



THE ROLE OF AFRICA

IN THE GLOBAL MINING INDUSTRY

Industry overview | February 2023

IDEAS | PEOPLE | TRUST



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The global mining industry has been growing over the last three years, driven by the growth of international and local funding and technological development across various industries, including automotive and construction.

Africa is an essential player in the global mineral commodity supply, holding significant amounts of critical mineral commodities, such as cobalt, gold, and platinum. Mineral commodities are distributed widely, with certain countries being major producers of specific commodities. For instance, the DRC was a leader in cobalt and tantalum production in 2021, while South Africa was a leader in platinum production. Mining growth in Africa positively impacts the development of African countries and attracts more foreign investments to the continent. The global transition from fossil fuels to renewable energy is expected to enhance the further expansion of Mining in Africa in the coming years.



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THE GLOBAL MINING INDUSTRY IS PREDICTED TO GROW STEADILY DESPITE VARIOUS CHALLENGES

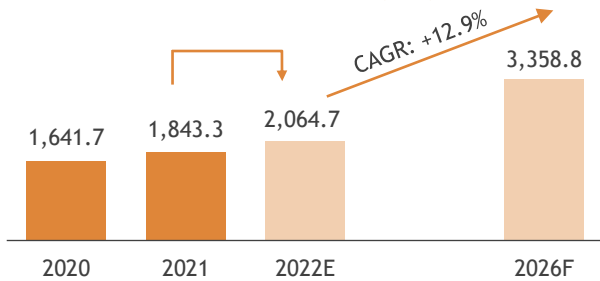
Revenue from the global mining industry has been growing steadily since the second half of 2020 due to increasing foreign direct investments and subsidies from national governments. Among other drivers of mineral commodities production are the global energy transition, utilisation of low-carbon vehicles, and the development of information technologies. Rising mineral commodity prices have boosted revenue since the global economic recovery.

In 2021, continuing increases in metals prices, access to subsidies and financing, and decreasing lockdown restrictions positively impacted the growth of mining exploration budgets across various countries, including Canada, Australia, the USA, China, South Africa.

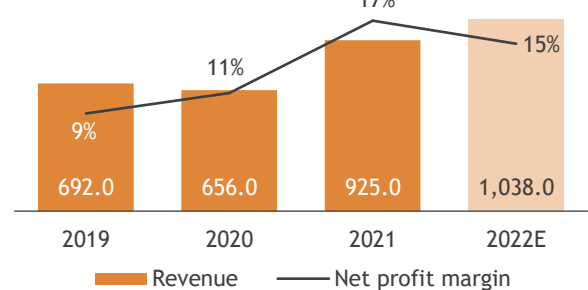
This continued into 2022, with growing demand and high prices for most base metals, such as cobalt and lithium, and precious metals, including gold and platinum. However, the middle of the year was affected by worsened macroeconomic conditions, which caused rising price volatility for most mineral commodities. While, at the end of 2022, lithium, gold, and platinum prices grew compared to the start of 2022, cobalt prices were lower than the respective prices in January 2022.

Mining companies are expected to concentrate on their operating efficiency to secure a solid financial performance and stay profitable in 2023. Furthermore, miners may increase hedging initiatives to lock in favourable prices for mineral commodities.

The global mining industry revenue (\$bn)



Revenue and net profit margin of the leading mining companies (\$bn)¹



KEY TRENDS IN THE GLOBAL MINING INDUSTRY



CHANGES IN TRADITIONAL SUPPLY CHAINS

The mining industry must amend its supply chains for the green energy transition. Various changes being implemented by mining companies in the move toward low-carbon operations include efficiency improvements, portfolio restructuring, and increasing usage of energy-efficient technologies.



INCREASE IN HEDGING ACTIVITY

During recent years, mineral commodity prices showed significant volatility underpinned by the COVID-19 pandemic, the Russia-Ukraine war, and the global energy crisis. Mining companies actively use futures and options to reduce the volatility of commodity prices and secure revenues.



REMOTE CONTROL & SAFER OPERATIONS

Using digital applications, mining specialists remotely monitor mineral processing plants and mines and have a comprehensive online view of the equipment. Due to specific maintenance-oriented algorithms, specialists can predict equipment failures & maintenance needs and increase the safety of operations.



OVERCOMING THE TALENTS SHORTAGE

The ageing workforce and declining interest in mining from young talents may cause a critical skills shortage in the global mining industry. To solve this problem, mining companies must actively invest in training, learning opportunities, and digitalisation and offer paid internships for young professionals.

Source: Statista – Mining industry worldwide – [2022]; S&P Global Market Intelligence website; Media overview
 Notes: (1) The aggregated revenue of the Top-40 mining companies by market capitalisation

