, 2013; Kostick, 2013; Loferski, 2013a, b; Olson, 2013; Papp, 2013; Shedd, 2013; Tanner, 2013).

The mineral industry was an important source of export earnings for many African nations in 2012. To promote exports, groups of African countries have 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 (ECOWAS), 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.

## Acknowledgments

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For mineral production statistics—

- Cameroon—National Institute of Statistics,
- Egypt—Central Agency for Public Mobilization and Statistics,
- Ethiopia—Ministry of Mines and Energy,
- Ghana—Minerals Commission,
- Malawi—Department of Mines,
- Mauritania—National Office of Statistics,
- Mauritius—Ministry of Energy and Public Utilities,
- Morocco—Department of Energy and Mines and Directorate of Statistics,

- Mozambique—National Directorate of Mines,
- Niger—Ministry Mines and Industrial Development,
- Seychelles—Seychelles Energy Commission,
- South Africa—Department of Mineral Resources,
- 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—the International Monetary Fund.

For mineral consumption data—

- BP p.l.c.,
- International Nickel Study Group,
- World Bureau of Metal Statistics, and
- World Steel Association.

For exploration and other mineral-related information—SNL Metals and Mining (formerly SNL Metals Economics Group) in Charlottesville, Virginia.

## General Economic Conditions

In 2012, the real gross domestic product (GDP) of Sub-Saharan Africa increased by 4.9% compared with 5.5% in 2011. The GDP increased in Libya by 104.5% in 2012; Tunisia, 3.6%; Algeria, 3.3%; Morocco, 2.7%; and Egypt 2.2% (table 2). The worldwide GDP increased by 3.2% in 2012 and 3.9% in 2011. The average GDP growth rate in petroleum-exporting countries was 6.3%; in low-income petroleum-importing countries, 4.9%; and middle-income petroleum-importing countries, 3.8%. In Sierra Leone, the GDP increased by 15.2% in 2012 mainly because of increased iron ore production. South Sudan's GDP decreased by 47.6% in 2012 because of the suspension of crude petroleum production in January (International Monetary Fund, 2013, p. 79, 153, 158–159).

GDP growth in African petroleum-exporting countries is projected to be at or about 5.8% in 2013 and 7% in 2014. In low-income petroleum-importing countries, GDP growth is expected to be at or about 6.5% in 2013 and 8.1% in 2014. GDP growth is likely to be at or about 3.3% in 2013 and 3.9% in 2014 in middle-income petroleum-importing countries. South Sudan's GDP is expected to increase by 24.7% in 2013 and 43% in 2014 after petroleum production resumes (International Monetary Fund, 2013, p. 79, 159).

## Investment Data

In South Africa, numerous producers are planning new mines and plants and capacity expansions of existing operations for andalusite, antimony, cement, chromite, coal, diamond, ferrochromium, ferromanganese, fluorspar, gold, ilmenite, iron ore, magnesium metal, manganese ore, PGMs, phosphate rock and fertilizers, rare-earth elements, rutile, titanium metal, uranium, vermiculite, wollastonite, zinc, zircon, and zirconium metal.

In 2012, the estimated costs of newly committed mineral projects was \$20 billion, of which PGM projects accounted for 48%; processed minerals, 12%; gold, 5%; and other unprocessed minerals, 35% (Mnguni, 2013, p. 25).

Investment in African exploration and development activities continued to increase, especially among Chinese companies. Chinese minerals-related investment in Africa increased to \$15.6 billion in 2011 (the latest year for which data were available) from \$1.5 billion in 2010, and accounted for about 75% of Chinese foreign mining investment in 2011 (Campbell, 2013).

Australian companies were involved in 650 minerals and mineral fuels exploration, development, and production projects in 37 African countries. The Australian Government had made provision to spend \$4.8 million during the next 2 years to establish an African minerals development center and planned to invest \$190 million in mining projects from 2011 through 2015 (Swanepoel, 2012).

A survey of institutional investors conducted by the Economist Intelligence Unit found that two-thirds of the respondents investing in frontier regions listed Africa as having the greatest opportunity for investment of global frontier markets in spite of its macroeconomic and political risk (Economist Intelligence Group Ltd., 2012).

In 2012, the Government of Namibia initiated Project 2050, which is a project to construct engineered barriers along the coast to allow mining to take place. The Government planned to spend \$322 million during the next 5 years on Project 2050 (Mining Magazine, 2012).

## Legislation

In July 2010, the U.S. Congress passed the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act), which contains provisions concerning the use of minerals to finance military operations in eastern Congo (Kinshasa). The U.S. Securities and Exchange Commission (SEC) issued regulations in final form in accordance with the Dodd-Frank Act in August 2012 (U.S. Securities and Exchange Commission, 2012, p. 56274–56275).

Under the regulations, all companies registered with the SEC that sell products containing cassiterite, columbite-tantalite, gold, or wolframite are required to disclose whether these minerals originated from Congo (Kinshasa) or adjoining countries. Companies that sell products containing cassiterite, columbite-tantalite, gold, or wolframite that originated in Congo (Kinshasa) or adjoining countries are also required to submit annual reports to the SEC describing the due diligence measures taken to determine the source and custody of such minerals and to provide a description of the products manufactured or contracted to be manufactured that are not conflict-free (U.S. Securities and Exchange Commission, 2012, p. 56274).

In March 2011, the government of Katanga, which is a Province of Congo (Kinshasa), and the International Tin Research Institute (ITRI) started the ITRI Tin Supply Chain Initiative (iTSCI), which is a traceability mechanism for domestically produced tantalum, tin, and tungsten to meet end users' requirements under the Dodd-Frank Act and Organisation for Economic Co-operation and Development due

diligence guidelines. By the end of 2012, 140 mine sites were covered by the scheme in Katanga Province. ITRI restarted certification in Sud-Kivu Province in October after 2 years of suspension and initiated certification in Maniema Province in December (International Tin Research Institute, 2013).

In December 2010, the Government of Rwanda and ITRI started the implementation of the iTSCI in Rwanda. By the end of 2012, about 450 cassiterite, columbite-tantalite, and wolframite mines in Rwanda were covered by the scheme (International Tin Research Institute, 2013).

In November 2012, the Government of Congo (Kinshasa) announced plans to increase its free-carried and nondilutable share in mining projects to 35% from 5%. The Government also planned to increase royalty rates on diamond and other gemstones to 6% from 4%; on precious metals, to 6% from 2.5%; and on nonferrous metals, to 6% from 2%. At yearend, the proposed changes had not been enacted (Metal Bulletin, 2012; Bahamin, 2013).

In late 2012, the Government of Kenya issued new regulations requiring a 35% domestic share in the Kenyan operations of mining companies. The Government planned to allow companies between 3 and 5 years to comply with the regulations (Kabukuru, 2013).

In late 2012, the Government of Tanzania issued new regulations requiring all foreign-owned mining companies to cede 50% of their shares in their Tanzanian operations to the Tanzanian public. The regulations applied to new mining licenses, and could be met by giving a 50% share in the operation to State Mining Co. (Stamico) or by listing on the Dar es Salaam stock exchange and selling 50% of the shares in the operations to Tanzanians (Kabukuru, 2013; Pesa Times, 2013).

With Statutory Instrument 11 of 2012, the Zimbabwe Ministry of Mines and Mining Development significantly increased fees associated with mineral exploration and mining. The fees were listed in the Mining (General) (Amendment) Regulations, 2012 (no. 16). The annual ground rent due to the Government was increased to \$3,000 per hectare for diamond claims; to \$1,000 per hectare for platinum claims compared with \$10 per hectare in 2011; and to \$100 per hectare for coal, coalbed methane, and nuclear-energy source material. The Government also approved a policy prohibiting the export of uncut or unpolished diamond and planned to implement nationalization of the country's diamond industry (Howe, 2012; Ministry of Mines and Mining Development, 2012).

In Mauritania, a New Model Mining Convention Law was passed in 2012 to provide a consistent framework for implementing the 2008 Mining Code. The new law includes an amendment to the Mining Code that sets new royalty rates for copper, gold, and iron ore (Coles and others, 2012).

## Exploration

Exploration activity, as defined by African exploration budgets reported by the SNL Metals Economics Group (SNL-MEG), increased to about \$3.4 billion in 2012 from about \$2.4 billion in 2011 (SNL Metals Economics Group, 2012). Based on site data compiled by the USGS, active gold and silver projects in 2012 accounted for approximately 50%

of the reported African exploration projects; base metals, about 15%; iron ore, about 10%; PGMs, about 7%; uranium, about 6%; diamond, about 3%; and other minerals, about 9%. Early-stage exploration projects accounted for about 69% of the 2012 activity; producing projects, about 17%; feasibility stage projects, about 10%; and developing projects, about 4%.

African exploration activity, expressed in terms of the number of active sites, increased to 433 sites in 2012 from 342 active sites in 2011. Exploration was focused primarily in, in descending order based on the number of sites, South Africa (78 sites), Burkina Faso (38 sites), Ghana (35 sites), Tanzania (29 sites), Namibia (27 sites), Congo (Kinshasa) (27 sites), Mali (23 sites), Guinea (18 sites), and Botswana (14 sites). Activity also took place at 144 sites in a number of other countries (table 3).

Exploration activity in Africa in 2012 varied as improving commodity prices and renewed investor interest stimulated activity in some areas while concerns related to labor issues and regional unrest limited activity in other areas. Issues of concern included artisanal mining rights, mining of conflict minerals, employment grievances and shortages, resource nationalism, and political instability (Hall, 2012). In 2012, mining-related tax increases were initiated in Burkina Faso, Congo (Kinshasa), Guinea, and Senegal, and were proposed by the Governments of Côte d'Ivoire and Ghana (Creamer Media's Mining Weekly, 2012).

