GLOBAL BUSINESS REPORTS

MACIG

MINING IN AFRICA
COUNTRY INVESTMENT GUIDE

2024

Dear Reader,

We are proud to release the latest edition of MACIG, the "Mining in Africa Country Investment Guide," which since its first edition in 2014 has grown to become the reference book across the African mining investment community. A decade after launching the first MACIG, the 2024 edition still spans thousands of kilometers, over 150 interviews, and a dozen country profiles to paint the most comprehensive picture of a complex and fundamental continent for global mining. Importantly, and to bridge print and digital, this is the first edition of GBR's print book that makes use of QR codes to give readers exclusive digital content.

In light of the green transition, Africa's geological wealth is once again the center of attention, to the extent that many of the mining executives interviewed by GBR flagged a new "scramble for Africa" between Western and Eastern powers. Geopolitical competition for critical minerals is exemplified by large capital investments, such as the Lobito Corridor, by which the US and the EU intend to reduce China's dominance in the critical minerals space.

Leaders in Africa realize the power of regional as well as public-private partnerships, and have vowed to ensure local populations increasingly benefit from the Mother Continent's resources. In 2023, several African countries renewed their push to create, retain and capture value. In Namibia, for example, the authorities introduced a ban on the export of raw critical minerals, hoping to boost its downstream capabilities. Tanzania and Zimbabwe added in-country beneficiation as key tenets in their development roadmaps, while the DRC and Zambia launched Special Economic Zones to strengthen the refining component of their battery supply chain.

Heading into 2024, the pipeline of projects across the African continent could not be more exciting. After decades of setbacks, Rio Tinto expects to kick off its US$20 billion Simandou iron ore project in Guinea. Mining powerhouses including Barrick, Ivanhoe and Anglo American are developing substantial assets. Yet, the extraordinary demand for Ghana's gold, the DRC's copper, or Namibia's uranium is currently balanced by the global landscape of price volatility and political uncertainty. The latter deters investors' appetite for projects sitting in numerous African nations, while others suffer from infrastructure or energy limitations.

The world is hungry for African minerals. As Africa moves away from a purely extractive-based model to an integrated one, GBR visited North, West, Central and South Africa to assess the progress and to understand the opportunities and challenges that lie therein. We would like to thank all ministers, executives, and key players who contributed their insights to this report, and hope that this edition of MACIG serves its ambitious goal: To guide investment in African mining.

Alfonso Tejerina
Director and General Manager
Global Business Reports

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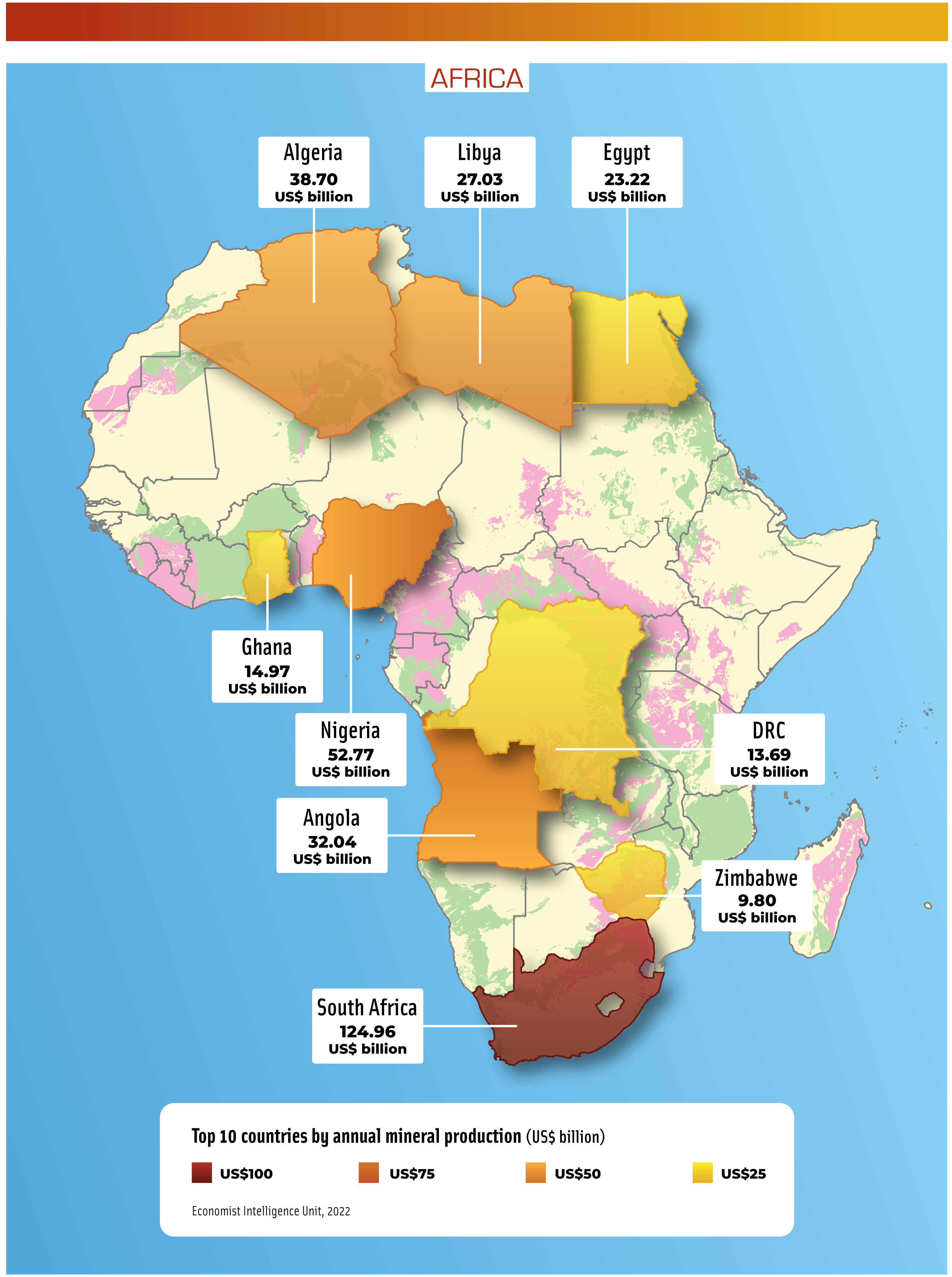


Introduction

"Africa possesses unmatched potential, propelled by its vibrant and youthful population, strategic shipping, and logistical opportunities, as well as an abundance of minerals essential for powering global decarbonization efforts and achieving a zero-emissions world."

-Marna Cloete,
President, Ivanhoe Mines

Image by Lina Loos at Unsplash.

Introduction

Unearthing geopolitical rivalry, economic challenges and the retention of value

We see great potential for world-class discoveries around our operations and further afield in Africa and the Middle East region from Zambia in the South to Saudi Arabia in the North. Tanzania is a particularly promising candidate for our next multi-million-ounce discovery.

Mark Bristow, President and CEO, Barrick Gold

For more than a century, the extractive sector has been instrumental in Africa's economic development. With the role the continent is poised to play in the green energy transition, governments will continue to depend on the mining industry to boost national economies. According to Vanessa Ushie, acting director of the African Natural Resources Management and Investment Centre, African Development Bank (AfDB) Group: "Africa's extractive resources are expected to contribute more than US$30 billion annually to government revenue by 2040."

The African mining sector is at a critical juncture. The extraordinary demand for the continent's resources is currently balanced by the global landscape of price volatility and uncertainty. The latter keeps deterring investor appetite in projects sitting in nations with little political stability and affected by infrastructure, energy, and security woes. Such challenges persist across many African nations in 2023. As these opposing forces continue to unfold, the fate of the African mining sector teeters on the precipice of either a generational opportunity or missed potential.

Capturing value from the new scramble for Africa

Africa has long been a theatre of competition among the global powers. The legacy of colonialism has given way to new forms of rivalry in the post-colonial era, and the 21st century has witnessed the resurgence of Africa as a battleground for influence and resource control. China, with its insatiable appetite for raw materials to fuel its rapid economic growth, has emerged as the dominant player in African mining. Through extensive investments and infrastructure development, China has forged partnerships with various African nations to secure access to minerals including copper, cobalt and coal (it controls about 80% of Co/ Cu production in the DRC). Yet, Western companies remain active, particularly with renewable energy projects (more than 71 currently developed in the continent), leading to record investment in the continent. According to UNCTAD, in 2021 FDI to Africa reached US$83 billion, up from US$39 billion in 2020. The largest holders of foreign assets in Africa remain the old colonial powers, led by UK (US$65 billion) and France (US$60 billion), with the US and China accounting for US$48 and US$43 billion respectively.

In his opening speech at the Battery Metals Forum in Kinshasa in September 2023, Paul Kabuswe, Minister of Mines and Mineral Development of Zambia, highlighted the main dilemma for African leaders: How to balance attracting foreign investment while retaining value locally. For too long the continent has been pillaged and stripped of its resources, so that today, Africans are determined to build local value-creation models and benefit more fully from their countries' natural resources. With exceptional geology, progressively competent industrial skills, and more established frameworks of governance, African mining jurisdictions are increasingly negotiating from a position of strength, as both West and East scramble for the ingredients to fuel the green energy transition.

Currently, only 3% of the total value created by the battery metals industry in the DRC remains with local communities. For Africa to shift from an exporter of raw materials to a value added manufacturing hub the continent will need a predictable business environment, competitive incentives, investment in infrastructure and human capital, and access to finance. Demonstrating political intent, in 2022 the DRC and Zambia signed a cooperation agreement to "facilitate the development of an integrated value chain for the production of electric vehicle (EV) batteries in the DRC and Zambia."

Governments across Africa are concluding deals and presenting policy initiatives to develop refining, processing, and other value-adding capabilities for their mineral resources. In that regard, 2023 saw several incentives, including offtake agreements for battery and EV products, and the establishment of Special Economic Zones.

Long-lasting inflation and commodity rollercoasters

Recent months have witnessed a rollercoaster ride in commodity prices. Lithium prices dropped by two-thirds in H1 2023 after reaching an all-time high in late 2022, and cobalt prices tumbled by over 30% in 2023, with surging surpluses emerging from the DRC. Gold has also been subject to wide price swings due to geopolitical tensions, economic uncertainties and shifts in global monetary policies. Copper has experienced price surges and declines in response to supply and demand disruptions. Commodity price volatility is compounded by the impact of inflation, and despite decreasing, the latter has not spared Africa's leading economies. Ghana, for instance, faced around 45% inflation rate in 2023.

The DRC will be able to leverage its hydro-energy potential from the Congo River to ensure that mining and processing are powered by green energy. It is important to foster regional collaboration with neighboring countries to create an African supply chain for critical minerals.

David Sturmes, Director of Corporate Engagement and Strategic Partnerships, Fair Cobalt Alliance

Ongoing developments across various resource sectors

Africa has a generational opportunity to benefit from the scramble for battery metals thanks to its diversity across the period table. The continent contains most of the world's cobalt and manganese, is home to the prospective Copperbelt, Niger might reshape the uranium scene, Malawi, Namibia, and Uganda's rare earths projects keep strengthening, while lithium projects in the DRC's Manono area are ramping up.