RESERVES OF KEY MINERAL COMMODITIES ARE DISTRIBUTED ACROSS DIFFERENT COUNTRIES

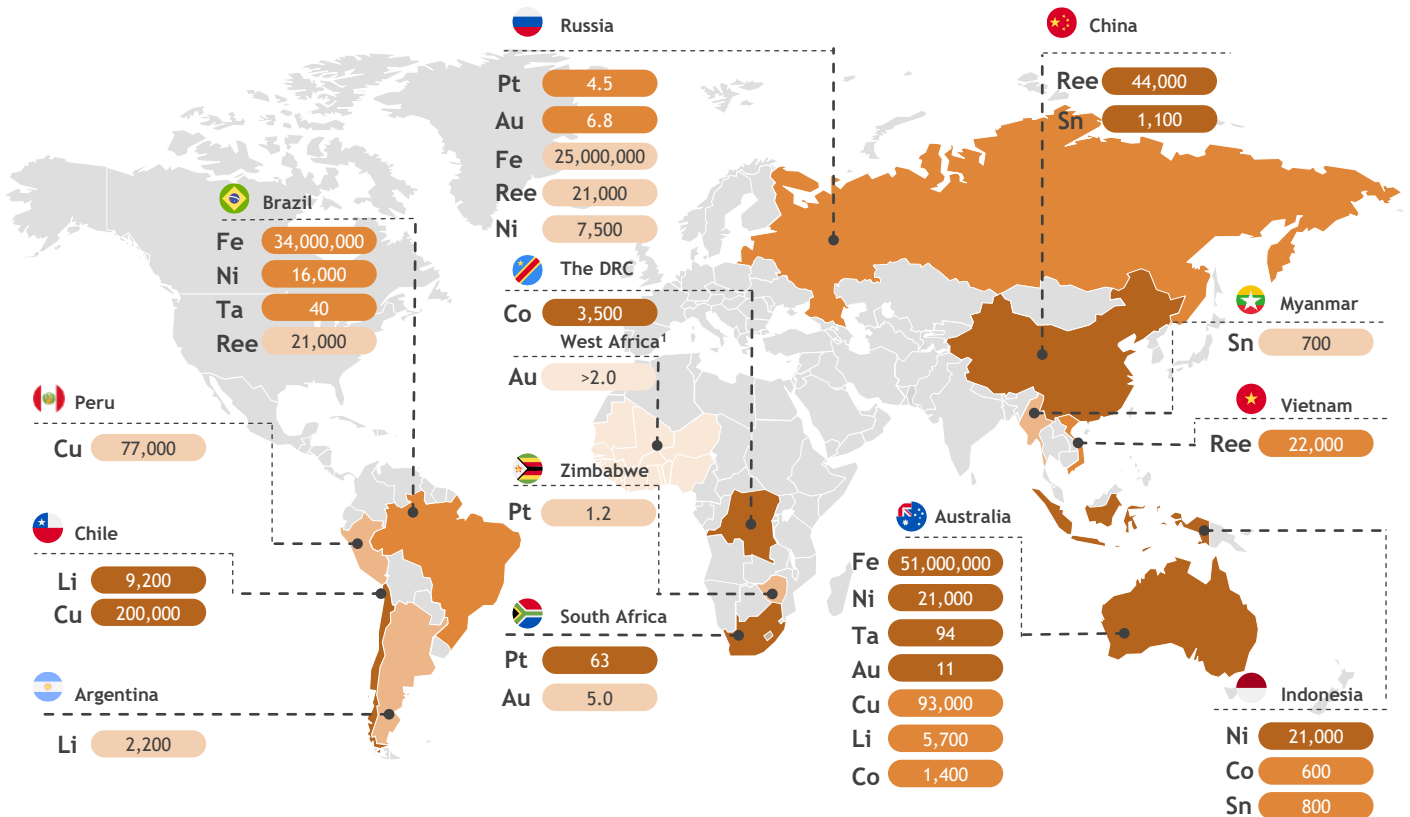
THE ROLE OF MINERAL COMMODITIES IN THE GLOBAL ECONOMY

The global economy is increasingly dependent on mineral commodities. Minerals are essential in product manufacturing: from mobile phones and other electronics to batteries and automotive parts. Overall, Australia, Russia, and Brazil are the top 3 countries by reserves of numerous mineral commodities.

Gold is also important for various industries, ranging from medicine to aerospace. The most substantial reserves of gold are in Australia and Russia, as well as in South Africa, and in West African countries. The reserves of lithium, cobalt, and nickel, crucial for advanced battery technologies, are scattered all over the world, with significant amounts in Chile, the Democratic Republic of the Congo (the DRC), Australia, and Indonesia.

Although southern and eastern African countries are abundant in rare earth deposits, essential in wind turbines and electric vehicle motors, the region still lags far behind China. Next-generation technologies, such as wind and photovoltaic solar energy, greatly rely on copper, considerable reserves of which are located in South America. African countries hold a significant amount of platinum-group metals, vital elements for proton exchange membrane applications, which help leverage the zero-emissions potential of hydrogen.

TOP-3 COUNTRIES BY RESERVES OF KEY MINERAL COMMODITIES IN 2021, THOUSAND METRIC TONNES



Global reserves in 2021, thousand metric tonnes

Fe Iron ore (crude ore)	180,000,000	Cu Copper	880,000	Co Cobalt	7,600
Pt Platinum-group metals	70	Sn Tin	4,900	Li Lithium	22,000
Au Gold	54	Ta Tantalum	134	Ree Rare earths	120,000
				Ni Nickel	95,000

● Top-1 ● Top-2 ● Top-3 by reserves in the world

Source: United States Geological Survey – Mineral commodity summaries – [2021, 2022]; Statista website; Media overview
 Notes: (1) Based on data for leading gold producers in West Africa as of 2020, namely Ghana, Burkina Faso, and Mali