As focus on African resources increased, so did resource nationalism and conflict generated by groups interested in securing a portion of the wealth generated by mining in light of higher metal prices. In Burkina Faso, the second most explored country in Africa in 2012, increasing activity by militant groups limited exploration and mining activities (Jamasmie, 2012). A military coup in Mali and rebel activity in its northern Provinces in 2012 also limited mineral exploration in the country (Smith, 2012).

## Commodity Overview

In tables 5 through 20, estimates for the production of major mineral commodities for 2015 and beyond have been based upon supply-side assumptions, 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 (2012) 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 and 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 by about 2% in 2012 compared with that of 2011. In 2012, increased output at the Kindia and the Sangaredi Mines in Guinea more than offset decreased output at the Friguia Mine. In Ghana, production increased at the Awaso Mine. Output decreased at the Sierra Minerals Mine in Sierra Leone. Guinea accounted for about 91% of African bauxite production, and Ghana and Sierra Leone, more than 4% each. In 2012, Africa's share of world bauxite production was 7% (table 4).

African production of refined aluminum decreased by about 4% in 2012. Decreased production at the Hillside smelter in South Africa more than offset increased production from the Ikot Abasi smelter in Nigeria. South Africa accounted for about 34% of African aluminum output; Egypt, 30%; and Mozambique, 29%. Africa accounted for 4% of the world's aluminum production in 2012 (table 4).

*Consumption.*—In 2012, world primary refined aluminum consumption increased to 45.7 million metric tons (Mt) from 42.9 Mt in 2011. Africa's primary refined aluminum consumption decreased to 689,800 metric tons (t) in 2012 from 701,500 t in 2011 (Karpel, 2013).

*Outlook.*—African bauxite production is likely to increase by an average of between 15% and 16% per year from 2012 to 2019. In Guinea, three new mines are planned to open by 2017, including the Koumbia bauxite project. The expansion of the Sangaredi Mine is also planned for 2017. Output from the Sierra Minerals Mine in Sierra Leone is expected to increase. The expansion of the Awaso Mine in Ghana could take place by 2017 (table 5).

The production of refined aluminum in Africa is expected to increase by an average of between 1% and 2% per year from 2012 to 2019. In Ghana, production is expected to increase at the Valco smelter by 2019. Output is also likely to increase at the Hillside smelter in South Africa (table 6).

**Cobalt.**—*Production.*—In 2012, African cobalt mine production decreased by about 13% compared with that of 2011. Decreased production in Congo (Kinshasa) was attributable to lower output at a number of mines, including the Kamawa, the Kisanfu, the Luiswishi, and the Ruashi Mines. Production increased at the Ambatovy nickel-cobalt mine in Madagascar and at the Nkomati Mine in South Africa. In 2012, Congo (Kinshasa) accounted for 83% of African cobalt mine production; Zambia, 9%; and South Africa, 4% (table 7). Africa's share of world cobalt mine production was 60% in 2012 (table 4).

*Outlook.*—African cobalt mine production is expected to increase by an average of between 5% and 6% per year from 2012 to 2019. Congo (Kinshasa) is likely to account for most of the increase in output because of the expansion of the KOV, the KTO, and the Mutanda Mines. Production is also expected to increase at the Luiswishi, the Mukondo Mountain, and the Tenke Fungurume Mines. In Madagascar, the Ambatovy Mine could reach full capacity in 2016. Zambia's output could nearly double because of copper mine expansions. The Nkomati Mine

is expected to contribute to increased production in South Africa in 2013 (table 7).

**Copper.**—*Production.*—Africa's copper mine production increased by about 10% in 2012 compared with that of 2011. In 2012, Zambia accounted for 45% of African copper mine production; Congo (Kinshasa), 43%; and South Africa, 5%. Africa's share of world copper mine production was 9% in 2012 (table 4). The production increase in Congo (Kinshasa) was attributable to increased output at numerous mines, including the Kinsevere, the Kipoi, the Mutanda, the Mukondo Mountain, and the Tenke Fungurume Mines. Production also increased in Namibia and Zambia. In South Africa, output decreased at the Palabora Mine.

In 2012, Zambia accounted for 50% of African refined copper production; Congo (Kinshasa), 44%; and South Africa, 6% (table 9). Zambia's output remained nearly unchanged in 2012. In Congo (Kinshasa), production increased at the Kinsevere, the Luilu, the Luita, the Mutanda, and the Tenke Fungurume solvent extraction-electrowinning (SX-EW) plants. Decreased output in South Africa was mostly attributable to reduced output from the Palabora refinery. Egypt was the only producer of secondary refined copper in Africa; primary production accounted for most African production.

*Consumption.*—In 2012, world refined copper consumption increased to nearly 20.1 Mt from 19.5 Mt in 2011. Africa's refined copper consumption increased to 244,900 t in 2012 from 242,600 t in 2011 (Karpel, 2014).

*Outlook.*—African copper mine production is expected to increase by an average of more than 9% per year from 2012 to 2019. Zambia's output is likely to nearly double because of increased output from the Chambishi Main, the Kansanshi, the Konkola, and Lubambe Mines by 2017, and the opening of the Sentinel Mine at the end of 2014, the Chambishi Southeast Mine in 2016, and the Baluba East Mine in 2017. In Congo (Kinshasa), expansions were planned at the Mutanda Mine by 2014; the Kipoi Mine by 2016; and the KOV, the KTO, and the T17 Mines, from 2013 to 2019. Other contributions to increased national production of mined copper in Congo (Kinshasa) would include the opening of the Frontier Mine in 2013 and increased output from the Kinsevere and the Tenke Fungurume Mines (table 8).

Mining from a copper-rich zone at the Bisha Mine in Eritrea was planned to take place from 2013 to mid-2016. The Asmara North project is also likely to contribute to copper production in Eritrea starting in 2015. In Namibia, the Tshcudi Mine could start production in 2015. South Africa's production of mined copper is expected to increase because of the Lift II project at the Palabora Mine starting in 2017 and expansions at PGM mines. Copper mine production is also likely to increase in Botswana (table 8).

The production of refined copper is expected to increase by an average of about 6% per year from 2012 to 2019. In Congo (Kinshasa), production is likely to increase at the Kinsevere, the Luilu, the Luita, the Mutanda, and the Tenke Fungurume SX-EW plants; the opening of a new plant at the Kipoi Mine is planned for 2015. Congo (Kinshasa), which did not produce refined copper in 2005, could account for 58% of the continent's refined copper output by 2017. South Africa's production of refined copper is expected to increase because

of the Lift II project at the Palabora Mine starting in 2017. Zambia's output is also likely to increase (table 9).

**Gold.**—*Production.*—Africa's gold mine production was about 531,000 kilograms in 2012, which was an increase of about 3% compared with that of 2011. Production was nearly unchanged since 2005 because the long-term decline in South African production was offset by the increased output in Burkina Faso, Ethiopia, Ghana, Sudan, Togo, and other countries (table 10). In 2012, Africa's share of world gold mine production was about 20% (table 4).

In 2012, South Africa accounted for 29% of African gold production; Ghana, 16%; Sudan, 9%; Mali and Tanzania, 8% each; and Burkina Faso, 5%. South Africa's share of continental gold production decreased to 29% from 55% in 2000 because of rising production costs associated with deeper underground operations and increased production in Burkina Faso, Ghana, Sudan, and other countries (table 10).

The decrease in South Africa's production was broadly based in 2012, with output decreasing at the Beatrix, the Blyvoor, the Great Noligwa, the KDC, the Kopanang, the Kusasaletu, the Moab Khotsonq, the Modder East, the Mponeng, the Savuka, the Tau Tona, and other mines. Production increased at the Doornkop and the Phakisa Mines. In Tanzania, increased production from the Geita and the North Mara Mines and the opening of the New Luika Mine were more than offset by decreased production from the Bulyanhulu, the Buzwagi, the Golden Pride, and the Tulawaka Mines. The decrease in Burkina Faso's production was partially attributable to the Inata and the Kalsaka Mines. Output also decreased at the Bisha Mine in Eritrea and the Guelb Moghrein and the Tasiast Mines in Mauritania.

Sudanese artisanal gold miners nearly doubled their production in 2012. Artisanal gold mining also increased in Ethiopia. In Congo (Kinshasa), the Twangiza Mine was the first large-scale mine to produce gold in recent years. Twangiza opened in late 2011 and increased its output in 2012. In Mali, increased production from the Kalana, the Loulo-Gounkoto, and the Tabakoto Mines more than offset decreased production from the Morila Mine. Output also increased at the Sabodala Mine in Senegal.

*Outlook.*—Gold mine production in Africa is expected to increase by an average of about 3% per year from 2012 to 2019. The majority of the increase is likely to be attributable to countries in West Africa, particularly. In Ghana, the outlook is for an increase in output because of the opening of the Akyem Mine in 2013 and the Konongo Mine in 2017 and the expansion of the Obuasi Mine by 2017. Côte d'Ivoire's production is likely to nearly triple because of the expansions of the Bonikro and the Tongon Mines by 2019 and the opening of the Yaoure Mine in 2015 (table 10).

Gold production is also expected to increase in other West African countries, including Burkina Faso, Mali, and Senegal. Burkina Faso's production is likely to increase because of the opening of the Bissa Mine in 2013 and the expansion of the Mana Mine by 2019. In Mali, the expansion of the Sadiola Mine by 2019 would more than offset the closure of the Yatela Mine. The outlook for Senegal is for increased output because of the

opening of the Masawa and the OJVG Mines by 2017 and the expansion of the Sabodala Mine by 2019 (table 10).

In eastern Africa, Tanzania's production is likely to remain nearly unchanged. Increased output from the Bulyanhulu and the New Luika Mines by 2014 and the opening of the Singida Mine by 2016 are expected to be offset by the closures of the Golden Pride and the Tulawaka Mines in 2013. In Ethiopia, increased production is likely to be attributable to the opening of the Tulu Kapi Mine in 2017. The depletion of the gold-rich zones in the Bisha Mine in Eritrea is expected to be offset by the start of production at the Koka Mine and the Asmara North project in 2014 and 2015, respectively. Output in Congo (Kinshasa) is likely to nearly triple because of the opening of the Kibali and the Namoya Mines in 2013 and increased output at the Twangiza Mine (table 10).