In 2023, many African jurisdictions saw new mines coming online, deals being made and developers moving towards production. The biggest stories this year came out of Ghana, with the JV between Gold Fields and

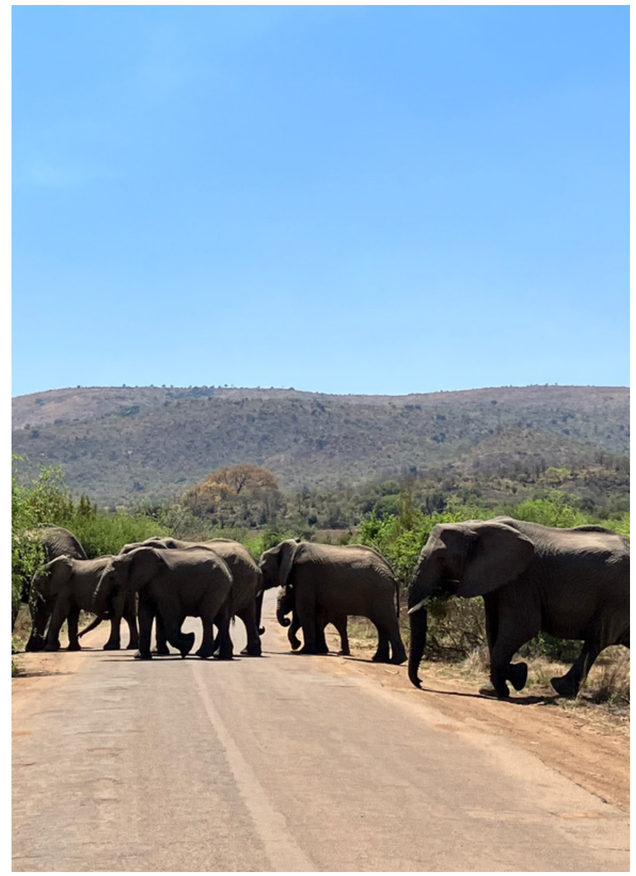


Image by Alex Stonor

AngloGold Ashanti to combine Tarkwa and Iduapriem, effectively creating the continent's largest gold mine, and on the Copperbelt, where Ivanhoe Mines' Kamoa-Kakula complex is poised to become one of the largest copper producing operations in the world.

In Africa, ESG is understood as a key factor in attracting investment and maintaining a social license to operate. Moreover, effective tailings management has gained prominence, and miners in Africa are now investing in safer, more sustainable processes. In conclusion, mining in Africa is a multifaceted and evolving landscape, influenced by the scramble for resources between Eastern and Western powers, economic challenges posed by commodity prices and inflation, and the pursuit of value addition through beneficiation. This report will explore these themes and provide a comprehensive analysis of the major mining jurisdictions in Africa, offering insights into the challenges and opportunities that lie ahead.

To ensure that the continent can fully harness this potential, the sector must be acutely aware of both the risks and facilitators in play. Importantly, broadening the economic benefits of mining throughout the continent and securing community engagement will be pivotal factors for achieving success. Simultaneously, the industry must address the growing calls for supply chain transparency and sustainability.

Predominant Resource of Top 10 African Mineral Producing Countries

Source: Economist Intelligence Unit

Rank	Country	Predominant Resources
1.	South Africa	Gold, Manganese, Platinum, Others
2.	Nigeria	Oil, Iron Ore, Columbite, Others
3.	Algeria	Hydrocarbons
4.	Angola	Diamond, Gold, Oil, Others
5.	Libya	Oil, Clay, Cement, Salt, Others
6.	Egypt	Gold, Silver, Copper, Others
7.	Ghana	Gold, Limestone, iron Ore, Others
8.	Democratic Republic of Congo	Gold, Copper, Cobalt, Others
9.	Gabon	Manganese, Iron Ore, Uranium, Others
10.	Zimbabwe	Platinum, Chrome, Coal, Gold, Others

Geopolitical headwinds and resource nationalism

In Africa, resource nationalism will remain the top geopolitical factor to deal with. This is key, as for most African economies, natural capital accounts for between 30-50% of total wealth.

In Burkina Faso, for instance, the military junta in October 2023 withdrew gold junior Sarama Resources' mining license at Tankoro 2. Earlier in 2023, the governance also requisitioned 200 kg/Au from Canadian miner Endeavour, stating the "public necessity" to justify the move. Geopolitical risks in Africa remained complex and varied. Liam Morrissey, CEO of MS Risk, a risk management consultancy, shared: "Recent incidents highlight challenges like porous borders, transnational crime, terrorism, and conflict. Ethiopia, with remnants of the Tigray conflict, poses challenges for companies returning to previous concessions. Sudan's evolving situation makes predictions there difficult. The DRC faces persistent issues in the east."

In the past three years, West Africa was the theatre of what can unfortunately be defined as a coup contagion. Mali, Burkina Faso, Gabon, Niger, Guinea – and even a failed attempt in Guinea Bissau – are all reminders that political stability can never be taken for granted in Africa. While these have not posed direct security risks to mining operators, they emphasize the importance of careful risk management.

Through insights gathered on the ground across North, West, Central, and South Africa, the following pages provide an analysis of a continent where risks and opportunities differ, where mining jurisdictions are at uneven levels of development, but where growth ambitions are unapologetically stated ■

Investors' Corner

Guiding investment in African mining

Managing country risk overlay is imperative, requiring innovative approaches to ensure that the commercial aspects of a project remain viable despite challenges. This may involve securing guarantees from locations like Switzerland, London, or Canada to support operations in African countries where risk ratings may vary.

Vusi Mpofu, Sector Lead: Mining Chemicals, Nedbank Corporate & Investment Bank

Following challenges in attracting foreign investments post-pandemic (investment flows dropped to US$45 billion in 2022, against a record US$80 billion in 2021 according to UNCTAD), Africa re-emerged as a popular region for investors in 2023, and as demand for critical minerals surges, the outlook for investment in Africa's commodities remains promising for 2024.

Mining jurisdictions across the African continent compete to attract foreign investment. Bolstered by investments in metals, renewables, and mega projects, Egypt won the FDI race (followed by South Africa and Nigeria) in 2022.

For African jurisdictions to continue securing capital in the mining industry, the essential element is the ability of countries to develop a stable tax regime throughout the life cycle of a mine, including a stable legal system, as well as socioeconomic stability.

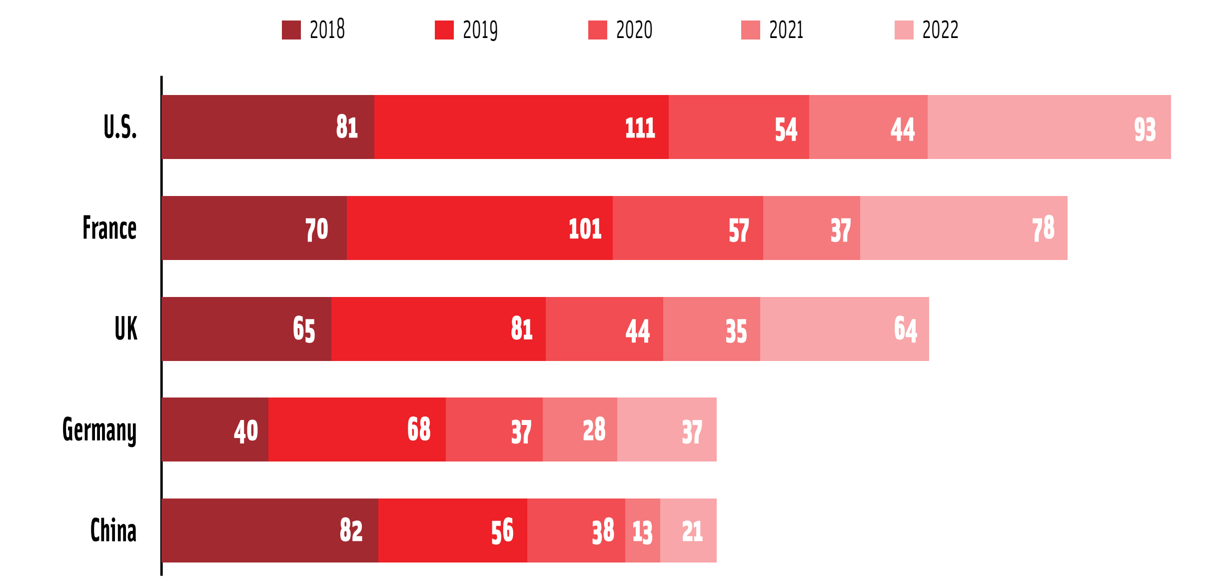
African diversification, African discrepancies

In 2022, African mining accounted for less than 10% of global exploration spending and 5% of global mining revenue. Nevertheless, its minerals are today the object of a race to secure the supplies needed for the green transition, and Africa's share is set to increase. Africa provides opportunities for investors with different risk appetites. High-reward projects are plentiful across the continent. Law firm White & Case, which specializes in mining topics, noted an uptick in investor interest in small, high-risk mining projects across the continent in 2022, as well as a growing interest from startups linked to the tech world looking to secure long-term supply for the energy transition, like KoBold Metals, which committed US$150 million to develop the Mingomba copper-cobalt mine in Zambia.

Junior mining ventures in Africa often encounter challenges in securing financing for new projects due to inherent risks. Such a challenge has been felt by ASX-listed Southern Palladium, which holds a 70% interest in the Bengwenyama PGM project in South Africa. Having submitted mining rights in 2023 and preparing a PFS, CEO Johan Odendaal explained: "A notable challenge in Africa's business landscape is the significant discount

Foreign Direct Investment to Africa (in $US billions), 2018-2022

Source: EY Africa Attractiveness Report 2023



at which companies trade compared to their counterparts in other regions. This discrepancy poses a hurdle when raising capital in the markets. Moreover, in South Africa there is a more conservative risk appetite compared to countries like Canada or Australia. This creates a challenge for exploration companies as there is a gap between obtaining prospecting rights and being able to deliver a PFS."

Yet, a shift in risk appetite is underway, driven in part by major mining companies' lack of investment in exploration and development over the past decade. These majors are now striving to catch up by engaging with junior miners and explorers. In May, BHP acquired a 17% stake in Kabanga Nickel, which holds the Kabanga project in Tanzania. Similarly, Rio Tinto acquired a 15% stake in Sovereign Metals in July, which is developing the Kasiya graphite project in Malawi.

Such shifts suggest a vibrant M&A mining scene in the near to medium term. Noting the unprecedented disconnect between projects' market value (the price of a security) and intrinsic value (the price investors believe it should be traded at) value, Phil Russo, CEO of Toubani Resources, whose 2.4 gold million-oz Kobada gold project is on track to be West Africa's next mine, commented: "We believe that our work will resonate with both the investment and M&A communities, as we aim to bridge the gap between our current value and our inherent potential."

"Our clients face critical challenges in energy security, particularly in environments like underground mining where workforce safety is paramount. In addition, maintaining optimal production levels is crucial for financial viability and sustaining operations."

Sandra du Toit, Africa Director, Partners in Performance

Institutional and retail investors have their say

No place highlights the importance of risk calculation like Africa. Boasting well-established protocols, the strongest geology, and a management team responsible for multiple success stories, does not protect a project from an executive order by a military junta withdrawing a permit and seizing the land. If companies cannot mine in court, they certainly cannot create value there either. Zambia (First Quantum, Glencore), Nigeria (government faced with an US$11 billion arbitration bill) and Burkina Faso (the junta withdrew Sarama Resources' permit under opaque reasons) are examples of governance, geopolitical, and regional stability risks in Africa. Touching upon Nedbank's – one of South Africa's

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Demetrios Papathanasiou

GLOBAL DIRECTOR, ENERGY AND EXTRACTIVES GLOBAL PRACTICE
THE WORLD BANK

Could you introduce the Energy and Extractives Global Practice within the World Bank?

Our Energy and Extractives Global Practice is committed to advancing innovative solutions that drive economic growth while protecting the environment and promoting social inclusion. Our priorities include expanding access to clean energy, supporting responsible mining practices, and improving the livelihoods of communities in resource-rich countries.

We support mining countries and state-owned enterprises to unlock value-addition opportunities, improve governance, transparency, performance, and private sector investment, and contribute to policies that will support green, sustainable mineral supply chains.

Demand for critical metals like copper or lithium is on the rise – how is this shaping African mining?

Africa has significant mineral wealth, including over 60-70% of the world's cobalt supply and large resources of lithium, which are essential for decarbonizing the global energy system. But Africa's mineral resource potential is largely untapped because of insufficient investments in geoscience information, an unstable investment environment, inadequate infrastructure, and a lack of skilled workers.

Improving energy infrastructure is also crucial. This is both a constraint and an opportunity since a growing mining industry can provide long-term paying customers that serve as an anchor for investments in national power systems. Investments in infrastructure can stimulate development and alleviate rural energy poverty while meeting the needs of the mining sector and reducing carbon emissions.