THE PRODUCTION OF RARE EARTH ELEMENTS SHOWED SIGNIFICANT GROWTH IN RECENT YEARS

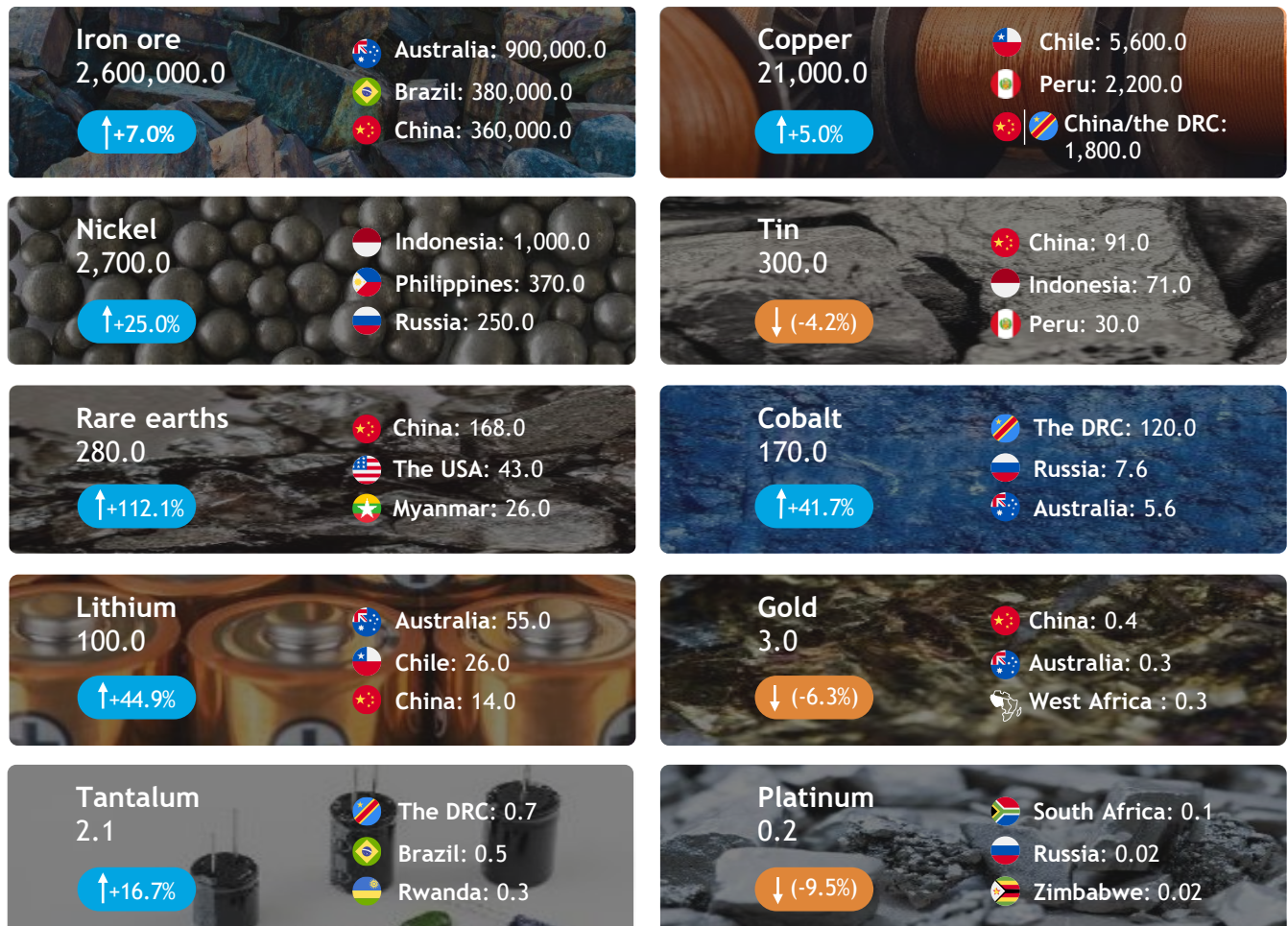
The production of most mineral commodities increased between 2017 and 2021 due to rising urban development and the growing demand from industrial sector companies. The increase in manufacturing low-carbon vehicles accelerated the production of certain mineral commodities, primarily cobalt, copper, lithium, and nickel.

Iron ore was the leader among key mineral commodities by production volume in 2021 due to its significant use in construction and energy infrastructure.

Rare earth elements showed the highest increase in production in 2017-2021, caused by the use of these mineral commodities in technological product manufacturing that has been continuously expanding over the last five years.

In the five years to 2021, the production of precious metals, such as gold and platinum, declined mainly due to the lower demand in 2020 caused by the COVID-19 pandemic. While China, Australia, and West Africa were key players in gold production in 2021, South Africa, Russia, and Zimbabwe took the main places in platinum production.

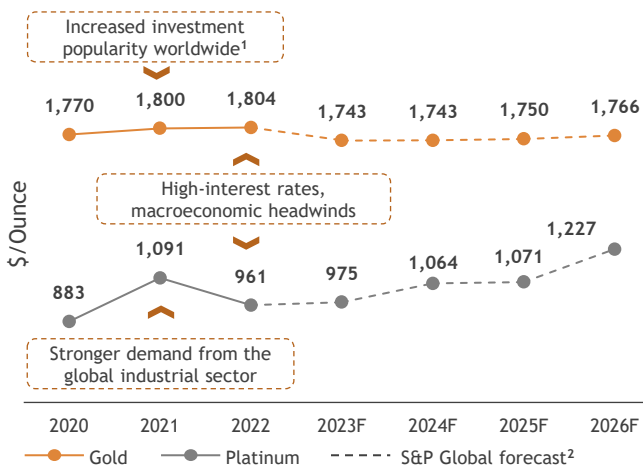
THE ROLE OF MINERAL COMMODITIES IN THE GLOBAL ECONOMY



X.X% Change in the production volume over 2017-2021

PLATINUM PRICES ARE PROJECTED TO GROW IN THE LONG RUN IN CONTRAST TO OTHER METALS

GLOBAL PRICES FOR PRECIOUS METALS: GOLD AND PLATINUM



The World Bank’s precious metals index fell by 4% in 2022 compared to 2021, as a result of global economic weakness and growing interest rates.

The average global prices for gold are projected to fluctuate in the future, impacted by expectations of increasing interest rates and the upcoming global recession. For the above-mentioned reasons, gold prices are forecasted to fall by 3% in 2023 compared to 2022.

Prices for platinum are anticipated to rise in the coming years. In the short-term, the limited extraction volumes will drive the global demand for platinum. In the long-term, the global demand for this element will be driven by the hydrogen economy, which is expected to reach \$2.5tn by 2050.