In southern Africa, the long-term decline in South Africa's production could be reversed from 2012 to 2015. The expansions of the Barberton and the Modder East Mines are planned to be completed in 2013; the Cooke 1–3, the Doornkop, the Kusasaletu, the Phakisa, and the South Deep Mines, in 2016; and the Randfontein Mine, in 2017. The reopening of the Ezulwini and the Burnstone Mines are likely to be in 2014 and 2015, respectively. South Africa's production is expected to decrease starting in 2017 because of the decline in output at the Beatrix, the Driefontein, the Kloof, and the Modder East Mines and the shutdown of the Blyvoor, the Buffelsfontein, the Savuka, and the Tau Lekoa Mines. The opening of the Otjikoto Mine in Namibia is planned for 2015. Gold production could also increase in Zambia and Zimbabwe (table 10).

In northern Africa, the decrease in output from Sudan's artisanal miners and the closure of the Hassai Mine in 2016 is expected to be partially offset by the opening of a new mine at Wadi Gabgaba in 2013. In Egypt, production is likely to increase at the Sukari Mine by 2015. Output is also expected to increase in Mauritania (table 10).

Several African countries that had only artisanal gold production in 2012 are likely to open large-scale gold mines in the near future. The opening of the New Liberty Mine in Liberia was planned for 2015. Other new mines opening include the Passendro Mine in the Central African Republic by 2017 and the Boamahun and the Komahun Mines in Sierra Leone by 2017 and 2019, respectively (table 10).

**Iron and Steel.—Production.**—African production of crude steel decreased by less than 1% in 2012 compared with that of 2011. Output increased in Egypt and Libya and decreased in South Africa. In 2012, South Africa accounted for 45% of regional crude steel production; Egypt, 43%; Libya, 5%; Algeria, 4%; and Morocco, 3% (table 12). Africa's share of world crude steel production amounted to 1% in 2012 (table 4).

**Consumption.**—In 2012, world crude steel consumption increased to nearly 1.54 billion metric tons (Gt) from 1.51 Gt in 2011. African crude steel consumption increased to 31.4 Mt in 2012 from 28.4 Mt in 2011. Egypt accounted for 32% of African crude steel consumption; Algeria, 19%; Morocco and Nigeria, 6% each; and Kenya and Libya, 3% each (World Steel Association Committee on Economic Studies, 2013a, p. 78–79).

**Outlook.**—Crude steel production is expected to increase by an average of nearly 11% per year from 2012 to 2019. Algeria's

share of African steel output is likely to increase to 22% in 2019 from 4% in 2012 as ArcelorMittal expands capacity and a Qatari-Algerian joint venture opens a new plant. In Egypt, several companies, including Egyptian Steel Group, planned to expand capacity. Libya's current steel plants are expected to resume production at the levels of before the war in 2011 and to restart previous expansion plans. Steel production is likely to start in Tanzania with the opening of the Liganga iron ore mine by 2018. In Ethiopia, the Toussa plant is planned to start production by late 2015. Output is also expected to increase in Mauritania, Tunisia, and Zambia (table 12).

**Iron Ore.—Production.**—In 2012, the iron content of ore produced in Africa was 58.1 Mt. Increased production in South Africa was attributable to the Beeshoek, the Khumani, and the Palabora Mines; output decreased at the Mapochs, the Sishen, and the Thabazimbi Mines. Output increased at the Western Range project in Liberia in 2012. In Sierra Leone, production increased at the Marampa and the Tonkolili Mines. South Africa was the leading iron ore producer in Africa and accounted for 72% of continental output; Mauritania, 13%; Sierra Leone, 6%; and Egypt, 4% (table 11).

**Outlook.**—The iron content of ore produced in Africa is expected to increase to about 194 Mt in 2019. Most of the increase is likely to be attributable to countries in West Africa. In Guinea, the planned opening of the Forecariah Mine was in 2013 and the Nimba project, in early 2016. Production from the new mines in Blocks 1 through 4 near Simandou, the Kalia Mine, and the Zogota Mine could start by 2017. Iron ore production could start at the Kango Mine in Gabon in 2019. The expansions of the Marampa and the Tonkolili Mines in Sierra Leone are expected to be completed by 2017. In Liberia, the openings of the Bong Mine and the Putu Range project are planned for 2014 and 2017, respectively. Production is also likely to increase at the Western Range project. Mauritania's output was expected to nearly triple because of the expansions of the Guelb el Rhein, the Kedia d'Idjill, and the M'Haoudat Mines and the startup of the Guelb El Aouj and other projects (table 11).

In South Africa, full production at the Khumani and the Kolomela Mines was planned for 2013. New expansions were planned at Palabora and Thabazimbi by 2013 and 2019, respectively. Iron ore mining is likely to start at the Tete project in Mozambique in 2016 and at the Liganga Mine in Tanzania in 2018 (table 11).

Guinea, Liberia, and Sierra Leone did not produce iron ore in 2010; their shares of African iron ore production by 2019 are expected to be 41%, 11%, and 8%, respectively. South Africa's share is likely to decline to 24% from 75% in spite of a substantial increase in domestic production (table 11).

**Nickel.—Production.**—African nickel mine production increased by about 6% from 2011 to 2012. In South Africa, increased output from the Nkomati Mine more than offset decreased production from PGM mining operations. Production increased at the Ambatovy Mine in Madagascar. Botswana's nickel output also increased. The Munali Mine in Zambia shut down in 2012. South Africa accounted for 57% of African nickel mine production in 2012; Botswana, 22%; and Madagascar and Zimbabwe, 10% each (table 13).

**Consumption.**—In 2012, world primary refined nickel consumption increased to nearly 1.66 Mt from 1.58 Mt in 2011. Africa's primary refined nickel consumption increased to 24,800 t in 2012 from 21,800 t in 2011 (International Nickel Study Group, 2013).

**Outlook.**—African nickel mine production is expected to increase by an average of about 15% per year from 2012 to 2019. In South Africa, nickel production is likely to reach full capacity at Anglo American Platinum Ltd.'s PGM operations by 2016. Output is also likely to increase at other PGM mining operations and at the Nkomati Mine. In Madagascar, the Ambatovy Mine could reach full capacity in 2016. The Enterprise Mine in Zambia could open in 2015, and the Munali Mine could reopen in 2017. By 2019, Madagascar and Zambia could increase their shares of African nickel mine production to 30% and 21%, respectively (table 13).

**Platinum-Group Metals.**—**Production.**—From 2011 to 2012, Africa's production of palladium and platinum decreased by 5% and 11%, respectively. In South Africa, decreased palladium and platinum production in 2012 was attributable to the Crocodile River, the Eland, the Impala, the Marikana, the Pilanesburg, the Siphumelele, the Thembelani, the Tumela, and the Union Mines. The Everest and the Smokey Hills Mines shut down operations in 2012. Output increased at the Nkomati, the Two Rivers, and the Zondereinde Mines. In Zimbabwe, PGM production increased at the Unki Platinum Mine. South Africa, which was the continent's dominant producer of PGM, accounted for 91% and 87% of the production of platinum and palladium, respectively (tables 14, 15).

**Outlook.**—African mine production of palladium and platinum is expected to increase by an average of about 4% per year each from 2012 to 2019. In South Africa, the expansions at the Bokoni, the Impala, and the Marula Mines could be completed in 2018. The opening of the Booyensdal Mine is planned for 2013; the Styldrift I Project and the Western Bushveld Joint Venture, for 2015, and the Waterberg project, for 2018. Output in Zimbabwe could also increase by 2017 (tables 14, 15).

**Tin.**—**Production.**—In 2012, African tin mine production decreased by about 26% compared with that of 2011. Output decreased at artisanal and small-scale mining operations in Congo (Kinshasa); Rwanda's production also decreased. The Abu Dabbab project started production in Egypt. In 2012, Congo (Kinshasa) accounted for 59% of African tin mine production, Rwanda, 23%; Nigeria, 9%; and Egypt, 6% (table 16).

Africa did not produce refined tin in 2012 (table 17). Reported production of tin metal ceased in Nigeria and Rwanda in 2005 and 2006, respectively.

**Outlook.**—African tin mine production is expected to more than double from 2012 through 2015 because of the opening of the Achmmach project in Morocco and the Ugandan Tin project in Uganda and increased production at the Abu Dabbab project in Egypt. It is unclear whether sufficient markets could be found for minerals produced in Nord-Kivu and Sud-Kivu Provinces in Congo (Kinshasa) that were not certified as conflict-free (table 16).

## **Industrial Minerals**

**Diamond.**—**Production.**—In 2012, Africa's share of world diamond production, by volume, was 56% (table 4). African diamond production increased by about 3% in 2012 compared with that of 2011. In Zimbabwe, output increased at the Mareng diamond fields. In Congo (Kinshasa), large-scale diamond mines at Mbuji-Mayi and Tshibwe and artisanal diamond miners increased their output. Artisanal diamond production increased in Central African Republic and Guinea. Output increased at large-scale operations in Lesotho and Namibia. In Botswana, production decreased at the Jwaneng and the Letlhakane Mines. Artisanal diamond output decreased in Ghana and Guinea (table 18).

Congo (Kinshasa) accounted for 29% of African diamond output, by volume; Botswana, 28%; Zimbabwe, 17%; Angola, 11%; South Africa, 10%; and Namibia, 2%. Large-scale mining operations were predominant in Angola, Botswana, Lesotho, Namibia, and South Africa (table 18).