How can Africa capture more downstream investments?

The global efforts towards diversified and resilient supply chains create opportunities for African countries to capture more economic activity and create good-paying jobs. According to our research, Africa could attract between US$300 billion and US$800 billion in potential revenues in the downstream value chain by 2030, in industries ranging from automotive, construction, and machinery production to other metal fabrication.

There are already successful examples of countries that have taken steps to unlock their downstream potential. Zambia and the DRC signed a cooperation agreement in April 2022 to form the "Zambia-DRC Battery Council" to increase mid and downstream activities in EV battery production. ■

Vanessa Ushie

ACTING DIRECTOR - AFRICAN NATURAL RESOURCES MANAGEMENT AND INVESTMENT CENTRE
AFRICAN DEVELOPMENT BANK GROUP

Can you give an overview of the African Development Bank's (AfDB) main missions?

The overarching objective of the AfDB Group is to spur sustainable economic development and social progress in African countries through mobilizing and allocating resources for investment in African countries and providing policy advice and technical assistance to support development efforts. The Bank is actively involved in supporting the development of the mining sector in Africa through the implementation of the AMV. Through its public and private sector operations, the Bank has intensified efforts in recent years to foster the role of minerals as a catalyst for economic growth and poverty alleviation on the continent.

What is the AfDB's take on artisanal mining, and de-risking projects while benefiting local communities?

The African Development Bank has been actively supporting the formalization of Artisanal and Small-Scale Mining (ASM) in Africa. The Bank recognizes the importance of ASM as a source of livelihood for millions of people and aims to promote responsible and sustainable ASM practices through various initiatives. Currently, the Bank is supporting ASM projects in Liberia and Sierra Leone with a grant of US$1.4 million. Whilst regulation in the ASM sector is not as efficient as in the large-scale sector, it is important to strengthen governance systems towards formalization and overall derisking of the mining sector.

Will empowering local value chains as opposed to a purely extractive-based model be key to Africa's mining success?

A conducive business environment, supportive policies, investment in infrastructure and human capital, and access to finance will ensure the development of local value chains.

What will make the difference between success and failure for the African Green Minerals strategy?

Regional cooperation and smart partnerships will be key. Governments must also support the industry with incentives including offtake agreements for battery and EV products, and the establishment of Special Economic Zones with adequate infrastructure. ■

Osam Iyahen

SENIOR DIRECTOR, NATURAL RESOURCES
AFRICA FINANCE CORPORATION (AFC)

Do you think the world is more attuned to the opportunities in Africa?
We see a remarkable amount of interest in the African mining space, especially from the Americas. We have met various delegations from the US, and they are very eager to partner with AFC on projects. It is no coincidence Kamala Harris visited Zambia and Tanzania, both very rich in critical minerals. Likewise, Asian countries have always shown a lot of interest and a higher tolerance for risk in Africa.

What kind of mining projects is AFC prioritizing?
We have been engaging in different projects, including being the largest financier for the producing Thor Explorations Segilola project, the only commercial gold mining project in Nigeria. Outside of gold, we are also increasingly focused on critical minerals, but we must move from extraction to beneficiation and return value on the continent so that we are not repeating the oil curse.

We have also partnered geo-mapping company Xcalibur Multiphysics to understand better the geological potential of different partner countries.

Do you see a willingness to beneficiate in Africa?
It is a catch-22 situation because developers might go for that tried-and-tested model of shipping to China, where they have a captive off-take market and a mature processing environment with guaranteed returns rather than taking the risk of building the processing facility. As an African-based organization, we can take that downstream processing risk. In Gabon, for instance, we are building a smelter to achieve full value chain integration for manganese. Without that layer of beneficiation, the ore would be shipped to China. I believe most investors want to do the same, but they do not have the right means, so by partnering with AFC they gain institutional and political cover.

Do you have a final message?
We see a remarkable amount of interest in the African mining space, especially from the Americas. We have met various delegations from the US, and they are very eager to partner with AFC on projects. It is no coincidence Kamala Harris visited Zambia and Tanzania, both very rich in critical minerals. Likewise, Asian countries have always shown a lot of interest and a higher tolerance for risk in Africa. ■

Marie-Gabrielle Opese

CEO
STANDARD BANK DRC

How does Standard Bank support the mining industry within the DRC?
Standard Bank DRC is part of the Standard Bank Group, which is the largest financial services organization on the continent by the size of its assets. We can leverage the financial strength of the Group, and the partnership we have with the Industrial and Commercial Bank of China Limited (ICBC). Over the past year, Standard Bank has injected hundreds of millions of dollars into the mining industry.

In terms of digital products, Standard Bank offers innovative and interactive products through our mobile banking platform. Our host-to-host solution is a direct system-to-system integration between our clients' ERP systems and the bank, with no user intermediary involved, so that clients can manage their working capital more effectively. Another innovation is that we have integrated our digital platform with our mobile banking platform, and this is a means for us to reach the beneficiaries of payments coming from our corporate clients.

Is the DRC doing enough to move from an extractive-based model to a local content value-added one?
We need the government to be deliberate when it comes to setting policies and ensuring that the industry complies with the rules, but the government also needs to give the private sector the means to comply with regulations. For example, if you want to transform and process minerals you need energy, but there is a significant energy supply deficit in the DRC, however, the country has great hydropower potential with the Grand Inga project. It is a matter of being willing to set up required stable power supply infrastructures to give the private sector the means to process minerals and being deliberate in terms of actions.

What are Standard Bank's main priorities and objectives in the DRC for 2024 and beyond?
Standard Bank has been operating in the DRC for over 30 years, and we will continue to support growth in the country. ■

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four largest banks – robust due diligence practices, Vusi Mpofu, sector lead mining and chemicals at Nedbank, a leading South African bank, explained: "Managing country risk overlay is imperative, requiring innovative approaches to ensure that the pricing and commercial aspects of a project remain viable despite potential challenges. This may involve securing guarantees from locations like Switzerland, London, or Canada to support operations in African countries where risk ratings may vary."

Institutional investors have increasingly prioritized projects that encourage the downstream capabilities of Africa to process the minerals its crust holds. And here, too, challenges are plenty. The Washington-based Peterson Institute found that neither the DRC, Mozambique, Madagascar, or Guinea have the energy infrastructure needed to expand refining capacity. With over US$10 billion in assets, the Africa Finance Corporation (AFC) has pioneered investment in downstream processing risk, notably by financing a smelter to achieve full value chain integration for manganese in Gabon. Its senior director for natural resources, Osam Iyahen, commented: "Africa can supply the bulk of the critical minerals to drive the green agenda, but we must move from extraction to beneficiation and return value on the continent so that we are not repeating the oil curse."

Retail investors are currently nervous about the short-term, many of them expecting a recession as early as H1 2024. Most mining-focused funds are down on their positions, as seen with plunging valuations and the dearth of financing in 2023. However, some retail fund managers see the current market as an ideal time to pick up shares of very devalued companies.

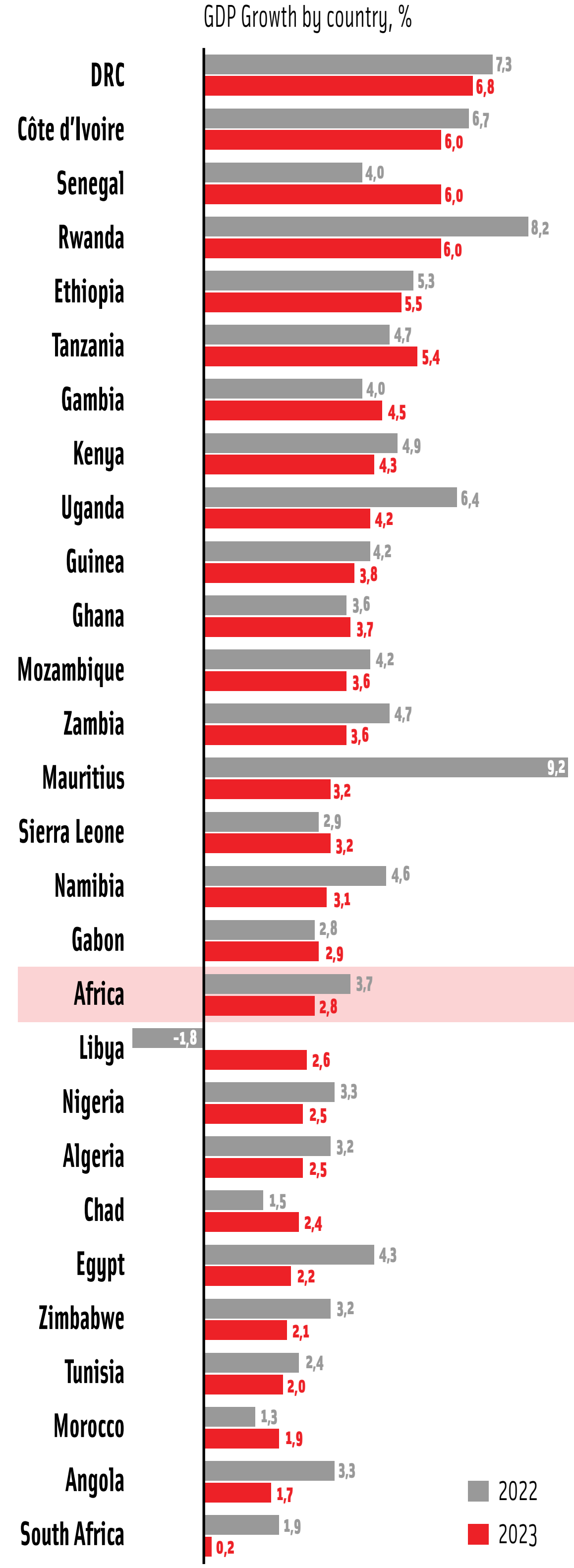
Looking ahead, companies will have to present themselves as champions of decarbonization when courting both private and institutional investors. A 2021 study by Accenture found that 63% of investors "would be willing to divest or avoid investing in mining companies that fail to meet their decarbonization targets." Different funding mechanisms will be key to supporting African juniors, who often lack the financial lift to access reporting houses required for comprehensive ESG compliance.

According to UNCTAD, Africa has offered the highest return on Foreign Direct Investment (FDI) in recent years. The transition to the green economy means the continent, via its mineral wealth and low renewable energy rates, presents ample opportunities. ■

"We are approaching a pivotal juncture where the carbon intensity of resources and commodities will emerge as a defining market metric. For instance, parties will refuse to buy platinum from South Africa because the metal is too carbon-heavy."

Joshua Kilani, Managing Director, Xpotential Mining Services

Growth powered by smaller economies
Source: Oxford Analytics



Célestin Mukeba Muntuabu

MANAGING DIRECTOR
EQUITYBCDC

What are the highlights of EquityBCDC since the acquisition by Equity Group in 2021?
As far as Equity's acquisition of BCDC is concerned, the advantage is that we had to merge an organization with a corporate focus, with another that also managed corporate and SME clients. Our guiding principle remains the same: We want to create an inclusive bank in the DRC. To achieve this we have developed a whole arsenal of banking products and digital solutions for mass consumption.

Can you describe EquityBCDC's support for the mining industry value chain in the DRC?
As well as supporting major mining companies, we also support the entire value chain, including SMEs. Before we support a mining project, we ensure that the highest standards of environmental management are met and that our clients are compliant. We also analyze corporate governance, and we have the AFC standards, for example, and apply them to the mining companies we work with.

EquityBCDC has developed a resilience and growth plan for Africa, which the Group launched after the shock of the pandemic and the war in Ukraine to support the development of African countries. This plan is particularly aimed at the extractive sector, where we are looking at ways of adding value locally. For example, we were able to secure a US$300 million investment for a mining company in Katanga.

How is the DRC positioning itself to attract more foreign direct investment?
The country is experiencing a real boom in the sense that we've enjoyed several years of stability. The problem is how the Congo is perceived abroad. There's a lot of opportunity here: The bank has gone from US$2.6 to US$4 billion in assets in two years; you don't see that kind of growth everywhere. The challenges are marketing real investment opportunities in the DRC.