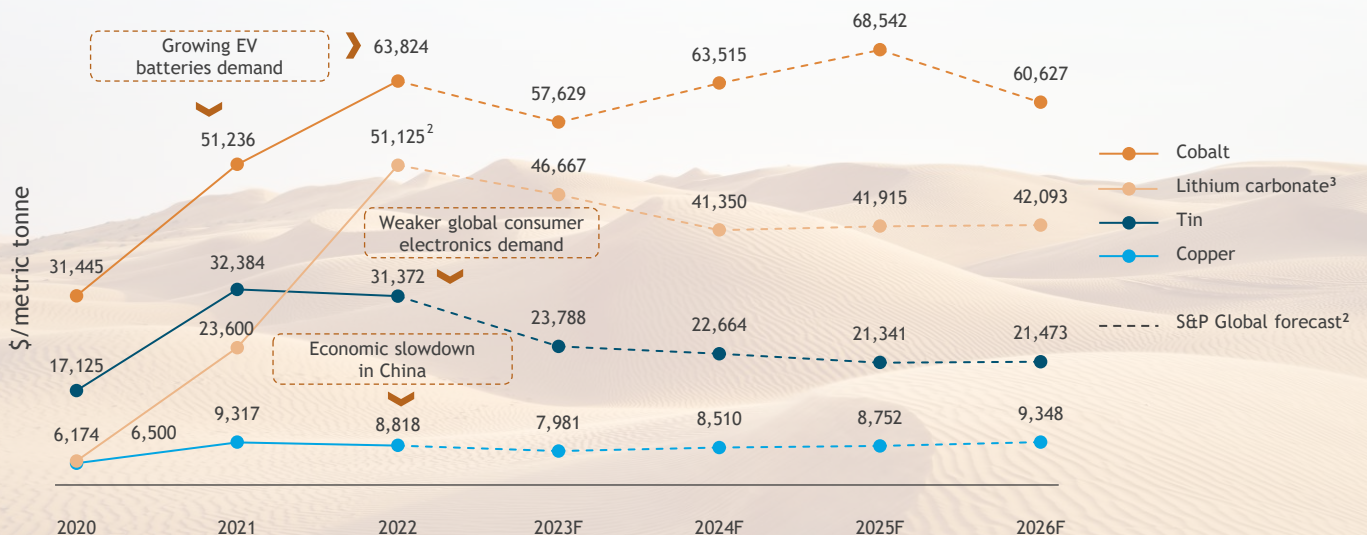
GLOBAL PRICES FOR BASE METALS: COPPER, TIN, COBALT, AND LITHIUM

The World Bank’s base metals index grew by 3% in 2022 against 2021. However, global macroeconomic instability dictates a downward price tendency for the base metal market. The base metals index is expected to drop by 15% in 2023 compared to the previous year.

The weakened demand from the global consumer electronics sector in 2022 is forecasted to continue impacting tin prices, causing a significant 24% drop over 2022-2023. However in the long-term, the demand for tin might stabilise due to its intensive utilisation in electric vehicles.

Demand for cobalt and lithium boosted their prices during 2020-2022, also due to the growing electric vehicle market. However, S&P Global forecasted cobalt and lithium prices to go down over 2022-2023 as more supply comes to the market. While cobalt prices are expected to rise during 2023-2024, lithium prices will continue decreasing and are projected to start recovering in the following year.

Copper prices are expected to tumble by 6% in 2023 versus 2022 as a result of declining demand from the global consumer electronics sector. The long-term demand for copper will correlate with renewable industry development.



Source: Statista – Mining industry worldwide – [2022]; S&P Global Market Intelligence website; Media overview
 Notes: (1) The aggregated revenue of the Top-40 mining companies by market capitalisation

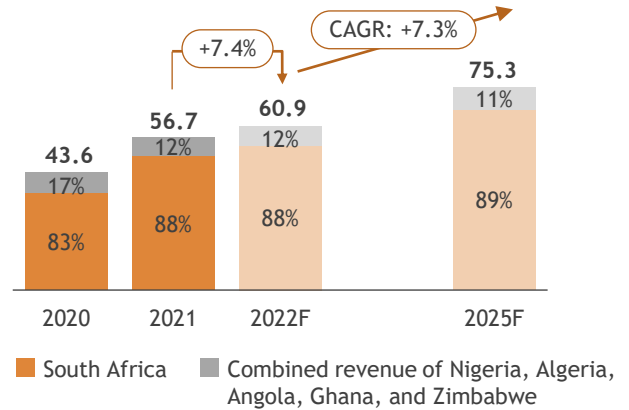
AFRICAN MINING WILL GROW IN THE FUTURE, REFLECTING THE RESPECTIVE GLOBAL UPWARD TREND

The African mining industry plays a crucial role in the global supply of mineral commodities. Holding a great variety of mineral reserves, Africa attracts significant foreign investments and remains one of the core suppliers of numerous critical minerals.

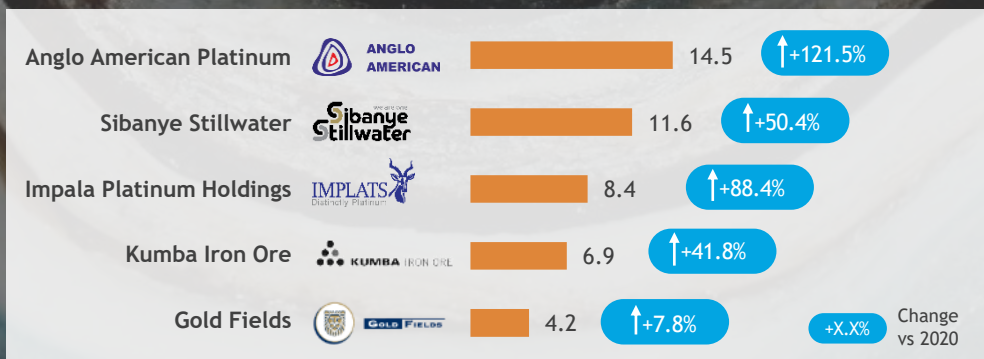
The economic development of African countries substantially relies on the growth of Mining. In 2021, the demand for mineral commodities improved the financial condition of African mining companies, and when African mining companies are financially successful, local governments can support the wider economic development of their countries.

South Africa is a leading player in the African mining industry, owning high quantities of natural resources. However, the country needs further legislative advances, improvement in supply chains, and power grid reliability to reinforce its mining potential.

MINERALS PRODUCTION REVENUE IN SELECTED LARGEST MINING AFRICAN COUNTRIES (\$BN)^{1,2,3}



TOP-5 MINING COMPANIES IN AFRICA BASED ON REVENUE IN 2021 (\$BN)¹



All Top-5 African mining companies by revenue have headquarters in South Africa, one of the leading countries in the mining industry across the African continent.