In 2012, the global value of rough diamond production amounted to \$13.4 billion, of which Africa accounted for more than 49%. Botswana accounted for 20% of the value of global rough diamond output; Angola, 9%; Namibia, 7%; South Africa, 6%; Zimbabwe, 4%; Lesotho, 2%; and Congo (Kinshasa), 1%. The global value of polished diamond production amounted to \$19.7 billion, of which Botswana, Namibia, and South Africa combined accounted for 10% (Even-Zohar, 2013).

The Kimberley Process Certification Scheme (KPCS) was established in 2003 to reduce the trade in conflict diamond, particularly diamond originating from Angola, Congo (Kinshasa), and Sierra Leone. The establishment of the KPCS involved Government officials from 80 countries that produced, processed, and imported diamond as well as representatives from the European Union, the World Diamond Council, and nongovernmental organizations. As of December 2012, the following African countries had met the minimum requirements of the KPCS: Angola, Botswana, Cameroon, Central African Republic, Congo (Brazzaville), Congo (Kinshasa), Ghana, Guinea, Lesotho, Liberia, Mauritius, Namibia, Sierra Leone, South Africa, Tanzania, Togo, and Zimbabwe (Global Policy Forum, 2013).

In December 2005, the United Nations Security Council banned the importation of rough diamond from Côte d'Ivoire because of the alleged link between illegal diamond mining and the country's unresolved armed conflict. In April 2012, through Resolution 2045 (2012), the United Nations Security Council decided to renew until April 30, 2013, the measures in place to prevent any country from importing rough diamond from Côte d'Ivoire (United Nations Security Council, 2005; 2012; 2013, p. 39, 43).

**Outlook.**—The production of rough diamond in Africa is expected to increase by an average of nearly 4% per year from 2012 to 2019, with output increasing by more than 1 million carats per year each in Angola, Botswana, Congo (Kinshasa), Lesotho, South Africa, and Zimbabwe. In Botswana, increased output is likely to be partially attributable to the opening of the Karowe Mine and the reopening of the Damtshaa Mine. Large-scale diamond mining is expected to increase at

Tshibwe in Congo (Kinshasa). Production could rise at Marengue in Zimbabwe from 2012 to 2015 (table 18).

The opening of the Lighobong Mine in Lesotho is planned for 2016. In Tanzania, the expansion at the Williamson Mine is likely to be completed by 2017. In South Africa, the expansions of the Kimberley Underground and the Koffiefontein Mines in 2016, the Finsch Mine in 2018, and the Cullinan Mine in 2019 would contribute to increased production. The increase in Angola's output would be partially attributable to the opening of the Tchegi Mine and the expansion of the Luo Mine (table 18).

**Lithium.**—*Production.*—Zimbabwe was Africa's only producer of lithium minerals. In 2012, production at the Bikita Mine increased by about 10% (table 19).

*Outlook.*—Lithium mineral production at the Bikita Mine is likely to increase from 2012 to 2015 and then remain stable (table 19).

### **Mineral Fuels and Related Materials**

**Coal.**—*Production.*—African coal production increased by about 5% in 2012 compared with that of 2011. The increase in South Africa's production was attributable to numerous mines that included the Bosjesspruit, the Brandspruit, the Dorstfontein East, the Dorstfontein West, the Goedgevonden, and the Optimum Mines. The Benga Mine started operations in Mozambique and the Moatize Mine increased production in 2012. Output also increased at the Morupule Mine in Botswana and the Entuba Coalfields in Zimbabwe. South Africa, which was the dominant coal producer in Africa, accounted for 96% of regional coal output; Mozambique, 2%; and Zimbabwe, 1% (table 20). About 99% of South Africa's coal production was bituminous. Africa accounted for about 4% of the world's total anthracite and bituminous coal production in 2012 (table 4).

*Consumption.*—Africa accounted for nearly 3% of world coal consumption in 2012. Within the region, South Africa accounted for 92% of African coal consumption. From 2007 to 2012, Africa's consumption of coal remained nearly unchanged (BP p.l.c., 2013, p. 33).

*Outlook.*—African coal production is expected to increase by about 5% per year from 2012 to 2019. South Africa is likely to be responsible for the majority of the increase; its production could increase to 341 Mt by 2019 (table 20). Increased output would be broadly based, with at least 14 companies planning new mines or expansions of existing mines by 2019. At least 20 new mines and 4 expansions of existing mines are planned.

Mozambique became the second-ranked coal producer in Africa in 2012. Production is expected to increase at the Benga, the Changara, and the Moatize Mines by 2016. The Ncondezi and the Revuboe Mines are also likely to start up by 2016. Tanzania could become the third-ranked producer with the expansion of the Ngaka Mine by 2015 and the opening of the Mchuchuma Mine by 2018. Coal mining is also expected to increase in Ethiopia and Malawi (table 20).

### **Trade Review and Outlook**

Sub-Saharan Africa's current account deficit amounted to 3% of the GDP in 2012. Oil-exporting countries had an average current account surplus of 6.9% of the GDP. Middle-income

oil-importing countries had an average current account deficit of 6.2% of the GDP, and low-income oil-importing countries, an average deficit of 13% of the GDP (International Monetary Fund, 2013, p. 79).

The average current account deficit for middle-income oil-importing countries is expected to be 6.3% of the GDP in 2013 and 6.1% of the GDP in 2014. For low-income oil-importing countries, the deficit is forecasted to be 12.2% of the GDP in 2013 and 12.1% of the GDP in 2014. For oil-exporting countries, the surplus is predicted to be 3.7% of the GDP in 2013 and 3.2% of the GDP in 2014. Sub-Saharan Africa is expected to run a current account deficit of 4% of the GDP in 2013 and 2014 (International Monetary Fund, 2013, p. 79).

In 2012, Europe received 40% of Africa's petroleum exports; China, 18%; the United States, 17%; India, 9%; and other countries in the Asia and the Pacific region, 9%. West African countries sent 46% of their exports to China, India, and other countries in the Asia and the Pacific region and 29% to Europe. North African countries sent 61% of their exports to Europe and 13% to the United States (BP p.l.c., 2013, p. 18).

Africa's natural gas exporters included Algeria, which accounted for 49.8% of the continent's natural gas exports; Nigeria, at least 27.2%; Egypt, at least 6.7%; Libya, 6.5%; Equatorial Guinea, 4.9%; and Mozambique, 3.6%. Italy received 28% of total African natural gas exports; Spain, 20%; Japan, 12%; France, 8%; Turkey, 6%; and India and the Republic of Korea, 4% each. Intra-regional exports to other Africa countries accounted for only 6% of total African natural gas exports (BP p.l.c., 2013, p. 28).

In 2012, Asian countries (particularly China) received the vast majority of Africa's iron ore exports. Intra-regional trade to other African countries accounted for less than 1% of total African iron ore exports (World Steel Association Committee on Economic Studies, 2013a, p. 99; 2013b, p. 22).

Intra-regional mineral trade was, however, significant for gold. South Africa imported gold, mostly from West African countries, to supply its gold refinery. A majority of African gold mine production was refined in South Africa before being exported to other regions.

Most of Africa's copper and PGM production was also exported in refined form. The majority of Africa's chromite production was processed into ferrochromium prior to export. For other mineral commodities, which included bauxite, colored gemstones, diamond, iron ore, manganese, niobium (columbium), petroleum, tantalum, tin, tungsten, and uranium, most or all of the continent's production was exported prior to downstream processing.

### **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 fuel use in artisanal production of bricks and lime, and removal of tree cover to access diamond, gemstone, and sand and gravel deposits. The use of mercury by artisanal gold miners has led to serious air and water pollution in such African countries as Congo (Kinshasa), Ghana, Kenya, Mozambique, Sudan, Tanzania, and Zimbabwe (United Nations Environmental Programme, 2011, p. 32, 34).



In South Africa's Witwatersrand basin, acid mine drainage from gold mining operations threatened to contaminate water supplies in Gauteng Province with increased levels of toxic heavy metals and radioactive particles. The acid mine drainage was the result of leaching from tailings piles and from abandoned deep underground mines that filled with water that became acidic. In the eastern part of the Witwatersrand basin, the rising water levels in the mines are expected to reach the environmental critical level (ECL) (which is the highest level in a mine in which groundwater systems are not contaminated) by June 2014. In the central part of the basin, which includes Johannesburg, the ECL is expected to be reached in mid-2013 (Allan, 2013).

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TABLE 1  
AFRICA: AREA AND POPULATION IN 2012

Country	Area <sup>1</sup> (square kilometers)	Estimated population <sup>2</sup> (thousands)
Algeria	2,381,741	38,482
Angola	1,246,700	20,821
Benin	112,622	10,051
Botswana	581,730	2,004
Burkina Faso	274,200	16,460
Burundi	27,830	9,850
Cameroon	475,440	21,700
Cape Verde	4,033	494
Central African Republic	622,984	4,525
Chad	1,284,000	12,448
Comoros	2,235	718
Congo (Brazzaville)	342,000	4,337
Congo (Kinshasa)	2,344,858	65,705
Côte d'Ivoire	322,463	19,840
Djibouti	23,200	860
Egypt	1,001,450	80,722
Equatorial Guinea	28,051	736
Eritrea	117,600	6,131
Ethiopia	1,104,300	91,729
Gabon	267,667	1,633
Gambia, The	11,295	1,791
Ghana	238,533	25,366
Guinea	245,857	11,451
Guinea-Bissau	36,125	1,664
Kenya	580,367	43,178
Lesotho	30,355	2,052
Liberia	111,369	4,190
Libya	1,759,540	6,155
Madagascar	587,041	22,294
Malawi	118,484	15,906
Mali	1,240,192	14,854
Mauritania	1,030,700	3,796
Mauritius	2,040	1,291
Mayotte	374 <sup>3</sup>	NA
Morocco	446,550	32,521
Mozambique	799,380	25,203
Namibia	824,292	2,259
Niger	1,267,000	17,157
Nigeria	923,768	168,834
Reunion	2,517 <sup>3</sup>	NA
Rwanda	26,338	11,458
Sao Tome e Principe	964	188
Senegal	196,722	13,726
Seychelles	455	88
Sierra Leone	71,740	5,979
Somalia	637,657	10,195
South Africa	1,219,090	52,275
South Sudan	644,329	10,838
Sudan	1,861,484	37,195
Swaziland	17,364	1,231
Tanzania	947,300	47,783
Togo	56,785	6,643
Tunisia	163,610	10,778
Uganda	241,038	36,346

See footnotes at end of table.