As BCDC turns 115, what is your long-term vision?
We skilfully combine maturity with the youthful side that the bank brings with all its digital solutions. ■

Alassane Sorgo

GENERAL MANAGER
ECOBANK DRC

Can you present Ecobank and the main highlights from the DRC?
Established in the Democratic Republic of Congo in 2008, we have been working in the mining sector for several years now. Our aim is to consolidate and establish collaborations with mining companies and their value chain. We recently took part in DRC Mining Week and African Mining Indaba 2023 in Cape Town. We also accompanied the Minister of Mines to the PDAC annual convention in Toronto to support the DRC as a destination.

What factors make the DRC an attractive place for foreign investments?
Nowadays, the amount of foreign investment is significant, with the mining sector being one of the main beneficiaries. We all know that the DRC has incredible potential, firstly because of its natural resources, but also because of the size of its market. With a population of over 100 million, more than 50% of whom are relatively young, and therefore a ready supply of labor, the domestic market is vast and potentially lucrative for companies. It should also be noted that in recent years, the DRC has made significant progress in the development of transport, telecommunications and energy infrastructures, which facilitates investment and trade, particularly in the mining sector. The new economic reforms also play an important role in investor decisions. Tax incentives, guarantees and administrative facilities have improved the business climate and encouraged foreign investment.

What is your assessment of the state of the workforce in the country?
Although the Democratic Republic of Congo has a large workforce, there are major challenges. Investment in education, training, the creation of formal jobs and the promotion of decent working conditions are essential to stimulate economic development and improve prospects for the working population, thereby helping to create a middle class.

What are your priorities to sustain growth in the mining sector?
We are continually focusing on developing solid expertise in order to better understand the specific features of the sector and anticipate needs and respond to specific requirements. ■

SPOTLIGHT

M&A and deal-making scene in Africa

In value terms, M&A activity in the Middle East and Africa rose by 876% in Q3 2023 as compared to Q3 2022. Experts have noted that a perfect storm of factors came together in 2023: The growing demand for minerals, increased focus on exploration, and the need for scale to match Africa's large, valuable mining assets.

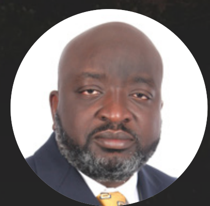
Notable transactions in Africa in 2023

MARCH
In Ghana, Gold Fields and AngloGold Ashanti announced a JV combining Gold Fields' Tarkwa mine and AngloGold's Iduapriem mine to create Africa's largest gold mine.

JUNE
Lilium Mining acquired 90% stake in Endeavour Mining's Boungou and Wahgnion Mines for US$300 million.

SEPTEMBER
Fortuna Silver completed the acquisition of Chesser Resources (US$60 million) to expand its presence in West Africa to include the Diamba Sud Gold Project in Senegal.

OCTOBER
In Burkina Faso, West African Resources and Orezone entered a MOU to unlock synergies at their Sanbrado operating centers, located within 14km of each other.



"The industry is gearing up for a vibrant M&A scene in 2024, driven by producers facing reserve depletion. Recent deals like Fortuna and Chesser support the forecasted M&A activity, making the outlook for gold exploration intriguing and promising."

Nana Sangmuah, President and CEO, Roscan Gold

"The M&A landscape in the West African mining scene is expected to be very active in the coming years. This activity will be driven by several factors, including the growing demand for critical minerals, increased focus on exploration, rising commodity prices, and the need for scale."

George Ankomah, Lead Partner - Tax & Regulatory Services, Deloitte Ghana

"The consolidation is driven by the need for economies of scale, risk mitigation, and a stronger bargaining position in uranium off-take agreements. As the uranium market recovers, the appetite for strategic partnerships, mergers and acquisitions in Namibia and other uranium-rich regions is growing."

John Borshoff, Managing Director and CEO, Deep Yellow Resources

Image by Mihai Vlasceanu at Pexels

Dean McPherson

HEAD, BUSINESS DEVELOPMENT – GLOBAL MINING

TORONTO STOCK EXCHANGE AND TSX VENTURE EXCHANGE

"Africa-focused companies continue to do well in our markets because our market participants know Africa and are confident with the vast opportunities the continent presents."

What are the highlights of the past year at the TSX and TSXV?

In mid-2022, we launched the S&P/TSX Energy Transition Materials Index which tracks exploration and production stage companies that focus on critical minerals needed for this global transition. This summer, BlackRock launched and listed the iShares S&P/TSX Energy Transition Materials Index ETF based on our index. This offers more investors, particularly retail investors, an opportunity to gain exposure to the companies at the root of the global energy transition.

In October 2023, we launched the TMX ESG Data Hub in response to the needs of our investor clientele. ESG has become a key decision element in investors' decision processes. This ESG Data Hub services investors seeking ESG data on companies.

Despite a challenging 2023, we saw two significant new mining listings: Lithium Royalty Corp and Allied Gold. These listings underline how much critical minerals continue to influence the sector globally; as well as the fact that TSX continues to be the leading mining exchange for global companies looking to access capital, regardless of the commodities they are focused on.

How have TSX-listed African mining firms performed in 2023 and do you foresee more consolidation in this scene?

Historically, Africa has been mostly known for its precious metals, but recently we are seeing Africa's rise as a critical jurisdiction for energy transition materials. The DRC is at the forefront of this space, but many other countries are now being recognized for their untapped and underexplored resources. The bankers, research analysts, investors, etc. who participate in our markets are familiar with the region, and as such can navigate any challenges that may arise operating there. Africa-focused companies continue to do well in our markets because our market participants know Africa and are comfortable and confident in connecting investors with the vast opportunities the continent presents. Allied Gold's recent listing on TSX exemplifies this well.

In a very challenging market, through the IPO, Allied Gold, which is focused on West Africa, raised close to C$300 million this summer. In the past, we saw London as the main competition for African companies. Allied Gold's decision to list on the TSX, instead of in London for example, underscores Toronto's position as a leader on the global stage with our mining ecosystem and thanks in part to its seamless connection to the large American investor base looking to access global mining equities.

In terms of consolidation, we are seeing a global trend of companies realizing they need to increase their size or scale. In addition, many companies are looking to add to or diversify their project base, sometimes on a geographic or commodity basis. As this plays out, M&A will be a big factor going forward.

What advice do you have for mining companies considering an IPO considering the current economic climate?

With uncertainty and volatility in the capital markets, the windows of opportunity to raise capital and/or enter the public markets have been reduced from years to months. Companies must be prepared and ready to move on short notice. Do all you can to prepare, in spite of the uncertainty of when that window will open. The key is to be prepared to move quickly. Our pre-listing services are there for companies to prepare them for public life.

~40% of public mining companies worldwide are listed on TSX or TSXV. How do you intend to maintain this dominance going into 2024?

We pride ourselves on being a market for all mining companies regardless of stage in the life cycle. Our overarching strategy at TMX Group is to be client-centric in our business lines. We achieve this through three key areas: Innovation, advocacy, and quality of service.

On the advocacy front, we use our position to advocate for Canadian capital markets to improve. We have already seen positive signs with the federal and provincial governments, with increased incentives to encourage participation in the critical minerals space for example.

Finally, our internal processes are continually being improved. Our adoption of new technologies/efficiencies in listing processes along with programs like our Growth Accelerator service, which mentors our early-stage companies on key success factors as a public company. ■

Sam Mokorosi

HEAD: ORIGINATION & DEALS

JOHANNESBURG STOCK EXCHANGE

Can you provide an overview of the Johannesburg Stock Exchange (JSE) and highlight some recent milestones?

Today, we stand as Africa's largest stock exchange and proudly rank among the top 20 globally in terms of market capitalization for equity listings, boasting a total of approximately US$1 trillion among our listed companies. One notable aspect is our exceptional liquidity, with daily trading volumes ranging from US$1.1 to US$1.5 billion. Nearly 30% of our listed companies are either dual-listed or incorporated offshore, making us a truly international exchange.

Mining plays a substantial role within the JSE. This sector represents approximately 31% of total market capitalization. We currently have 37 companies listed under basic materials. Importantly, these companies have managed to raise a significant amount of secondary capital. For instance, by June 30th, we had already seen around 700 million rand raised in secondary capital from basic materials companies. This showcases the sector's ability to attract investment and its positive impact on the exchange's financial health.

Could you elaborate on the factors that led to the JSE hitting an all-time high in early 2023?

The JSE's impressive performance can be attributed to two key factors. Firstly, the weakening of the South African rand has benefited mining companies listed on our exchange. Secondly, strong commodity prices at the beginning of the year played a crucial role in driving up market values.

Could you highlight recent notable mining deals that have taken place on the JSE?

This year we welcomed ADRA, a mining services company. They operate cross-border and have added value to our listings. Another noteworthy listing is Southern Palladium, which achieved dual-listing status on both the Australian Stock Exchange and the JSE. Additionally, Copper 360, a copper company, joined our ranks earlier this year.

How will the JSE maintain its leadership in the financial markets?

Working closely with the government, we aim to maintain a favorable regulatory environment and macroeconomic stability. ■

Tom Attenborough

HEAD OF INTERNATIONAL BUSINESS DEVELOPMENT, PRIMARY MARKETS

LONDON STOCK EXCHANGE GROUP

What are the factors making the LSE an attractive listing option for mining firms with operations in Africa?

The London Stock Exchange is the most international exchange globally and continues to be Europe's leading exchange for raising equity capital. Companies that list on our markets can access deep pools of liquidity and a strong ecosystem of global investors and advisers who support companies across all sectors and stages of their growth.

While global IPO market conditions continue to be impacted by economic and geopolitical volatility, London's markets have remained active, with more capital raised in London than on the next two European stock exchanges combined. In 2023, we have welcomed international companies from a variety of sectors including Metals and Mining, Real Estate, Chemicals and Technology, enabling them to boost their global profile and expand their investor base. Issuers in London can also benefit from access to long term capital, which can be allocated to fund innovation, growth and acquisitions. We have seen listings in the sector from Africa this year from South African uranium developer Neo Energy Metals PLC and East African rare earths exploration company Altona Rare Earths PLC, in addition to other global miners like Celsius Resources and Metals One.

What are the LSE's priorities to remain a leader in the financial markets in the future?

London is a vibrant market with a dynamic financial ecosystem that is able to support companies from around the world. Our priorities are to continue to work with market participants and the wider industry to ensure the UK has the best possible environment for companies to generate the capital they need. The UK is also seeing its biggest capital markets reform in decades, which is vital to ensure they can continue to serve their purpose for companies with global operations. ■

Geographies

"Africa remains largely untapped despite the natural resource riches it is endowed with."

-Mark Bristow,
President and CEO, Barrick Gold

Image by Graphi Node at Unsplash

North Africa

Highlighted projects

EGYPT

The Dara Gold Concession

"Dara presents strong geological indicators, pointing to the presence of significant mineral deposits of a highly potential gold-copper porphyry. The prime location, renowned for its mineral-rich reserves, adds further allure to the project and makes it a compelling choice for investment."

Mostafa Talaat, CEO, Ankh Resources

EGYPT

The Abu Marawat Gold Concession

"Abu Marawat is in an area with excellent infrastructure, a four-lane highway, close-by railway, as well as 220 KW power line and groundwater pipeline in close proximity. Egypt remains the most lucrative country for gold explorers, but it must work hard and act quickly to stand out because other countries are already moving fast."