Anglo American Platinum is the largest mining company in Africa by revenue as of 2021. It is also an outstanding global producer of gold, platinum, palladium, nickel, copper, and other commodity minerals.

KEY TRENDS IN THE GLOBAL MINING INDUSTRY

OPERATIONAL EFFICIENCY MANAGEMENT

Mining companies actively focus on operational efficiency improvement, driven by declining greenfield investment opportunities and environmental constraints on new mine development. Electrification, automation, and digitalisation are helping miners optimise costs and improve operational productivity and safety.

PRICE RISK MANAGEMENT INITIATIVES

The volatility of commodity prices and local currencies significantly influences African mining companies. Industry players require enhanced price risk management initiatives. Companies are hedging high commodity prices to secure their financial conditions and increasing funds for their capital projects.

INCREASED CHINA'S INVESTMENT IN AFRICA

China is increasing its investments in emerging markets, particularly Africa. Over 2020-2021, total outbound foreign direct investment (FDI) from China into Africa grew by about 9% and reached \$145.2bn. Over 25% of China's FDI was in the mining industry.

THE GROWING ROLE OF ESG

African mining companies are responding to global ESG challenges and transforming their business models. Miners are enhancing their portfolios with critical minerals for the energy transition, including lithium and copper. Companies are focusing on the well-being of local communities, particularly with healthcare improvements.

Source: Statista website; EIU website; National statistical offices of selected countries in Africa; Companies' annual reports; Media overview
 Notes: (1) Numbers are converted from local currencies to USD due to the annual average exchange rate by the Fed and the national banks of selected countries; (2) The aggregated CAGR and minerals production revenues in 2022 and 2025 were calculated based on the analysis of forecast data for the mining industry across six reviewed African countries; (3) The DRC was not included in the analysis due to the lack of required data from reliable sources

RESERVES OF KEY MINERAL COMMODITIES ARE DISTRIBUTED ACROSS DIFFERENT COUNTRIES

AFRICA'S ROLE IN THE GLOBAL PRODUCTION OF MINERAL COMMODITIES

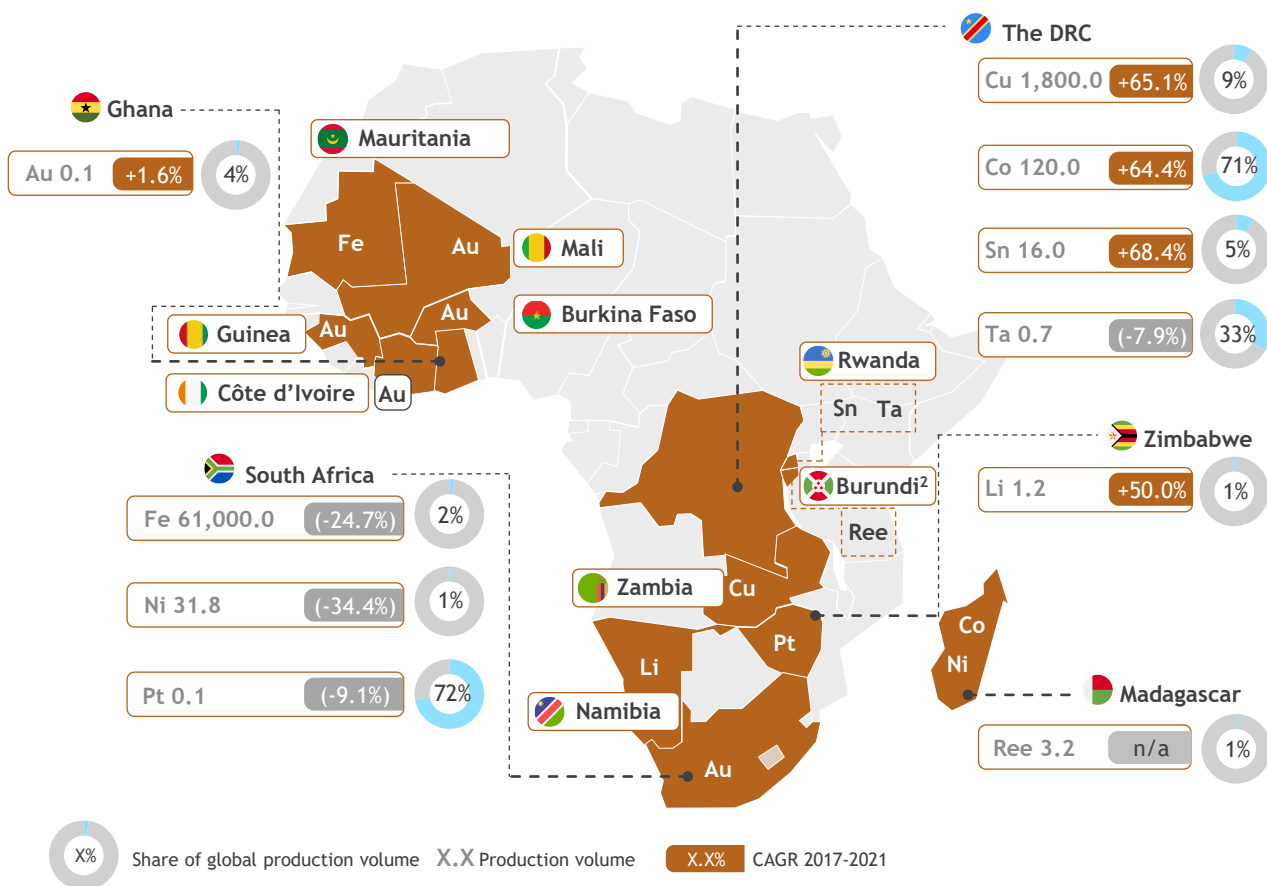
Africa is a core producer of the valuable resources used in technology development and manufacturing. According to the UNEP¹, Africa holds approximately 30% of the mineral reserves and 40% of gold globally and has the most extensive cobalt and platinum reserves in the world.