TABLE 1—Continued  
AFRICA: AREA AND POPULATION IN 2012

Country	Area <sup>1</sup> (square kilometers)	Estimated population <sup>2</sup> (thousands)
Western Sahara	266,000 <sup>3</sup>	NA
Zambia	752,618	14,075
Zimbabwe	390,757	13,724
Total	30,315,134	1,081,730
World total (land only) <sup>4</sup>	148,940,000	7,046,368

NA Not available.

<sup>1</sup>Source: U.S. Central Intelligence Agency, The World Factbook.

<sup>2</sup>Source: The World Bank, 2012 World Development Indicators Database.

<sup>3</sup>2010 data.

<sup>4</sup>Source: The World Bank, 2013 World Development Indicators Database.

TABLE 2  
AFRICA: GROSS DOMESTIC PRODUCT<sup>1,2</sup>

Country	Gross domestic product in 2012 based on purchasing power parity		Real gross domestic product growth rate (percentage)		
	Gross value (billion dollars)	Per capita (dollars)	2010	2011	2012
Algeria	272.5	7,268	3.6	2.6	3.3
Angola	123.1	6,092	3.4	3.9	5.2
Benin	15.6	1,556	2.6	3.5	5.4
Botswana	32.3	15,706	8.6	6.1	4.2
Burkina Faso	24.6	1,415	8.4	5.0	9.0
Burundi	5.4	619	3.8	4.2	4.0
Cameroon	50.2	2,338	3.3	4.1	4.6
Cape Verde	2.2	4,368	1.5	4.0	2.5
Central African Republic	3.8	851	3.0	3.3	4.1
Chad	26.6	2,474	13.6	0.1	8.9
Comoros	0.9	1,251	2.1	2.2	3.0
Congo (Brazzaville)	18.9	4,616	8.8	3.4	3.8
Congo (Kinshasa)	27.3	365	7.2	6.9	7.2
Côte d'Ivoire	39.9	1,707	2.4	-4.7	9.8
Djibouti	2.4	2,648	3.5	4.5	4.8
Egypt	534.1	6,474	5.1	1.8	2.2
Equatorial Guinea	19.7	26,487	-2.6	4.6	5.3
Eritrea	4.3	710	2.2	8.7	7.0
Ethiopia	109.0	1,256	10.6	11.4	8.5
Gabon	27.8	18,052	6.7	7.1	5.6
Gambia, The	3.4	1,868	6.5	-4.3	5.3
Ghana	82.7	3,316	8.0	15.0	7.9
Guinea	12.0	1,109	1.9	3.9	3.9
Guinea-Bissau	1.9	1,210	3.5	5.3	-1.5
Kenya	75.0	1,781	5.8	4.4	4.6
Lesotho	4.0	2,126	6.3	5.7	4.5
Liberia	2.6	665	6.1	7.9	8.3
Libya	76.5	11,936	5.0	-62.1	104.5
Madagascar	21.2	945	0.4	1.8	1.9
Malawi	14.1	848	6.5	4.3	1.9
Mali	17.8	1,088	5.8	2.7	-1.2
Mauritania	7.6	2,096	4.7	3.6	6.9
Mauritius	20.0	15,424	4.2	3.8	3.3
Mayotte	NA	NA	NA	NA	NA
Morocco	168.9	5,193	3.6	5.0	2.7
Mozambique	26.0	1,156	7.1	7.3	7.4

See footnotes at end of table.

TABLE 2—Continued  
AFRICA: GROSS DOMESTIC PRODUCT<sup>1,2</sup>

Country	Gross domestic product in 2012 based on purchasing power parity		Real gross domestic product growth rate (percentage)		
	Gross value (billion dollars)	Per capita (dollars)	2010	2011	2012
Namibia	16.8	7,800	6.3	5.7	5.0
Niger	13.0	807	10.7	2.2	11.2
Nigeria	444.3	2,697	8.0	7.4	6.6
Reunion	NA	NA	NA	NA	NA
Rwanda	15.0	1,441	7.2	8.2	8.0
Sao Tome e Principe	0.4	2,121	4.5	4.9	4.0
Senegal	26.3	2,005	4.3	2.6	3.5
Seychelles	2.3	24,989	5.6	5.0	2.9
Sierra Leone	8.0	1,295	5.3	6.0	15.2
Somalia <sup>3,4</sup>	5.9	600	2.6	2.6	2.6
South Africa	576.1	11,281	3.1	3.5	2.5
South Sudan	11.6	1,120	XX	NA	-47.6
Sudan	NA	2,549	2.5	-1.8	-3.3
Swaziland	6.2	5,719	1.9	0.3	-1.5
Tanzania	73.1	1,627	7.0	6.4	6.9
Togo	6.9	1,093	4.0	4.8	5.6
Tunisia	104.0	9,650	2.9	-1.9	3.6
Uganda	50.8	1,424	6.2	6.2	2.8
Western Sahara <sup>3,5</sup>	0.9	2,500	NA	NA	NA
Zambia	23.7	1,683	7.6	6.8	7.2
Zimbabwe	7.2	552	9.6	10.6	4.4
Regional total	1,906	161,750	XX	XX	XX
World total	83,193	XX	XX	XX	XX

NA Not available. XX Not applicable.

<sup>1</sup>Source: International Monetary Fund, World Economic Outlook Database, October 2013.

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

<sup>3</sup>Source: U.S. Central Intelligence Agency, The World Factbook.

<sup>4</sup>2010 estimate.

<sup>5</sup>2007 estimate.

TABLE 3  
SELECTED SIGNIFICANT AFRICAN EXPLORATION ACTIVITY IN 2012

Country	Type <sup>1</sup>	Site	Commodity <sup>2</sup>	Company	Resource <sup>2,3</sup>
Burkina Faso	E	Balogo	Au	Golden Rim Resources Ltd.	185,000 oz Au (IF).
Do.	E	Banfora	Au	Gryphon Minerals Ltd.	1 Moz Au (R).
Do.	E	Bombore	Au	Orezone Gold Corp.	4.56 Moz Au (D).
Do.	E	Batie West/Konkera	Au	Ampella Mining Ltd.	2 Moz Au (ID).
Do.	P	Mana	Au	SEMAFO, Inc.	2 Moz Au (D).
Congo (Brazzaville)	E	Hinda	P <sub>2</sub> O <sub>5</sub> , U <sub>3</sub> O <sub>8</sub>	Cominco Resources Ltd.	53 Mt P <sub>2</sub> O <sub>5</sub> , 38,000 t U <sub>3</sub> O <sub>8</sub> (D).
Côte d'Ivoire	F	Tengrela/Sissengue	Au	Perseus Mining Ltd.	655,000 oz Au (R).
Do.	E	Mt. Yaoure	Au	Amara Mining plc.	477,000 oz Au (D).
Ghana	P	Edikani/Central Ashanti	Au	Perseus Mining Ltd.	3.4 Moz Au (R).
Do.	F	Oboitan	Au	PMI Gold Corp.	2.4 Moz Au (R).
Do.	F	Wa-Lawra	Au	Azumah Resources Ltd.	431,000 oz Au (R).
Liberia	E	Western Cluster	Fe	Sesa Sterlite Ltd.	49 Mt Fe (D).
Mali	E	Fekola	Au	Papillon Resources Ltd.	3.5 Moz Au (ID).
Do.	E	Siribaya	Au	IAMGOLD Corp.	304,000 oz Au (ID).
Morocco	F	Achmmach	Sn	Kashah Resources Corp.	127,000 t Sn (ID).
Senegal	P	Sabodala	Au	Teranga Gold Corp.	1.4 Moz Au (R).
Sierra Leone	E	Nimini/Komahun	Au	Polo Resources Ltd.	521,000 oz Au (ID).
South Africa	E	Platreef	PGM, Au, Ni, Cu	Ivanhoe Mines Ltd.	29 Moz 3PGM+Au, 758,000 t Ni, 357,000 t Cu (ID).
Do.	E	Waterberg	PGM, Au, Ni, Cu	Platinum Group Metals Ltd.	10 Moz 2PGM+Au, 73,000 t Ni, 62,000 t Cu (IF).
Tanzania	E	Mtonya	U <sub>3</sub> O <sub>8</sub>	Uranium Resources plc.	Data not released.
Zambia	E	Mumbwa	Cu, Au, Ag	Blackthorn Resources Ltd.	1 Mt Cu, 85,000 oz Au, 2.4 Moz Ag (ID).
Do.	D	Trident	Cu, Ni	First Quantum Minerals Ltd.	3.9 Mt Cu, 360,000 t Ni (R).

Do. Ditto.

<sup>1</sup>D—Approved for development; E—Active exploration; F—Feasibility work ongoing/completed; P—Exploration related to existing producing operation.

<sup>2</sup>Abbreviations used in this table for commodities include the following: Ag—silver; Au—gold; Cu—copper; Fe—iron ore; Ni—nickel; P<sub>2</sub>O<sub>5</sub>—phosphate; PGM—platinum-group metals; 2PGM + Au— Includes platinum, palladium, and gold; 3PGM+Au—Includes platinum, palladium, rhodium, and gold; Sn—tin; U<sub>3</sub>O<sub>8</sub>—uranium.

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.

<sup>3</sup>Based on 2012 data reported from various sources; D—measured + indicated; ID—indicated; IF—inferred; R—proven + probable.