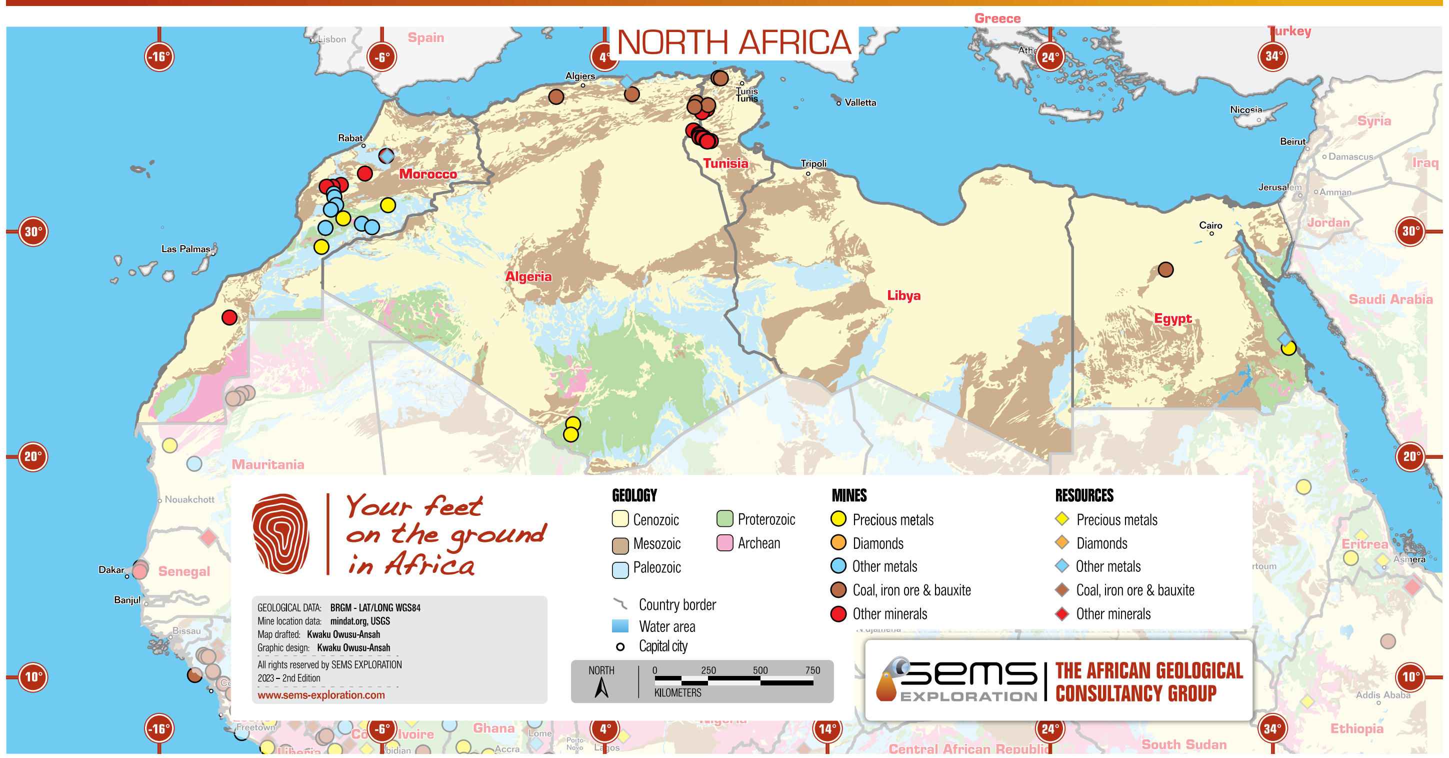
Tonno Vahk, CEO, Aton Resources

EGYPT

The Wadi Jundi Gold Project

"Akh Gold was among the four companies that were awarded two new areas as part of the 2021 bid round conducted by the Egyptian Mineral Resource Authority. Being near Sukari as well as other companies like Barrick, Lotus and Centamin presents good opportunities for knowledge sharing."

Mark Campbell, CEO, Akh Gold



Egypt and the Arabian Nubian Shield

Egyptian ambitions and the Arabian Nubian Shield (ANS) attract new players

Main producers and upcoming producers: Centamin, Barrick Gold

Main juniors: Ankh Resources, Akh Gold, Lotus Gold, Marine Logistics, Red Sea Resources

Six millennia after the Golden Era of the Pharaos, Egypt is on the move to rebuild its mineral legacy. 2023 was an unprecedented year for the country's mining story, as the government laid out its strategic plan to have the industry contribute to over 5% of total GDP by 2030 (against a mere 0.5% now). Minister of Petroleum and Mineral Resources, Tarek El Molla, coined Egypt as an 'Ideal Mining Destination' in a June 2023 report, a month after a meeting with President El-Sisi regarding the development of the country's mineral resources. Egypt produced 14 t of gold in 2022, with this representing the tip of the iceberg of its real production potential. Beyond gold, Egypt boasts high reserves of tantalum, phosphate and coal.

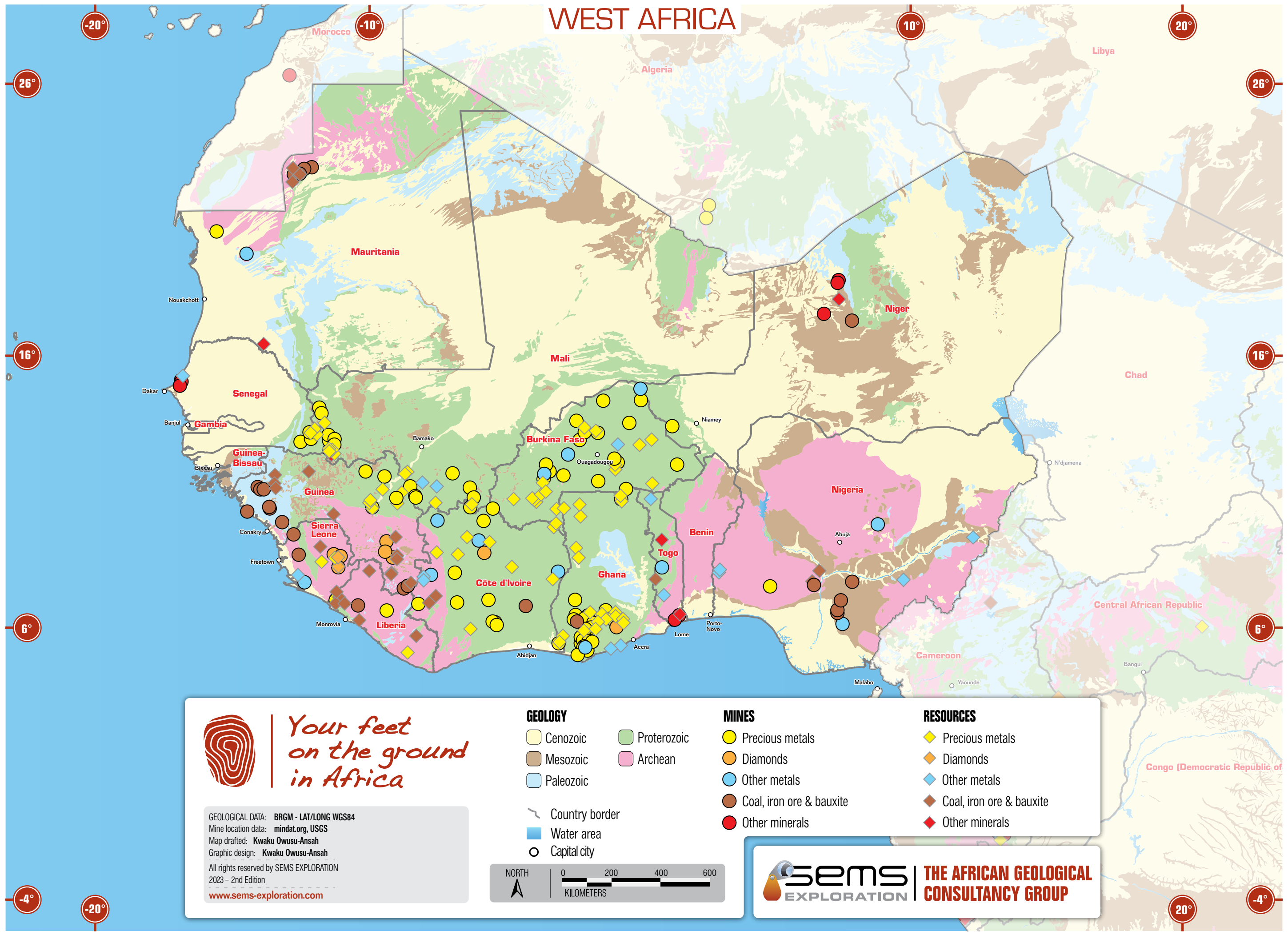
The Arabian Nubian Shield (ANS) structure, which is being particularly promoted by Saudi Arabia's generously financed plans to diversify to mining, also covers North and East African territories in Egypt, Ethiopia, Eritrea and Sudan. The highly prospective ANS encompasses the eastern desert of Egypt and other potentially lucrative areas, including Sinai. There has been limited exploration activity over the past century, except for at the Sukari gold mine, which means that many areas remain underexplored (around 90% of the Egyptian ANS has not been tendered in the past 20 years.)

Despite the presence of majors like Barrick in Egypt, which was awarded exploration licenses for 19 blocks in the Eastern Desert, this part of Africa is known for its large but often problematic artisanal gold output, with the only formal gold miner being Centamin, the operator of the Sukari gold mine in Egypt. Sukari produced its five millionth-ounce of gold in 2022, and has at least another 11 years of production ahead.

Recently, high grades, large deposits and a turn in policy are coaxing both majors and juniors to the area (in the past, mining was hampered due to old royalties schemes making exploration unprofitable). In July 2023, Egypt agreed on a new regulatory framework for exploration. With Barrick and Centamin operating within a framework whereby the government will receive a 5% net smelter royalty on revenue, a 22.5% corporate tax, and a 0.5% community development contribution on commercial discoveries made in the Eastern Desert (the EDX blocks). Egypt also granted eight new licenses to foreign companies in 2023. Ankh Resources obtained the Dara concession, not far from Barrick's license in the Eastern Desert.

In the ANS, logistics can be either unbelievably easy or unimaginably hard. Egyptian ANS players (as opposed to their Ethiopian or Sudanese peers) seem to be on the lucky side. For Aton Resources, an advanced explorer in Egypt currently applying for a mining license for its Abu Marawat concession, there are great perks to exploring in a barren desert, without vegetation or habitation, and close to a four-lane highway, railway, and power. Quite the opposite to operating in the deep forests of West or Central Africa.

Looking ahead, all elements point towards mining players being able to unleash Egypt's mineral potential. The authorities' renewed openness to mining investment in a push to increase FDI, coupled with the greenfield potential in a geologically endowed country, position Egypt as the new mining frontier in North Africa. Speaking about the country's potential across several commodities, Mostafa Talaat, Ankh Resources' CEO, stated: "Once the government conducts thorough investigations into the potential for critical minerals associated with the green transition, such as lithium, nickel, copper and cobalt, and offers them for investment, Egypt's mining sector will become an even more compelling investment frontier." ■



West Africa

Highlighted projects

MALI — **The Kobada Gold Project**

"The goal is to have the updated study ready for release in the first quarter of 2024. We believe this will offer the market a compelling perspective on Kobada's potential. Our project is characterized by its low-cost structure, large scale, and considerable underexplored areas. We are convinced that this combination will generate significant interest."

Phil Russo, CEO, Toubani Resources

CÔTE D'IVOIRE — **The Koné Gold Project**

"The Sanankoro project has just under a million oz in resources, with an additional 1 to 1.5 million oz in exploration targets based on recent results. We have converted over 400,000 oz of resources into reserves at approximately 1.3 g/t, forming a promising open-pit deposit with most resources being oxides or transitional zones."

Bert Monro, CEO, Cora Gold

GHANA — **The Enchi Gold Project**

"There are only a few development-stage gold projects as advanced as our Enchi gold project in Ghana. This places Newcore in a strategic position given that Ghana is the biggest producer of gold on the continent. One of the big advantages of operating here is the ability to expedite the timeline of a project from exploration to development and then ultimately toward a construction decision."

Luke Alexander, President and CEO, Newcore Gold

LIBERIA — **The Nimba Gold License**

"In late 2022, Hamak made its initial gold discovery in the north of Liberia on the border of Côte d'Ivoire. Geochemical soil sampling has identified a 3 km by 1 m gold in soil anomaly with significant peak gold values of over 1 g/t Au."