The DRC and South Africa are mining the highest volumes of chief mineral commodities in Africa today. In 2021, South Africa was the largest global producer of platinum, while the DRC produced the most cobalt, copper, and tantalum. Despite Africa being home to many mineral resources, a significant portion of reserves is unexplored or underexplored.

West Africa is an attractive investment destination due to abundant natural resources, especially gold. Increasing urbanisation rates, open investment policy, and the possibility of great discoveries in less-explored countries present promising opportunities for international investors. Foreign companies are already discovering the region's geological potential.

The global transition to renewable energy could bring Africa significant opportunities, as the continent is endowed with metals and minerals crucial for clean energy production.

TOP-2 COUNTRIES BY PRODUCTION OF KEY MINERAL COMMODITIES IN AFRICA IN 2021 (THOUSAND METRIC TONNES SPECIFIED FOR TOP-1)

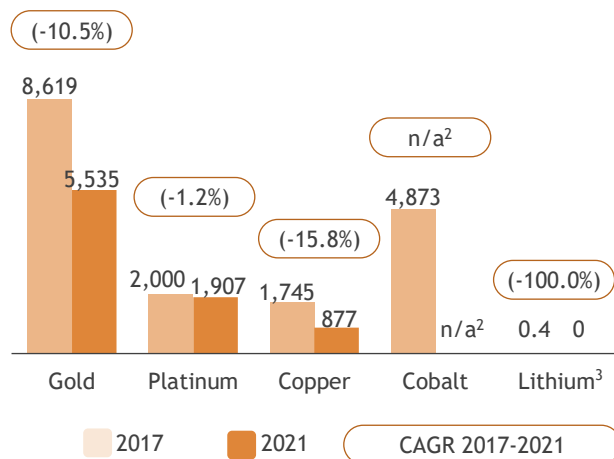


Fe Iron ore (crude ore)	Pt Platinum	Au Gold	Cu Copper	Sn Tin
Ta Tantalum	Li Lithium	Co Cobalt	Ree Rare earths	Ni Nickel

Source: United States Geological Survey – Mineral commodity summaries – [2022]; Statista website; Yahoo Finance website; TheGlobalEconomy website; Media overview
 Notes: (1) United Nations Environment Programme; (2) As of 2020

AFRICAN COUNTRIES ARE KEY PARTICIPANTS IN GLOBAL VALUE CHAINS, EXPORTING MINERAL COMMODITIES

African export of the selected mineral commodities (\$m)¹

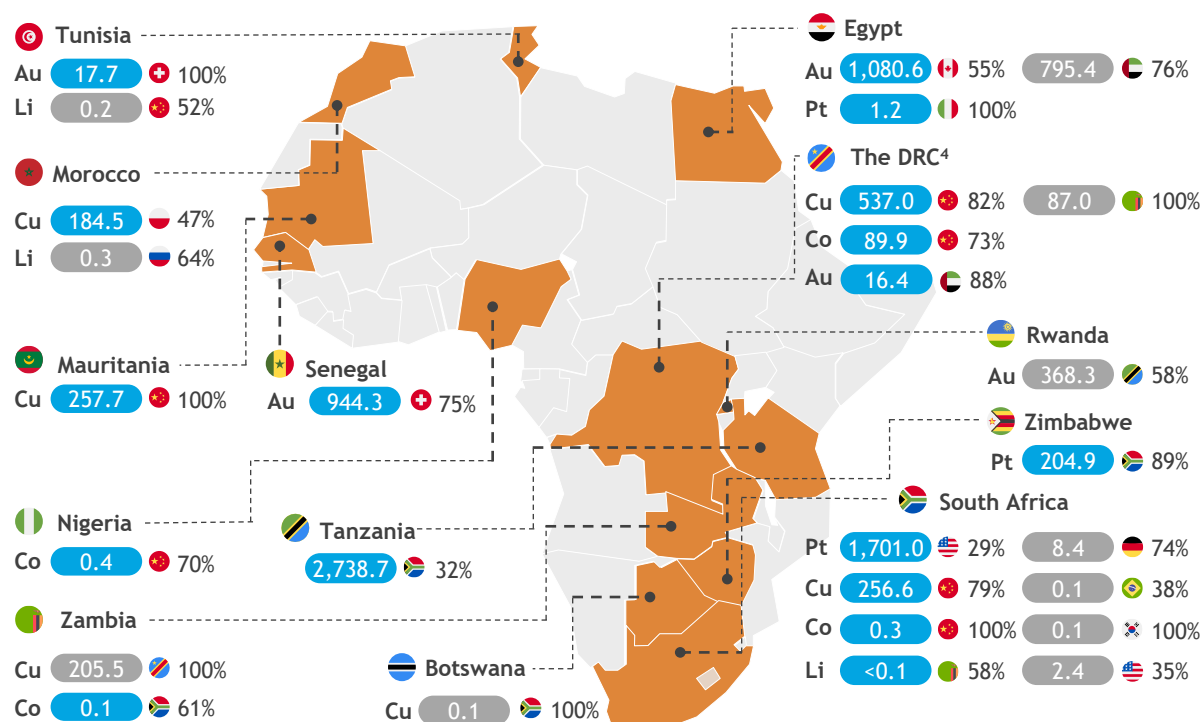


Africa participates in global value chains by exporting minerals for further processing and manufacturing. African countries trade both within the continent and with other regions - European countries and China are among the key international trade partners of Africa. South Africa is a leading importer of platinum, cobalt, and gold from other African countries.

High mineral commodity prices caused by Russia's war in Ukraine are prompting a rise in exports across African countries. Many exporters, particularly Zambia and Namibia, have initiated procedures to create a business-friendly environment and attract foreign investments into their domestic mining sectors. Africa's exports to Russia are relatively small and, in 2021, added up to just around \$5bn, while imports equalled \$14bn.