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

TABLE 4  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2012<sup>1</sup>  
(Thousand metric tons unless otherwise specified)

Country	Metals										
	Aluminum		Chromite, mine output, gross weight	Cobalt,		Copper, mine output, Cu content	Gold, mine output (kilograms)	Iron and steel		Lead, mine output, Pb content (metric tons)	Manganese ore, mine output, Mn content
	Bauxite	Metal <sup>2</sup>		mine output, Co content (metric tons)	mine output gross weight			Steel, crude	Iron ore, gross weight		
Algeria	--	--	--	--	--	323	--	1,560	--	557	--
Angola	--	--	--	--	--	--	--	--	--	--	--
Benin <sup>e</sup>	--	--	--	--	--	--	--	--	--	--	--
Botswana	--	--	--	195	36	1,800 <sup>e</sup>	--	--	--	--	--
Burkina Faso	--	--	--	--	--	27,850 <sup>3</sup>	--	--	--	--	23 <sup>e</sup>
Burundi	--	--	--	--	--	300 <sup>e</sup>	--	--	--	--	--
Cameroon	--	69	--	--	--	1,500 <sup>e</sup>	--	--	--	--	--
Cape Verde	--	--	--	--	--	--	--	--	--	--	--
Central African Republic	--	--	--	--	--	55 <sup>e</sup>	--	--	--	--	--
Chad	--	--	--	--	--	NA	--	--	--	--	--
Congo (Brazzaville)	--	--	--	--	--	150 <sup>e</sup>	--	--	--	--	--
Congo (Kinshasa) <sup>e</sup>	--	--	--	51,000	660	14,000	--	--	110	--	--
Côte d'Ivoire	--	--	--	--	--	10,423	--	--	--	--	45
Djibouti	--	--	--	--	--	--	--	--	--	--	--
Egypt <sup>e</sup>	--	580	--	--	--	8,148 <sup>4</sup>	--	4,000	6,627 <sup>4</sup>	--	36
Equatorial Guinea	--	--	--	--	--	NA	--	--	--	--	--
Eritrea	--	--	--	--	--	9,700	--	--	--	--	--
Ethiopia	--	--	--	--	--	12,311	--	--	130 <sup>e</sup>	--	--
Gabon	--	--	--	--	--	666	--	--	--	--	1,650
Gambia, The	--	--	--	--	--	--	--	--	--	--	--
Ghana	753	40 <sup>e</sup>	--	--	--	86,699	--	--	--	--	348 <sup>e</sup>
Guinea	16,041	--	--	--	--	14,790 <sup>5</sup>	--	--	--	--	--
Kenya <sup>e</sup>	--	8	--	--	--	1,600	11	290	--	--	--
Lesotho	--	--	--	--	--	--	--	--	--	--	--
Liberia	--	--	--	--	--	641	3,300	--	--	--	--
Libya	--	--	--	--	--	400	--	--	315	--	--
Madagascar <sup>e</sup>	--	--	67	720	--	--	--	--	--	--	--
Malawi	--	--	--	--	--	40,132	--	--	--	--	--
Mali	--	--	--	--	38	7,652	11,200	5 <sup>e</sup>	--	--	--
Mauritania	--	--	--	--	--	--	--	--	--	--	--
Mauritius	--	--	--	--	--	--	--	--	--	--	--
Morocco and Western Sahara <sup>e</sup>	--	--	--	2,000	12	500	80	475	30,000	49	--
Mozambique	8	564	--	--	--	178	--	--	--	--	--
Namibia	--	--	--	--	5	2,302	--	--	9,000 <sup>e</sup>	78 <sup>e</sup>	--
Niger	--	--	--	--	--	1,662	--	--	--	--	--
Nigeria <sup>e</sup>	--	26	--	--	--	4,000	70	400	--	--	--
Reunion	--	--	--	--	--	--	--	--	--	--	--

See footnotes at end of table.

TABLE 4—Continued  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2012<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Country	Metals														
	Aluminum		Chromite,		Cobalt,		Copper,		Gold,		Iron and steel		Lead,		Manganese
	Bauxite	Metal <sup>2</sup>	mine output, gross weight	mine output, gross weight	mine output, Co content (metric tons)	mine output, Cu content	mine output (kilograms)	mine output, gross weight	mine output, gross weight	mine output, Pb content (metric tons)	mine output, Mn content	mine output, Pb content (metric tons)	mine output, Mn content	mine output, Mn content	mine output, Mn content
Rwanda	--	--	--	--	--	--	3 <sup>e</sup>	--	--	--	--	--	--	--	--
Senegal	--	--	--	--	--	--	6,666	--	--	--	--	--	--	--	--
Seychelles	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sierra Leone	776	--	--	--	--	--	141	6,600	--	--	--	--	--	--	--
Somalia	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
South Africa	--	665	11,310	2,500 <sup>e</sup>	81	154,178	67,100	6,938	52,489	3,600	--	--	--	--	--
South Sudan	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Sudan	--	--	18	--	--	46,133	--	--	--	--	--	--	--	--	--
Swaziland	--	--	--	--	--	--	1,032	--	--	--	--	--	--	--	--
Tanzania	28 <sup>e</sup>	--	--	--	6	40,650	40	--	--	--	--	--	--	--	--
Togo <sup>e</sup>	--	--	--	--	--	16,500	223	109	--	--	--	--	--	--	--
Tunisia	--	--	--	--	--	--	3	7 <sup>e</sup>	--	--	--	--	--	--	--
Uganda	--	--	--	--	--	5,300	690	4,500	50	40	--	--	--	--	--
Zambia <sup>e</sup>	--	--	--	408 <sup>4</sup>	88	14,742 <sup>4</sup>	15	--	--	--	--	--	--	--	--
Zimbabwe <sup>e</sup>	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Total	17,600	1,950	11,800	61,800	1,530	531,000	95,200	16,000	91,500	5,870	--	--	--	--	--
Share of world total	7%	4%	38%	60%	9%	20%	2%	1%	2%	38%	--	--	--	--	--
United States	NA	2,070	--	--	1,170	235,000	54,200	88,700	345,000	--	--	--	--	--	--
Share of world total	NA	4%	--	--	7%	9%	2%	6%	7%	--	--	--	--	--	--
World total	256,000	55,000	31,200	102,000	16,800	2,700,000	2,980,000	1,590,000	5,200,000	15,600	--	--	--	--	--

See footnotes at end of table.

TABLE 4—Continued  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2012<sup>1</sup>

(Thousand metric tons unless otherwise specified)

Country	Metals—		Industrial minerals				Mineral fuels		
	Continued	Zinc, mine output, Zn content (metric tons)	Cement, hydraulic	Diamond, natural (thousand carats) <sup>6</sup>	Graphite (metric tons)	Phosphate rock, gross weight	Coal, anthracite and bituminous	Petroleum, crude (thousand 42-gallon barrels)	Uranium, U <sub>3</sub> O <sub>8</sub> content (metric tons)
Algeria	--	--	19,000	--	--	1,251	--	608,455	--
Angola	--	--	1,600 <sup>e</sup>	--	--	--	--	651,160	--
Benin	--	--	1,390	8,331 <sup>7,8</sup>	--	--	--	--	--
Botswana	--	--	--	20,478 <sup>9</sup>	--	--	1,455	--	--
Burkina Faso <sup>e</sup>	--	--	600	--	--	NA	--	--	--
Burundi	--	--	71	--	--	--	--	--	--
Cameroon <sup>e</sup>	--	--	1,100	5	--	--	--	22,995 <sup>4</sup>	--
Cape Verde	--	--	--	--	--	--	--	--	--
Central African Republic	--	--	--	366	--	--	--	--	--
Chad <sup>e</sup>	--	--	200	--	--	--	--	37,000	--
Congo (Brazzaville) <sup>e</sup>	--	--	150	52 <sup>4</sup>	--	--	--	99,000	--
Congo (Kinshasa)	10,319	--	377	20,900 <sup>e</sup>	--	--	--	8,545	--
Côte d'Ivoire	--	--	78	--	--	--	--	10,770	--
Djibouti	--	--	--	--	--	--	--	--	--
Egypt	--	--	55,200	--	--	6,236	300 <sup>e</sup>	265,720	--
Equatorial Guinea	--	--	--	--	--	--	--	98,000 <sup>e</sup>	--
Eritrea	--	--	45 <sup>e</sup>	--	--	--	--	--	--
Ethiopia	--	--	3,500 <sup>e</sup>	--	--	--	--	--	--
Gabon	--	--	220 <sup>e</sup>	--	--	--	--	88,330	--
Gambia, The	--	--	--	--	--	--	--	--	--
Ghana	--	--	3,000 <sup>e</sup>	233	--	--	--	26,429	--
Guinea	--	--	317	267	--	--	--	--	--
Kenya	--	--	4,640	--	--	--	--	--	--
Lesotho	--	--	--	479	--	--	--	--	--
Liberia	--	--	109	34	--	--	--	--	--
Libya	--	--	4,000 <sup>e</sup>	--	--	--	--	550,785	--
Madagascar <sup>e</sup>	--	--	410	--	4,100	--	--	--	--
Malawi	--	--	175	--	--	--	92	--	1,298
Mali	--	--	644	--	--	20 <sup>e</sup>	--	--	--
Mauritania	--	--	--	--	--	--	--	2,400	--
Mauritius	--	--	--	--	--	--	--	--	--
Morocco and Western Sahara <sup>e</sup>	46,000	--	14,500	--	--	28,000	--	1,600	--
Mozambique	--	--	1,184	--	--	--	4,900	--	--
Namibia	50,000 <sup>e</sup>	--	501	1,629	--	--	--	--	4,495
Niger	--	--	73 <sup>e</sup>	--	--	--	235	--	5,504
Nigeria	--	--	16,400	--	--	--	40 <sup>e</sup>	852,777	--
Reunion	--	--	-- <sup>e</sup>	--	--	--	--	--	--

See footnotes at end of table.