Karl Smithson, CEO, Hamak Gold

NIGER — **The Madaoulea Uranium Project**

"GoviEx Uranium completed the final feasibility study on our Madaouela project in Niger in September 2022, which led us into debt financing conversations with commercial banks, export credit agencies, and DFIs. Currently, we are trying to understand the changing political aspects of Niger."

Daniel Mayor, CEO, GoviEx Uranium

West Africa

Golden opportunities amidst regional perils

Will more countries be added to West Africa's long list of those succumbing to military coups in recent years? The July 2023 Coup in Niger was the sixth in the region in less than three years. The Sahel region, notably Burkina Faso and Niger, continues to grapple with endogenous destabilization that has raised the risk profile for mining, causing mine closures and halting exploration expenditure. Yet, in a troubled region, some countries stand out as a haven for investors and operators. Côte d'Ivoire, Ghana, and Senegal have seen their economies unharmed by conflicts. West Africa is known for its outcropping resources, and in recent years has produced around 380 t/y, which, if the region were considered as one country, would make it the third largest producer of gold in the world. In 2022, Ghana dethroned South Africa as the continent's top gold producer. Investment appetite for gold is currently strong as evidenced by several recent developments, including AngloGold Ashanti and Gold Fields' decision to join forces to build Africa's biggest gold mine; a fusion of the Iduapriem and Tarkwa mines in Ghana that will lead to a production of 900,000 oz/y. Meanwhile, Newmont's Ahafo (Ghana), Barrick's Lolo-Gounkoto (Mali), and B2Gold's Fekola (Mali) all delivered more than 600,000 oz/y for 2022, and are on track to deliver on their production targets for 2023, showcasing the strength of the producers in the region. Looking ahead, with the gold price teasing US$2,000/oz for the better part of the year, producers have *capex* to deploy towards strengthening their operations, and developers have a healthy glow.

Resource optimization means consolidation on the West African scene

Amidst global geopolitical and economic upheaval, investors in the mining industry are facing a challenging terrain characterized by unstable and unpredictable commodity markets. This situation is exacerbated by a widespread shortage of raw materials, persistent disruptions in supply chains, and rising energy and input expenses. This presents an auspicious moment for resource companies to consider investments in projects, and in West Africa, these investments have taken the form of capital commitments and M&A, without signs of slowing down. Recent developments in the West African mining industry have shown a trend of smaller and midtier companies seeking strategic partnerships and asset-sharing arrangements to adapt to the evolving market dynamics. Oriole Resources CEO Tim Livesey explained: "The partnership between West African Resources and Orezone in Burkina Faso is emblematic of the smaller and midtier companies' strategy. By joining forces for power supply, they are aiming to enhance operational efficiency and reduce costs in a challenging business environment."

The need to increase resources saw larger firms in Africa acquiring smaller, quality assets in 2023, and with the strong disconnect felt between intrinsic and market value, this consolidation trend will likely persist. Phil Russo, CEO of Toubani Resources, which is developing West Africa's next gold mine in Mali at the oxide-dominant Kobada gold project, shared: "There is a discernible trend of consolidation in the West African gold industry. There is a wide disconnect, perhaps the widest in a long time."

> *While gold remains dominant in West Africa, the similarities between operations in the gold industry and battery metals production make it a promising area for us as a contractor. Recent project developments, such as Leo Lithium in Mali or Atlantic Lithium's Ewoyaa in Ghana indicate a potential wave of new battery metal projects in the region.*
>
> Federico de Simone, Director, De Simone Group

The region is already witnessing opportunistic takeover offers. In October 2023, the proposal by a unit of China's Zhaojin Mining Industry for the shares of Australian miner Tietto Minerals, timely announced after the improvements at the Abujar Mine in Côte d'Ivoire, highlights the astute stance larger groups take in offers for undervalued companies. Majors are also making significant moves to reshape their own portfolios, as seen with Iamgold's decision to divest its West African exploration and development assets to Managem. Following the acquisition of Roxgold in 2021, a newcomer is Fortuna Silver's Séguéla mine, successfully commissioned in H1 2023. Finally, West African producer Asante Gold acquired the open pit Bibani mine from Resolute in 2021 and poured the first gold in the same year. "The acquisition allowed us to control 53 km along the Bibiani and Chirano shear zones. This is a prospective trend that has produced over 8 million oz throughout its history" explained Dave Anthony, Asante's CEO.

High speed, low (capital) intensity

The West African mining scene has dramatically changed in the past decade. Roughly 20 mines have been built since 2010 in West Africa, taking an average of only 1.7 years to complete, placing the region as a top destination for rapid execution. Perseus Mining managing director and CEO, Jeff Quartermaine, who developed two mines (Edikan and Sissingué) in Côte d'Ivoire over the past five years, recalled: "The first time I stepped out of the airport in Abidjan back in 2011, I saw buildings dotted with bullet holes and scorched by flame. Since the end of the war in 2011, the country has evolved tremendously, experiencing one of the fastest sustained economic growth rates in Sub-Saharan Africa and becoming one of the most attractive investment destinations in Africa."

What ensures enthusiasm about the region is the relatively low cost of production. Costs in West Africa are generally considered lower than elsewhere. One of the region's heavyweights, Endeavour, discovered 11.5 million oz/Au in the past five years, at a discovery cost of less than US$25/oz for indicated resources. Across operations in Côte d'Ivoire, Senegal, and Burkina Faso, Endeavour achieved an all-in-sustaining cost guidance of below US$930/oz in 2023. "The region offers some of the lowest capital intensity globally," commented Quartermaine.

Renewed foreign interest

While historical and persistent instability in West Africa has meant that a large part of the region has remained unexplored, the recent past has shown how quickly this can change. Côte d'Ivoire, Guinea and Liberia now present themselves as jurisdictions with very favorable conditions. The International Trade Administration recorded 20 operational projects in the country as of 2022, half of them in the bauxite field (Guinea hosts 23% of the world's bauxite reserves). More importantly, there were 36 projects under development recorded during that study (11 in bauxite, 10 in gold, and four in iron notably), positioning Guinea as a player to count on in the West African mining scene.

Guinea is home to the long-delayed Simandou iron ore project. The south-eastern mountain has been feeding the fantasies of miners and authorities alike: the 2.4 billion t "Iron Mountain" is the world's largest identified reserve of iron ore, still untapped. To put it into perspective, Simandou holds enough iron to build half a million Eiffel Towers. Now, however, the exploitation of Simandou seems closer. The deposit is divided into four blocks: Blocks 1 and 2 for Winning Consortium Simandou (WCS) – a consortium of Singapore's Winning International Group and Chinese giants Hong Quiao and Baowu – and Blocks 3 and 4 for Rio Tinto Simfer in association with China's Chalco Iron Ore Holdings. Guinea holds a 15% stake in each group of blocks, as stipulated in the Mining Code. Finally, Rio Tinto stated in December that it will spend over US$6 billion for the development of the Simandou project, train, and port infrastructure before the mine enters scheduled production in 2025.

In a region where, as opposed to Central, East, and South Africa, Western investments outnumber Chinese ones, actors on the ground have started to notice a shift. China's presence in Western African mining-related news grew exponentially in 2023. Beyond Guinea, China had accelerated discussions with Niger regarding the construction of a uranium mine, although these were halted by the coup. Western entities have felt the growing Chinese presence in West Africa. Currently developing the Koné project, poised to become the largest gold mine in Côte d'Ivoire, Rick Clark, Montage Gold's CEO, said: "Recent trends indicate a shift in Chinese investors' focus, withdrawing from various global jurisdictions and redirecting attention to West Africa. The region holds appeal for the Chinese due to the potential for swift transactions, deal-making, and accelerated project development, outpacing many other global jurisdictions." ■

Côte d'Ivoire

A beacon of stability amidst West African unpredictability

Main producers and upcoming producers: Barrick Gold, Perseus Mining, Fortuna Silver Mines, Endeavour Mining, Iamgold, Centamin

Main juniors: Tietto Minerals, Mako Gold, Awalé Resources, Montage Gold, Sama Resources

Côte d'Ivoire has evolved into a politically stable and economically vibrant region over the past decade. Factors like a stable political system, rule of law, significant foreign investment, strong GDP, and contented citizens make it an attractive investment destination.

Rick Clark, CEO, Montage Gold

A decade after the revision of its mining code in 2014, the mining industry is well and truly booming in Côte d'Ivoire. In the past five years, the country saw more mines being built than any of its West African neighbors, and it boasts a competitive advantage envied by all in the region: Political stability. Surfing on high gold prices, new mines coming online, and experience from the world's greatest international operators – the Australian Perseus, the Canadians Barrick Gold and Fortuna Silver, and the British Centamin and Endeavour Mining – the government now wants to grow the share of mining to up to 6% (currently at 3%) of the country's GDP by 2025. To do so, the government aims to diversify its mining industry beyond gold, particularly as it holds economic deposits of nickel, lithium, cobalt, and rare earths. In September 2023, the government granted two new lithium exploration licenses. Côte d'Ivoire contains a prospective part of the Birimian Greenstone

Belt, a mineral-rich belt of sedimentary volcanic rock stretching from Senegal to Ghana, with gold deposits expected to be the largest in the world. Nestor Houssou, executive GM of geosciences specialists Georec, is currently carrying out exploration work for several mining companies in Côte d'Ivoire, including Kenorland Minerals Africa, CAREM, and Global Mineraie. He said: "The country holds the largest share of the West African Birimian (35%) and is crossed by shear zones bearing gold occurrences in the neighboring countries. In legal terms, the country has had attractive mining legislation since 2014, which has led to a rush of mining companies to Côte d'Ivoire."

Côte d'Ivoire also boasts strong infrastructure that will facilitate any upcoming operations. Vamoussa Fofana, managing director of Imperium Services, which provides catering services to Fortuna's Séguéla mine among others, said: "We have a much better road network than other West African countries. The improvement of the last 10 years can be felt; almost all the accesses to the sites we serve are paved. Logistically, the setting is ideal."

Gold production reached 48 t in 2022, a 14% increase compared with 2021, and double what it was only five years ago. 50 t of production is expected for 2023, with the start of production from Fortuna's Séguéla mine and Tietto's Abujar mine. To sustain such momentum, development projects are seamlessly turning into mines, thanks to agile operators and a good operating environment. Tietto Minerals' Abujar mine, for example, came into production in 2023, and was built in under 12 months. Having poured its first gold in January, Abujar is expected to produce 260,000 oz/y in 2023 and is forecasted to produce 1.2 million oz of gold over its planned 11-year lifespan. Perseus Mining's Edikan and Sissingué mines are further examples of exceptionally fast mine development whilst remaining within budget. Greenfield discoveries are continually taking place in the country. In October, Canadian giant Endeavour published the partial results of its extensive 180,000 m drilling program at the Assafou deposit at its Tanda-Iguela gold exploration project. The improved mineral resource estimate for Tanda-Iguela, followed by technical studies in 2024, should put the company on track to develop its third gold mine in Côte d'Ivoire in the coming months. Fortuna Silver also made a significant discovery with the Sunbird deposit at the Séguéla mine. One challenge the country must address is illegal mining. Kouamé Klemet-N'Guessan, partner at KSK Avocats, an Ivorian law firm, detailed the issue: "Illegal mining activity constitutes a big security problem. This activity is criminal. People who engage in gold panning escape mining regulations and will therefore pollute groundwater and other sources."

Vamoussa Fofana, managing director, Imperium Services, which services several mines in the country, said: "We are facing a scourge: Clandestine gold panning. We need a much more physical presence of the state."

Beyond gold, Côte d'Ivoire ranks among the top global manganese producers, and Mako Gold announced the discovery of a significant deposit at Korhogo in August. The country is also witnessing an increase in lithium exploration in Issia, Agboville, and other regions. The future thus appears bright for the country, as long as it manages to maintain what its neighbors envy: Its steadiness. ■

Ghana

If you want to find an elephant, go to an elephant country

Main producers and upcoming producers: Newmont, Kinross, Gold Fields, AngloGold Ashanti, Perseus Mining, Resolute Mining, Asante Gold, Shandong Gold, Chifeng Jilong

Gold Main juniors: Newcore Gold, XTra-Gold, Ibaera Capital, Atlantic Lithium

"There has been acknowledgment from the government that some fiscal policies need to change to attract more investment into the country, and support mechanisms need to be put in place that encourage greenfield exploration."