In the near future, rising mineral commodity prices are expected to outweigh any marginal losses in total exports. Given the high demand for global mineral commodities, alternative African trading partners, particularly China, would quickly make up the small amount of lost Russian exports.

LEADING AFRICAN TRADING COUNTRIES OF SELECTED MINERAL COMMODITIES AS OF 2021 (\$M)

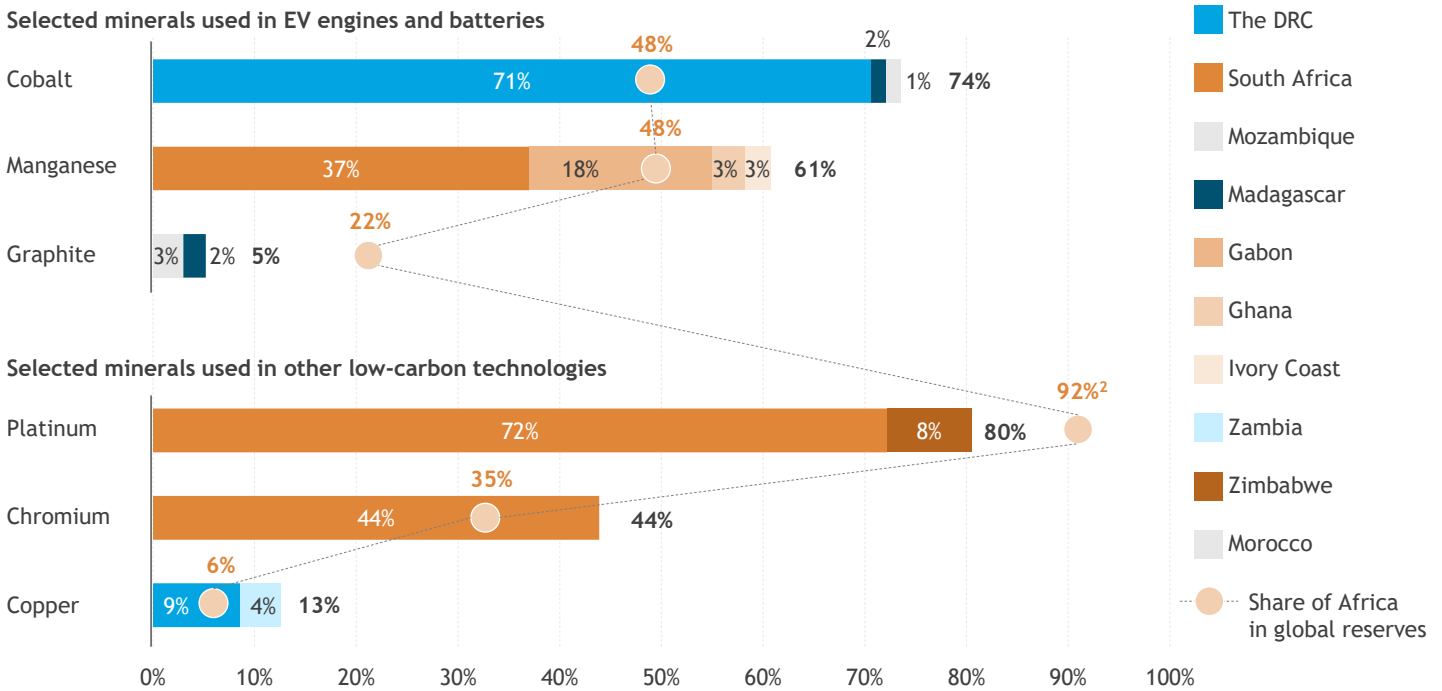


Pt - Platinum Li - Lithium Au - Gold Export Top trading partner
 Co - Cobalt Cu - Copper Import X.X% - Its share in the total export of a mineral

Source: UN Comtrade website; OEC website; The Economist Intelligence website
 Notes: (1) The data might vary due to the limited reliable statistical information; (2) In 2021, African export of cobalt comprised \$1.3m; however, the CAGR could not be calculated due to the lack of data from the DRC, the major cobalt exporter; (3) Export of lithium comprised \$398,577 in 2017 and dropped to \$0 in 2021; (4) As of 2020

AFRICA IS A POTENTIAL FACILITATOR OF CLEAN ENERGY TRANSITION WORLDWIDE THROUGH ITS MINERALS

SHARE OF AFRICAN COUNTRIES IN THE GLOBAL PRODUCTION OF SELECTED MINERALS, 2021¹



AFRICA'S MINING POTENTIAL

The global transition from fossil fuels to renewable energy represents one of the main opportunities for African mining. The adoption of wind and solar technologies and the growing dependence on fuel cells and lithium-ion batteries to power EVs will drive up global demand for strategic commodities, such as cobalt, copper, manganese, and others.

As the energy transition is gaining pace, clean energy technologies are becoming the largest and the fastest growing sector that requires critical minerals. To meet Paris Agreement goals, the share of clean energy technologies in the total demand for minerals is projected to reach over 40% for copper and rare earth elements, up to 70% for nickel and cobalt, and almost 90% for lithium.

The World Bank predicts that the production of critical minerals like graphite, lithium and cobalt, could increase by nearly 500% by 2050. Over three billion tonnes of minerals would be required to deploy wind, solar and geothermal power & energy storage to achieve a two-degree Celsius climate target.

African countries could capitalise on their abundance of the critical minerals vital for developing and functioning clean energy technologies. The African continent is the world's largest supplier of cobalt, manganese, chromium, tantalum, palladium, and platinum: it accounts for almost half of the global cobalt and manganese stocks, more than a third of the intercontinental chromium commodities and 92% of the world's platinum-group metal reserves.

In 2021, the production of minerals and metals was a significant source of income in the African region, accounting for about 8% of government revenue in African countries. The continent's resources could be used to meet the growing demand for clean energy technologies and accelerate the economic growth of the African region.