TABLE 4—Continued  
AFRICA: PRODUCTION OF SELECTED MINERAL COMMODITIES IN 2012<sup>1</sup>

(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) <sup>6</sup>	Graphite (metric tons)	Phosphate rock, gross weight	Coal, anthracite and bituminous	Petroleum, crude (thousand 42-gallon barrels)	Uranium, U <sub>3</sub> O <sub>8</sub> content (metric tons)		
Rwanda	--	100	--	--	--	--	--	--		
Senegal	--	4,689	--	--	1,381	--	57	--		
Seychelles	--	--	--	--	--	--	--	--		
Sierra Leone	--	335 <sup>p</sup>	541	--	--	--	--	--		
Somalia	--	--	--	--	--	--	--	--		
South Africa	37,034	12,800 <sup>e</sup>	7,245	--	2,242	258,576	343	551		
South Sudan	--	--	--	--	--	--	8,900 <sup>e</sup>	--		
Sudan	--	3,477	--	--	--	--	37,737	--		
Swaziland	--	--	--	--	--	152	--	--		
Tanzania	--	2,581	127 <sup>10</sup>	--	18 <sup>e</sup>	79	--	--		
Togo	--	1,605	(11)	--	1,110	--	--	--		
Tunisia	--	7,241	--	--	2,762	--	23,725	--		
Uganda	--	1,600 <sup>e</sup>	--	--	--	--	--	--		
Zambia <sup>e</sup>	--	1,200	--	--	--	200	--	--		
Zimbabwe <sup>e</sup>	--	1,100	12,060 <sup>4</sup>	6,000	20	3,500	--	--		
Total	143,000	166,000	72,700	10,100	43,000	270,000	3,390,000	11,800		
Share of world total	1%	4%	56%	1%	21%	4%	12%	18%		
United States	738,000	74,900	--	--	30,100	851,000	366,000	1,880		
Share of world total	6%	2%	--	--	14%	13%	8%	3%		
World total	13,300,000	3,800,000	130,000	11,700,000	209,000	6,550,000	28,600,000	66,200		

<sup>e</sup>Estimated; estimated data, U.S. data, and world totals are rounded to no more than three significant digits. <sup>p</sup>Preliminary. NA Not available. -- Zero or zero percent.

<sup>1</sup>Totals may not add owing to independent rounding. Percentages are calculated on unrounded data. Table includes data available as of September 22, 2014.

<sup>2</sup>Primary and secondary production.

<sup>3</sup>Includes artisanal mining, which was estimated to be 1,600 kilograms.

<sup>4</sup>Reported figure.

<sup>5</sup>Does not include artisanal mining production, which has historically ranged between 1,500 and 5,000 kilograms per year.

<sup>6</sup>Gemstones and industrial diamond.

<sup>7</sup>Does not include smuggled production.

<sup>8</sup>Production was approximately 90% gem and 10% industrial grade.

<sup>9</sup>Assumed to contain about 70% gem and near gem.

<sup>10</sup>Diamond figures are estimated to represent 85% gem-quality or semigem-quality and 15% industrial-quality stones. Does not include smuggled artisanal production.

<sup>11</sup>Less than ½ unit.

TABLE 5  
AFRICA: HISTORIC AND PROJECTED BAUXITE MINE PRODUCTION, 2005–2019<sup>1</sup>

(Thousand metric tons)

Country	2005	2010	2012	2015 <sup>e</sup>	2017 <sup>e</sup>	2019 <sup>e</sup>
Ghana	727	600	753	800	1,500	1,500
Guinea	14,600	15,300	16,041	16,100	38,200	45,500
Mozambique	10	9	8	8	8	8
Sierra Leone	--	1,090	776	1,500	1,500	1,500
Tanzania	2	39	28	28	28	28
Total	15,300	17,100	17,600	18,400	41,200	48,500

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 6  
AFRICA: HISTORIC AND PROJECTED PRIMARY AND SECONDARY ALUMINUM METAL PRODUCTION, 2005–2019<sup>1</sup>

(Thousand metric tons)

Country	2005	2010	2012	2015 <sup>e</sup>	2017 <sup>e</sup>	2019 <sup>e</sup>
Cameroon	87	60	69	70	70	70
Egypt <sup>2</sup>	244	539	580	580	580	580
Ghana	--	--	40	40	40	100
Kenya <sup>2</sup>	2	6	6	6	6	6
Mozambique	555	557	564	570	570	570
Nigeria	--	21	26	--	--	--
South Africa	846	807	665	830	830	830
Total	1,700	2,000	2,000	2,100	2,100	2,200

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>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 COBALT MINE PRODUCTION, 2005–2019<sup>1</sup>

(Metal content in metric tons)

Country	2005	2010	2012	2015 <sup>e</sup>	2017 <sup>e</sup>	2019 <sup>e</sup>
Botswana	326	272	195	200	200	200
Congo (Kinshasa)	24,500	60,000	51,000	70,000	71,000	70,000
Madagascar	--	165	720	4,800	6,000	6,000
Morocco	1,100	3,130	2,000	2,000	2,000	2,000
South Africa	400	1,800	2,500	2,800	2,800	2,800
Zambia	9,300	6,200	5,300	7,000	10,000	10,000
Zimbabwe	281	79	88	90	90	90
Total	35,900	71,700	61,800	86,900	92,100	91,000

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 8  
AFRICA: HISTORIC AND PROJECTED COPPER MINE PRODUCTION, 2005–2019<sup>1</sup>

(Metal content in thousand metric tons)

Country	2005	2010	2012	2015 <sup>e</sup>	2017 <sup>e</sup>	2019 <sup>e</sup>
Botswana	31	21	36	40	48	58
Congo (Kinshasa)	97	420	660	1,070	1,140	1,170
Eritrea	--	--	--	82	39	42
Mauritania	--	37	40	40	40	40
Morocco	4	14	12	14	15	15
Namibia	10	--	5	13	23	24
South Africa	89	103	81	70	78	103
Tanzania <sup>2</sup>	4	5	6	8	8	8
Zambia	447	686	690	1,100	1,300	1,300
Zimbabwe	3	5	6	10	10	10
Total	690	1,300	1,500	2,400	2,700	2,800

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Copper contained in concentrates and dore.

TABLE 9  
AFRICA: HISTORIC AND PROJECTED REFINED COPPER METAL PRODUCTION, 2005–2019<sup>1</sup>

(Thousand metric tons)

Country	2005	2010	2012	2015 <sup>e</sup>	2017 <sup>e</sup>	2019 <sup>e</sup>
Congo (Kinshasa)	--	261	469	840	910	930
Egypt <sup>2</sup>	3	3	3	3	3	3
South Africa	99	81	66	51	59	77
Zambia	399	530	531	600	600	600
Zimbabwe	7	5	1	5	5	5
Total	510	880	1,100	1,500	1,600	1,600

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Egypt produced only secondary refined copper; primary production in all other African countries.

TABLE 10  
AFRICA: HISTORIC AND PROJECTED GOLD MINE PRODUCTION, 2005–2019<sup>1</sup>

(Metal content in kilograms)

Country	2005	2010	2012	2015 <sup>c</sup>	2017 <sup>c</sup>	2019 <sup>c</sup>
Algeria	--	723	323	500	500	500
Benin <sup>2</sup>	--	--	--	--	--	--
Botswana	4	1,800	1,800	2,000	2,000	2,000
Burkina Faso <sup>3</sup>	625	22,939	27,850	33,700	37,400	35,600
Burundi	--	300	300	300	300	300
Cameroon <sup>2</sup>	1,000	1,800	1,500	1,500	1,600	1,600
Central African Republic <sup>2</sup>	15	60	55	60	5,100	5,100
Chad	150	100	(4)	(4)	(4)	(4)
Congo (Brazzaville)	120	150	150	150	150	150
Congo (Kinshasa)	7,200	12,000	14,000	36,000	38,000	38,000
Cote d'Ivoire <sup>3</sup>	1,335	5,310	10,423	16,800	25,600	29,900
Egypt	--	9,847	8,148	15,000	15,000	15,000
Equatorial Guinea	200	200	(4)	(4)	(4)	(4)
Eritrea	25	50	9,700	1,500	2,500	2,500
Ethiopia	4,376	6,773	12,311	12,000	13,000	14,000
Gabon <sup>2</sup>	300	--	666	1,200	1,400	1,400
Ghana <sup>3</sup>	66,852	76,332	86,699	90,800	97,100	98,700
Guinea <sup>3</sup>	25,097	15,217	14,790	14,200	14,400	14,400
Kenya	616	2,355	1,600	1,600	1,600	1,600
Liberia <sup>2</sup>	27	666	641	2,800	3,700	3,700
Madagascar	10	30	400	400	400	400
Mali <sup>3</sup>	44,230	36,360	40,132	41,700	40,000	45,500
Mauritania	--	8,305	7,652	10,000	10,000	10,000
Morocco	1,786	650	550	500	500	500
Mozambique	63	106	178	180	180	180
Namibia <sup>5</sup>	2,703	2,675	2,302	4,800	5,400	5,400
Niger	4,962	1,950	1,662	1,100	1,500	1,500
Nigeria	30	3,718	4,000	4,000	4,000	4,000
Rwanda	10	3	3	3	3	3
Senegal	600	4,381	6,666	7,800	15,100	18,200
Sierra Leone <sup>6</sup>	53	270	141	200	6,300	5,900
South Africa	294,671	188,702	154,178	186,000	191,000	183,000
Sudan	3,625	26,317	46,133	29,800	31,500	32,000
Tanzania	47,270	39,448	40,650	39,000	41,000	41,000
Togo <sup>7</sup>	6,179	10,452	16,500	16,500	16,500	16,500
Uganda	46	--	--	--	--	--
Zambia	440	3,600	4,500	5,500	6,000	6,000
Zimbabwe	14,024	9,100	14,742	16,000	16,000	16,000
Total	529,000	493,000	531,000	594,000	645,000	650,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>From artisanal mining.