Sulemanu Koney, Director, Ghana Chamber of Mines

The Ghanaian economy relies heavily on the mining sector, which not only draws in over 50% of foreign direct investment (FDI), but also contributes to more than a third of the country's export revenues. In 2022, the mining sector contributed about 7.6% of Ghana's GDP and about 18.6% of aggregate direct domestic tax receipts.

Ghana is once again the number one spot for gold production in Africa, wrestling back the crown it lost to South Africa in 2021. Ghana produced 3.7 million oz in 2022 (a 32% increase YoY), notably driven by a lowering of the withholding tax rate on unprocessed gold by small-scale miners, the consolidation of existing mines, and the fusion of two giants. The revival of AngloGold's new crown jewel, the Obuasi mine, which was overrun by an army of illegal miners a few years ago, and also the first gold poured at Asante's Bibiani gold mine in 2022 also made notable contributions. Obuasi increased production by 132% in 2022 to 250,000 oz/y, while the Bibiani mine yielded an output of more than 52,000 oz for 2022. Another significant project in the pipeline will come from Newmont, with the development of a new gold mine at Ahafo North. Planned to begin production in 2025, the mine is expected to produce between 350,000 and 375,000 oz/y over its projected 13-year mine life.

Ghana saw one of the biggest transactions in the African gold mining space in 2023, when two South Africans, Gold Fields and AngloGold Ashanti, put pen to paper to form a JV with their respective assets Tarkwa and Iduapriem. They expected to produce 600,000 oz/y over an estimated LOM of 18 years. Gold Fields' Interim CEO Martin Preece elaborated: "With this merger, we certainly see a significant extension of mine life, as well as a huge upside in terms of getting the combined mine's all-in sustaining costs under US$1,000/oz. This puts a good margin into the asset and is a win-win situation for all. Ghana is an excellent place for mining, and we hope that this JV will endorse the long-term future of the country as a stable and pre-eminent mining jurisdiction."

Despite Ghana counting numerous gold heavyweights, explorers are but a handful in the country. According to Sulemanu Koney, director of the Ghana Chamber of Mines: "There has been acknowledgment from the government that some fiscal policies need to change to attract more investment into the country, and support mechanisms need to be put in place that encourage greenfield exploration."

Nevertheless, Newcore Gold is actively exploring Ghana and updated the MRE for its Enchi project in March 2023, showcasing a robust heap-leach (HL) project with an after-tax NVP of US$302 million at a gold price of US$1,850/oz and an IRR of approximately 42%. President and CEO Luke Alexander said: "Newcore is the most advanced explorer in Ghana, with other gold projects in-country either owned by a larger entity or producing at a small scale."

Beyond gold, in October 2023, the government granted ASW-listed Atlantic Lithium a 15-year permit to start building its lithium mine in Cape Coast, the only of its kind in Ghana. CEO Keith Muller shared: "The DFS showcased exceptional project economics. For the 3.6 million t spodumene concentrate production over a 12-year LOM, we are looking at a post-tax NPV of US$1.5 billion with payback in 19 months."

Overall, efforts to accelerate 2023 green minerals strategies and tax incentives to benefit greenfield exploration suggest that future-facing commodities will be a growing part of the Ghanaian mining story. ■

In Ghana, there is a high focus on local content, and we need to consider this to succeed in our business. Dutylex is 100% Ghanaian-owned, but we represent a foreign product. While the finished product is imported in small packages, our strategy is to start bringing larger quantities in ISO tanks, to eventually establish a blending plant in Ghana so that the finished product is manufactured in the country.

Peter Quarm, CEO, Dutylex

Ghana is positioned as a global gold player. Many high-end engineers and technicians in the gold mining industry across the West African sub-region have come from Ghana.

Daniel Obeng-Davis, Finance Director, EDM African Resources

Burkina Faso

Geology remains the only ally

Main producers and upcoming producers: Endeavour Mining, Fortuna Silver Mines, Iamgold, Trevali, Nordgold, Centamin, Orezone

Main juniors: Diamond Fields Resources, Tajiri Resources

We are doing O&M activity in Boungou, where there is jihadist activity. Miners need convoys with military escorts to resupply the mine. Roads and convoys are attacked, disrupting supply deliveries. This year, we have done six significant overhauls in that area.

Philippe Pascal, Power Production Director, Africa Power Services

Gold is Burkina Faso's leading export. A dozen operating mines contribute to over a fifth of the country's GDP. But recent years have been marked by growing threats from jihadist groups in a country that is only partially controlled by the state. Prolonged instability means capital has not rushed to the country's mineral reserves. In 2022, six mines closed due to the cost of protecting workers and infrastructures, with more than 30 casualties recorded since 2019.

To put such risks and the costs associated into context, it is standard for gold producers who have operations both in Côte d'Ivoire and Burkina Faso to employ more personnel dedicated to protecting sites in the latter country than all staff combined at their Ivorian operations. Beyond insecurity, a factor harming foreign investments is political instability. With three presidents and as many prime ministers and mining ministers in less than two years, this unwelcomed political waltz is not to the taste of foreign investors. Lucid about the situation, the president of the Burkina Chamber of Mines, Adama Soro, expanded: "The political and security challenges we have encountered have been significant. Over the past two years, Burkina Faso has seen multiple leadership changes. These frequent changes have sometimes jeopardized previous progress and led to alterations in the regulatory framework."

Security challenges are forcing majors to make drastic decisions regarding their assets. To reduce its exposure in the country – and in light of expansion plans at higher quality assets in Senegal and Côte d'Ivoire – Endeavour Mining divested 90% stakes in its Boungou and Wahgnion mines in July. The firm faced several jihadist attacks in the past three years. And such challenges are being felt by actors across the spectrum. Emmanuel Yonli, lawyer at SCPA KAM & SOME, recalled that he used to travel by car to the east of the country to assist mining clients there. Today, he must fly there: "The security situation is currently the real challenge facing Burkina Faso. Insecurity is seriously affecting business in our country. Mining companies are having to deploy far more resources than usual to secure their operations and incurring considerable costs and even losses."

Finding allies to unlock synergies is paramount in such a challenging operating environment. Orezone's Bomboré mine poured its first gold in 2022, and in 2023 signed a MOU with neighboring West African Resources to join forces in areas of grid power, renewable energy, and optimizing security costs. Such agreements are likely to become standard in the Sahel, where mid-tier operators are strategically aligned on deal-making approaches to unlock value, keep opex low, and bolster security stances.

For juniors, finding opportunities in the country is a perilous endeavor. Looking to establish a new mining district in Burkina Faso, Sarama Resources completed a large chunk of the upcoming PEA for the multi-million-ounce Sanutura gold project in August 2023, located 60 km south of Endeavour's Houndé mine. With good geology and land position, further regional consolidation in the Houndé Belt is to be expected following the trend noticed across West African gold players, though this will depend on the political and security situation.

There is room for hope, although juniors and operators will have to rely (or depend) on the involvement of the military junta. The latter, through increased security measures around mining sites, intends to regain positive momentum in gold production (which dipped to 57 t in 2022 from 66 t in 2021). The country is host to some of the most prospective gold deposits in Africa, and recent large transactions have shown that deal-making is possible. Burkina Faso has a consistent record of opening an average of 1.2 new mines annually since 2010. The country's economic lifeline will likely come through new mines coming online (like Bomboré), strengthening across renowned gold belts, and more exploitation licenses being handed out, like Nordgold's Yimiougou operation in December 2022. ■

Adama Soro

PRESIDENT

THE CHAMBER OF MINES OF BURKINA (CMB)

How have recent political and security challenges impacted the mining industry in Burkina Faso?

Over the past two years, we experienced three presidents, three prime ministers, and three mining ministers. These frequent changes have sometimes jeopardized previous progress and led to alterations in the regulatory framework. Additionally, we have had to contend with security issues that have forced some mining companies to halt or close their operations. This was deeply concerning as it affected not only the overall performance of the extractive industry but also impacted livelihoods with thousands of workers losing their jobs and leaving their families in dire conditions.

What is the economic impact of the mining sector on Burkina Faso's GDP?

The mining sector accounts for approximately 20% of the country's GDP, making it a significant driver of economic growth. While we have around 12 operating mines; they collectively contribute a fifth of the GDP. In terms of employment, the mining industry directly employs about 15,000 people and indirectly supports another 35,000 jobs. These jobs are not only numerous but also considerably well-paid. Furthermore, mining companies have injected approximately US$1 billion into the local economy through procurement, making a substantial economic impact. This is poised to increase over the next years if the political and security context regains a certain level of stability.

What are the anticipated trends for the mining industry in Burkina Faso in 2024?

We anticipate positive trends. Despite recent security challenges, Burkina Faso has a strong track record of opening an average of 1.2 new mines annually since 2010. We expect this trend to continue, with new mines coming into operation. Although we experienced a modest dip in gold production in 2022 (66 t in 2021, but declining to 57 t in 2022), we maintain a positive outlook, anticipating production stability and potential growth in the upcoming years. This growth will be driven not only by new mines like Orezone's Bomboré mine but also by the expansion of existing operations. ■

Mali

The "Making gold shine for Malians" approach, and its risks

Coup contagion is a broader concern, seen in Mali, Burkina Faso, Gabon, Niger, Guinea, and a failed attempt in Guinea Bissau. They emphasize the importance of natural resources to these economies. Changes in mining codes, as in Mali, present challenges to Western companies.

Liam Morrissey, CEO, MS Risk

Main producers and upcoming producers: Barrick Gold, B2Gold, Resolute Mining, Hummingbird Resources, Firefinch

Main juniors: Roscan Gold, Toubani Gold, Compass Gold, Desert Gold, Robex Resources, Galiano Gold, Sylla Gold, Cora Gold, Kodal Minerals, Stellar AfricaGold, Marvel Gold, Leo Lithium, GoviEx Uranium

Home to firms like Barrick Gold, B2Gold, Resolute Mining, and Hummingbird Resources, Mali is one of Africa's top gold producers. The country produced over 66 t of gold in 2022, with mining representing 9% of Mali's GDP, 80% of exports, and half of total tax revenues. In 2022, ECOWAS lifted sanctions imposed following the 2021 Coup that saw Assimi Goita take power a second time after a previous Coup 14 months earlier. This allowed the country to recover economically in 2023, and to approve a new Mining Code in August. The latter will allow the government to take up to 35% stakes in mining projects (compared with 20% now) in a push to increase mining's contribution to GDP to up to 20%, the government said.

The country's biggest producers sustained their positive momentum in 2023. Barrick's Loulo-Gounkoto Complex, which contributed between 5% and 10% to the Malian GDP over the past decade, continued to replace depleting reserves to remain one of the top 10 gold-producing operations globally. The operation is on track to meet its guidance set at 510,000 – 560,000 oz/y, with proven and probable reserves estimated at 6.7 million oz.

100 km south of the Complex, B2Gold's Fekola mine had a strong H1 2023, producing 318,191 oz. The company remains on track to meet its annual production guidance of 580,000 and 610,000 oz/y at all-in-sustaining costs of between US$1,085-US$1,145/oz. A mineral resource estimate at the Anaconda area of the Fekola project revealed that production could increase to 800,000 oz/y. B2Gold now awaits an exploitation license for the Bantako North permit area, pending the implementation of the new Mining Code.

Leaving aside a strong gold production scene, the future of exploration in the country (for both exploration firms and majors) is by contrast opaque. In December 2022, Mali suspended the delivery of permits to "improve the process of issuing and monitoring licenses" according to the Ministry. And while B2Gold holds a US$38 million envelope for exploration budget in both Mali and Namibia and Barrick's exploration teams keep studying the Loulo region, other juniors and developers have had to put the brakes on their projects. Cora Gold, a West African developer advancing the Sanankoro gold project towards production, is awaiting its license to begin construction, with project execution to commercial production estimated at 21 months. Cora Gold CEO Bert Monro detailed: "The investment climate in Mali needs clarity and confidence that the moratorium has ended, allowing permit renewals and applications to proceed as usual."