IN 2021, SOUTH AFRICA WAS ONE OF THE GLOBAL LEADERS IN CRITICAL MINERALS' PRODUCTION

72% share in the global platinum production **44%** share in the global chromium production **40%** share in the global palladium production **37%** share in the global manganese production

Source: United States Geological Survey – Mineral commodity summaries – [2022]; Statista website; Yahoo Finance website; TheGlobalEconomy website; Media overview
 Notes: (1) United Nations Environment Programme; (2) As of 2020

DESPITE THE CONSIDERABLE POTENTIAL, AFRICA STILL FACES SEVERAL CHALLENGES HAMPERING ITS GROWTH

While African countries might benefit from the rising demand for mineral commodities, Africa can only fully realise its potential by overcoming existing challenges hindering the continent’s development.

Many African countries are highly dependent on the export of minerals. They still export most of the minerals without processing, which exposes the continent’s high vulnerability to global commodity price fluctuations. African countries must improve their infrastructure, investment climate, and governance to leverage their untapped resource potential.

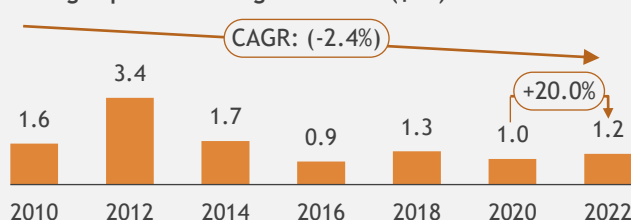
KEY CHALLENGES OF THE AFRICAN MINING INDUSTRY



UNFAVOURABLE INVESTMENT CLIMATE AND UNSTABLE EXPLORATION SPENDING

Currency volatility, policy revisions, agreement cancellations, and deteriorating infrastructure negatively affect the investment climate in Africa. A large part of Africa’s mineral resources remains underexplored, while the insufficient exploration budget challenges proper geological mapping. Over the past two years, Africa’s mining exploration budget has increased, but future growth is uncertain due to the global economic slowdown.

Mining exploration budget in Africa (\$bn)



POOR INFRASTRUCTURE

The relative logistics-related cost of mining in Africa is estimated to be 2.5 times higher than the world average due to infrastructure gaps, especially in transit and energy networks. Much of Africa’s mineral reserves are stranded inland, and individual mining projects cannot fund the infrastructure development necessary to transit and export the minerals.

Insufficient infrastructure, which is vital for expanding the refining capacity, is a primary challenge for the African mining industry. Infrastructure gaps hamper the mining and transportation of minerals critical for the transition to renewables and ultimately will slow the adoption of clean energy technologies.

Mining ventures in gold, aluminium, platinum, and copper may also deal with an expensive and unreliable energy supply that hinders their operations and efficiency. Thus, electricity expenditures can reach up to 40% of total operating costs for mining companies in Africa and harm profitability. Government efforts to attract investments in renewables could help to reduce energy costs in mines. However, such incentives still entail several challenges, for instance, the gradual imposition of unilateral changes negatively perceived by investors.



NEGATIVE EXTERNALITIES

Despite tightening regulations on climate change, the mining industry still threatens local environments. Deterioration of water and soil results in lower productivity of farms, while large amounts of dust can lead to respiratory problems.

Over the last ten years, mining companies’ social license to operate has seen a large investment in community infrastructure, which continues to pose a significant risk for local citizens. Both mining industry players and public sectors should pay particular attention to social issues to prevent conflicts and contribute to the development of local communities.

Adverse impact of mining on local environments

- Deforestation and land degradation
- Large-scale surface disturbances
- Generation of substantial volumes of industrial waste
- Release of potentially harmful noxious gases
- Large amounts of dust lead to respiratory diseases
- Reduction of agricultural productivity

ADOPTION OF ESG PRINCIPLES COULD SIGNIFICANTLY BENEFIT THE FUTURE VIABILITY OF BUSINESSES

Following international decarbonisation commitments, the African mining industry started actively implementing ESG practices, increasingly embedding ESG principles into business models, focusing on climate change, the well-being of local communities, and safe working conditions. Adhering to ESG principles in business has already become a must-have for stakeholders and investors, and the increasing pace of innovation and the widespread adoption of new transformative mining technologies can help address critical ESG matters.

New mining methodologies contribute to workers' safety by reducing human exposure to dangerous situations and injuries. From an environmental point of view, the effects of climate change could lead to droughts in many areas where people conduct mining activities. Implementation of ESG practices will promote using resources more sparingly, as well as reusing and recycling materials to improve the longevity and sustainability of Africa's mining industry.

KEY BENEFITS OF ESG FOR MINING COMPANIES



Making a positive impact on investors' sentiments and creating more value for stakeholders



Access to the larger capital markets due to proper ESG compliance and transparency

Better competitive positions among other mining industry players in raising funds and investments



Higher chances of the future viability of the business



Key benefits of ESG in the mining industry

SELECTED ESG INITIATIVES IN AFRICA

Despite the African mining industry facing several challenges, the major players have already started to address critical social issues, contributing to the development of local communities, and using natural resources more responsibly. Mining industry players are investing in solar, wind, and hydrogen power to overcome the problem of expensive and high-carbon electricity. Also, companies are developing water treatment facilities to reduce the reliance on the external water supply and are making efforts to provide local citizens with access to safe water.



SOLAR POWER TO CUT COSTS AND CARBON

A new solar power plant at Gold Fields' mine will supply almost a quarter of the needed energy to reduce reliance on the state power utility and cut costs.



HYDROGEN HAUL TRUCK

Anglo American Platinum plans to eliminate the use of diesel at mine sites and deploy hydrogen trucks and accompanying hydrogen infrastructure at eight mines by 2030.



RESPONSIBLE WATER USAGE

Sibanye-Stillwater commissioned a 4ML per day water treatment facility to reduce the site's reliance on external water suppliers and leverage excess groundwater.



INVESTING IN COMMUNITY WATER

African Rainbow Minerals constructed a 13.5km pipeline in partnership with the local municipality to provide water to 5,500 households in Kuruman and the surrounding areas.



GOLD FIELDS



ANGLO AMERICAN



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