<sup>3</sup>Excludes production from artisanal mining.

<sup>4</sup>Gold is produced, but information is inadequate to make reliable estimates of output.

<sup>5</sup>Does not include gold produced as a byproduct of copper mining.

<sup>6</sup>From artisanal mining for the years 2005 and 2010 only.

<sup>7</sup>May include artisanal gold production from neighboring countries; however, information is inadequate to make reliable estimates of the output that originated from these countries.

TABLE 11  
AFRICA: HISTORIC AND PROJECTED BENEFICIATED IRON ORE PRODUCTION, 2005–2019<sup>1</sup>

(Fe content in thousand metric tons)

Country	Average grade	2005	2010	2012	2015 <sup>e</sup>	2017 <sup>c</sup>	2019 <sup>c</sup>
Algeria	50%	800	735	819	1,000	1,500	1,500
Egypt	55%	880	141	2,200	2,200	2,200	2,200
Gabon	64%	--	--	--	--	--	1,100
Guinea	37% to 55%	--	--	--	580	63,000	79,500
Kenya	60%	--	7	7	7	7	7
Liberia	34% to 61%	--	--	2,000	7,300	20,200	22,300
Mauritania	59% to 72%	7,000	7,500	7,280	10,000	15,000	20,000
Morocco	54%	4	24	44	44	42	40
Mozambique	50%	--	--	--	--	500	1,000
Nigeria	36%	20	23	25	25	2,000	2,800
Senegal	58%	--	--	--	--	--	--
Sierra Leone	58% to 65%	--	--	3,600	11,600	15,400	15,400
South Africa	62% to 65%	24,900	36,900	42,000	47,100	47,800	46,900
Swaziland	44.5%	--	--	--	--	--	--
Tanzania	52%	--	--	--	--	--	1,000
Tunisia	54%	108	94	100	100	100	100
Uganda	61% to 67%	--	2	29	30	30	30
Zambia	65%	--	--	--	100	150	150
Zimbabwe <sup>2</sup>	51%	185	--	--	--	--	--
Total		33,900	45,400	58,100	80,100	168,000	194,000

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Average iron content for Zimbabwe prior to 1996 was 61%. Since 1996, the average grade has been 51%.

TABLE 12  
AFRICA: HISTORIC AND PROJECTED CRUDE STEEL PRODUCTION, 2005–2019<sup>1</sup>

(Thousand metric tons)

Country	2005	2010	2012	2015 <sup>e</sup>	2017 <sup>c</sup>	2019 <sup>c</sup>
Algeria	1,007	688	557	2,400	4,900	7,400
Congo (Kinshasa)	110	104	110	110	110	110
Egypt	5,565	6,700	6,627	9,000	11,000	11,000
Ethiopia	60	150	130	250	1,200	1,700
Kenya	--	260	290	380	380	380
Libya	1,255	825	315	1,325	1,500	2,000
Mauritania	1	5	5	100	100	100
Morocco	205	455	475	475	500	500
Nigeria	100	100	400	400	400	400
South Africa	9,494	7,617	6,938	7,200	7,200	7,200
Tanzania	--	--	--	--	--	800
Tunisia	66	115	109	200	200	200
Uganda	30	7	7	7	7	7
Zambia	--	40	50	100	200	200
Zimbabwe	107	14	15	15	15	15
Total	18,000	17,100	15,600	22,000	27,700	32,000

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 13  
AFRICA: HISTORIC AND PROJECTED NICKEL MINE PRODUCTION, 2005–2019<sup>1</sup>

(Metal content in metric tons)

Country	2005	2010	2012	2015 <sup>c</sup>	2017 <sup>c</sup>	2019 <sup>c</sup>
Botswana	39,335	23,053	17,948	20,000	22,000	24,000
Madagascar	--	2,000	8,250	55,000	64,000	64,000
Morocco	99	317	225	250	250	250
South Africa	42,392	39,960	45,945	56,000	63,000	70,000
Zambia	--	2,482	--	1,000	45,000	45,000
Zimbabwe	8,556	6,200	7,899	8,000	8,000	8,000
Total	90,400	74,000	80,300	140,000	202,000	211,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 14  
AFRICA: HISTORIC AND PROJECTED PALLADIUM MINE PRODUCTION, 2005–2019<sup>1</sup>

(Metal content in kilograms)

Country	2005	2010	2012	2015 <sup>c</sup>	2017 <sup>c</sup>	2019 <sup>c</sup>
Botswana	NA	3,328	2,613	2,600	2,600	2,600
South Africa	82,961	82,222	74,738	76,600	87,900	99,400
Zimbabwe	3,879	7,000	9,000	10,000	13,000	13,000
Total	86,800	92,600	86,400	89,200	104,000	115,000

<sup>c</sup>Estimated. NA Not available.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 15  
AFRICA: HISTORIC AND PROJECTED PLATINUM MINE PRODUCTION, 2005–2019<sup>1</sup>

(Metal content in kilograms)

Country	2005	2010	2012	2015 <sup>c</sup>	2017 <sup>c</sup>	2019 <sup>c</sup>
Botswana	NA	560	435	450	450	450
Ethiopia	--	8	--	--	--	--
South Africa	163,711	147,790	128,590	135,000	156,000	167,000
Zimbabwe	4,834	8,800	11,900	12,000	16,000	16,000
Total	169,000	157,000	141,000	147,000	172,000	183,000

<sup>c</sup>Estimated. -- Negligible or no production. NA Not available.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 16  
AFRICA: HISTORIC AND PROJECTED TIN MINE PRODUCTION, 2005–2019<sup>1</sup>

(Metal content in metric tons)

Country	2005	2010	2012	2015 <sup>e</sup>	2017 <sup>e</sup>	2019 <sup>e</sup>
Burundi	4	12	21	20	20	20
Congo (Kinshasa)	4,400	8,600	3,700	3,700	3,700	3,700
Egypt	--	--	400	1,000	1,000	1,000
Morocco	--	--	--	6,000	6,000	6,000
Niger	14	6	10	10	10	10
Nigeria	1,300	520	570	600	600	600
Rwanda	170	3,000	1,600	1,600	1,600	1,600
Uganda	--	32	--	600	940	960
Total	5,900	12,200	6,300	13,500	13,900	13,900

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 17  
AFRICA: HISTORIC AND PROJECTED TIN METAL PRODUCTION, 2005–2019<sup>1</sup>

(Metric tons)

Country	2005	2010	2012	2015 <sup>e</sup>	2017 <sup>e</sup>	2019 <sup>e</sup>
Congo (Kinshasa)	--	--	--	--	--	--
Nigeria	25	--	--	--	--	--
Rwanda	200	--	--	--	--	--
Total	230	--	--	--	--	--

<sup>e</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

TABLE 18  
AFRICA: HISTORIC AND PROJECTED DIAMOND PRODUCTION, 2005–2019<sup>1</sup>

(Thousand carats)

Country	2005	2010	2012	2015 <sup>e</sup>	2017 <sup>e</sup>	2019 <sup>e</sup>
Angola	7,079	8,362	8,331	8,500	9,000	10,000
Botswana	31,890	22,091	20,478	22,000	24,000	30,000
Cameroon	12	6	5	50	50	50
Central African Republic	383	302	366	370	370	370
Congo (Brazzaville)	--	381	52	70	70	70
Congo (Kinshasa)	35,207	16,800	20,900	18,400	22,200	24,200
Côte d'Ivoire	300	--	--	--	--	--
Gabon	(2)	(2)	(2)	(2)	(2)	(2)
Ghana	1,013	334	233	300	300	500
Guinea	549	374	267	300	300	300
Lesotho	52	100	479	500	1,300	1,700
Liberia	NA	27	34	30	30	30
Namibia	1,902	1,693	1,700	1,700	1,700	1,700
Sierra Leone	669	438	541	500	500	500
South Africa	15,776	8,868	7,245	8,600	9,700	10,000
Tanzania	220	80	127	240	310	310
Togo	41	(2)	(2)	(2)	(2)	(2)
Zimbabwe	251	8,435	12,060	15,000	15,000	15,000
Total	95,300	68,300	72,800	76,600	84,800	95,000

<sup>e</sup>Estimated. NA Not available. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Less than 1 unit.

TABLE 19  
AFRICA: HISTORIC AND PROJECTED LITHIUM PRODUCTION, 2005–2019

(Metric tons)

Country	2005	2010	2012	2015 <sup>c</sup>	2017 <sup>c</sup>	2019 <sup>c</sup>
Zimbabwe	1,100	47,000	43,000	50,000	50,000	50,000

<sup>c</sup>Estimated data are rounded to no more than three significant digits.

TABLE 20  
AFRICA: HISTORIC AND PROJECTED SALABLE COAL PRODUCTION, 2005–2019<sup>1</sup>

(Thousand metric tons)

Country	2005	2010	2012	2015 <sup>c</sup>	2017 <sup>c</sup>	2019 <sup>c</sup>
Botswana	985	988	1,455	1,600	1,500	1,200
Congo (Kinshasa)	120	--	4	4	4	4
Egypt	300	300	300	300	300	300
Ethiopia	--	20	20	30	90	200
Malawi	52	65	92	190	210	210
Mozambique	3	38	4,900	12,600	27,600	30,000
Niger	182	247	235	240	240	240
Nigeria	8	46	40	40	50	50
South Africa	244,940	254,522	258,576	293,000	322,000	341,000
Swaziland	222	146	152	150	150	150
Tanzania	31	(2)	79	440	500	2,500
Zambia	240	200	200	300	300	300
Zimbabwe	2,891	2,668	3,500	4,000	4,000	4,000
Total	250,000	259,000	270,000	313,000	357,000	380,000

<sup>c</sup>Estimated. -- Negligible or no production.

<sup>1</sup>Estimated data and totals are rounded to no more than three significant digits.

<sup>2</sup>Less than 1 unit.