While the country has faced a turbulent coup and is a stronghold for several jihadist groups, notably Al-Qaeda's Sahelian branch JNIM, Mali's main gold mines and exploration sites are mostly in the south or on the border with Senegal, whereas most terrorist attacks occur in north-eastern areas like Ansongo, Menaka and Gao. Mopti, in central Mali, where an attack was recorded in 2023, is more than 1,000 km away from B2Gold's Fekola gold mine. Moving towards a DFS at the Kobada gold project, holding 2.4 million oz in the MRE, Toubani Resources CEO Phil Russo commented: "While external rhetoric might cast a shadow, our experience suggests that the situation on the ground is more favorable. Savvy investors who look beyond the headlines can recognize that Mali has a history of continuous mining operations, and we remain optimistic about the long-term prospects."

Beyond gold, this is also progress in the lithium space. Leo Lithium is developing one of the world's largest spodumene mines, the Goulamina project. Goulamina is expected to deliver the first spodumene concentrate by mid-2024 to supply the growing lithium-ion battery industry and will be the largest spodumene producer in West Africa. ■

Nigeria

The "Giant of Africa" is tapping minerals to boost economic diversification

Main producers and upcoming producers: Thor Exploration, Kursi Group

For long reliant on oil, Africa's biggest economy is looking at its rich mineral endowment to bolster investment in the country and diversify its economy. Africa's biggest crude producer is home to 44 minerals, predominantly gold, tantalite, bitumen, iron ore, and uranium, worth over US$700 billion according to the Nigerian mining sovereign wealth fund Solid Minerals Development Fund (SMDF). But the real mining story in Nigeria remains to be written: In 2023, mining only contributed to 0.3% of the country's GDP, underlying the huge opportunities ahead.

Having entered production in 2021, the Segilola gold mine project in Osun State, operated by Thor Exploration, produced 98,000 oz in 2022. To date, Segilola remains the only industrial gold mine in a country where artisanal and small-scale mining represents most of the mineral production. 2020 data from ISS showed that up to 80% of mining in the Northern Zamfara state was done illegally, before being routinely smuggled to Niger or Togo. Such activity represents around US$500 million annually, of which no naira went to the state.

Beyond gold, Nigeria is intent on developing its lithium industry. In May 2023, Thor Explorations announced the formation of a lithium-focused subsidiary with the acquisition of 600 km2 of prospective lithium pegmatite tenure. Initial drilling at the West Oyo project area confirmed lithium-bearing mineralization, such as spodumene and lepidolite.

Importantly, the government is intent on ensuring that the wealth generated by its resources stays in the country. "The era of exporting raw solid minerals from Nigeria is over", firmly stated Minister of Solid Materials Dele Alake in 2023. This move is aligned with broader domestic value addition initiatives seen across Africa. Nigeria has tightened rules, stating that firms would not be able to export raw lithium before having established processing and refining plants in the country. Currently, China's Ganfeng Lithium is building a processing plant in Nasarawa state, which will be capable of processing about 18,000 t/y of lithium ore per day.

Despite areas that suffer jihadist and separatist violence in the country, Nigeria boasts a relatively stable operating environment for miners. Abdulfatai Yahaya, founder and chairman of the Kursi Group, one of the largest lithium traders in the country, and one of the biggest gold producers, touched on Nigeria's potential: "Virtually everywhere in Nigeria, mining operations can be set up, which will benefit the economic and social growth of the country... We have peace in Nigeria, which is not the case in many West African countries."

Several hurdles remain that deter foreign investors into the mining industry. Nigeria is vast, and its minerals largely unchartered. Illegal artisanal miners can pose problems for industrial miners, though some have used the latter's small discoveries to further develop an operation. In the hopes that it will strengthen operations and incentivize discoveries, the government is growing its support for infrastructure initiatives to support the mining industry. ■

Abdulfatai Yahaya

FOUNDER AND CHAIRMAN
KURSI GROUP

Can you introduce the Kursi Group?
Kursi Group is a conglomerate of mining, manufacturing, trading, and agriculture companies.

Under the Kursi Group, Kursi Investment Ltd is focused on the mining, processing, and trading of base metals, precious stones, and rare earths, including gold, lithium, lead, zinc, tin, manganese, and tantalite. The company has been mining for approximately two decades, and today, we are one of the largest gold miners in Nigeria. Our gold operation in Kwara State, Nigeria, is our biggest mining license, but we also hold other licenses which are still exploring, and on others where we have started operations.

Can you elaborate on Kursi's gold operation?
Kursi is currently expanding our gold operation which will enhance the level of our production to approximately 0.5 t/month. Based on the output of our exploration reports, if we are producing 1 t/month, we will still be able to work on our site for the next 57 years. Gold will remain a key element of the Kursi story.

Do you see any commodity driving growth for Kursi?
Nigeria has over 40 untapped minerals of interest, and Kursi wants to be one of the first companies to tap into these by developing various mining sites across the country. Lithium is one of the main commodities we want to concentrate on, and currently, we are the largest trader of lithium in Nigeria.

How prospective is Nigeria for mining?
Nigeria is a well-endowed country, and each state has mineral potential that can be tapped into. Kursi is fortunate to not have any security challenges in any of our operating areas and we have cordial relationships with the communities. The government is also supportive of mining. ■

East Africa

Spotlight on growing jurisdictions

Except for Tanzania, mining is a nascent industry in the region, yet an increasing presence of juniors and majors, along with substantial foreign investments in the region during 2023 (particularly in rare earths projects) show that East African jurisdictions have a part to play on the African mining scene.

Main producers and upcoming producers: Perseus Mining, Rio Tinto QMM, Geita Gold

Main juniors: Akobo Minerals, Lindian Resources, Ionic Rare Earths, Altona Rare Earths, Evion Group, Premier African Minerals, Winshear Gold

Gold in Ethiopia, Sudan, and Kenya

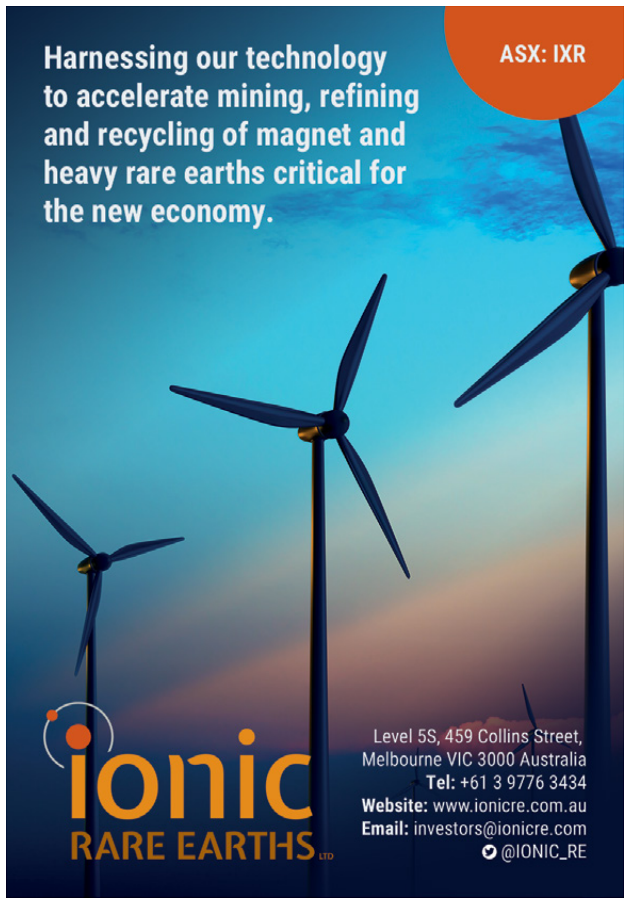
From Western Kenya near Lake Victoria to the Akobo River in Ethiopia, all the way to Nile State in Sudan, gold mining has the potential to reshape the economies of these reconstructing East African states.

Ethiopia

A staggering level of violence has plagued Ethiopia since the Tigray conflict erupted in 2020. In November 2022, representatives from Ethiopia's federal government and the Tigray People's Liberation Front (TPLF) signed a cessation of hostility agreement, ending a conflict that devastated the country. As Ethiopia heals, it will be intent on leveraging its natural resources to rebuild its economy. According to the Extractive Industries Transparency Initiative (EITI), Ethiopia boasts around 200 t of gold. Along the Akobo River, Akobo Minerals's Segele and Joru gold deposits hold promises for the country. Akobo recently completed 20,000 m of drilling at Segele and identified what looks like a quartz vein system with swarm waves stretching over a large area at Gindibil. To unlock this potential, CEO Jørgen Evjen said: "For the Ethiopian economy to blossom, it will need to review macroeconomic and fiscal issues," adding: "We need changes on the regulatory side for the industry to open."

Our priority is to engage the government in the drafting of legislation that will help debottleneck the industry. There is a backlog of 2,600 pending license applications, which is almost as much as the current active licenses (2,700). This does not only hold back rhe industry, but it also holds back the country.

Geert Klok - Chairman of the Board, Chamber of Mines of Mozambique (CMM)



Sudan

As the Sudanese army and the paramilitary Rapid Support Forces (RSF) fight for Khartoum, peace efforts led by a union of East African states have stalled. For the few mining operators in the country, safety and patience are on the agenda. Having acquired the Meyas Sand project in May 2022, Perseus Mining CEO Jeff Quartermaine tends on the side of caution: "We are not comfortable about taking an investment decision to develop the project with the conflict still raging without an end in sight in other parts of the country. Logistically, the port remains open, however, the investment climate is not where we require it to be for such a decision."

Kenya

Like all emerging jurisdictions, Kenya has barriers to entry to navigate, such as environmental protection measures, restrictions on foreign investment, and social issues that include conflict over resource control. That did not deter Marula Mining, a battery-metals developer, from tapping into the Kenyan market by being the first mining firm listed on the Nairobi Securities Exchange. Jason Brewer, CEO, explained: "Our portfolio will change dramatically in the next six months. Right now, we are busy finalizing agreements for a copper-graphite project in Kenya."

Activated carbon producer Panthera has a production facility in Mombasa, from which it assists gold mining firms in the region. Al Eadie, CEO, and co-founder, expanded: "Kenya's geographical position will allow us to easily expand into other regions in Africa, such as Tanzania and eventually West Africa, where there are much larger mining industries we can support."

Rare Earths in Uganda, Mozambique, and Malawi

Africa is home to numerous rare earth deposits, particularly in the East. For now, its potential is largely untapped and the continent remains at the level of great potential. However several projects in the pipeline are the promise of a growing African importance in global value chains.

Uganda

The new Mining and Minerals Act of 2022 has been well-received. Intentions to improve mining administration and

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East Africa

Highlighted projects

KENYA — **The Activated Carbon Production Facility**

"Panthera has a production facility in Mombasa, Kenya, and we source our coconut shell feedstock locally along the Kenyan and Tanzanian coasts. We are currently the only company producing coconut shell activated carbon in Africa, and we aim to expand our plants within East Africa."

Al Eadie, CEO and Co-Founder, Panthera Activated Carbon

ETHIOPIA — **The Segele Gold Project**

"Segele is a boutique mine of exceptionally high grades. We discovered this bonanza-style deposit back in 2020, and had our first mineral resource estimate done by SRK. In the April 2022 update, the MRE stands at 68,000 oz with an average grade of 22.7 g/t, but what is interesting is that the indicated part, some 40,000 oz, averages a grade of 40.6 g/t."

Jørgen Evjen, CEO, Akobo Minerals

MOZAMBIQUE — **The Monte Muambe Rare Earths Project**

"In August 2022, we were able to publish a JORC Exploration Target to get an idea of the potential of the deposit, and this demonstrated that the project has the potential to become a significant REE supplier in Africa, with the high-grade zones of the deposit totaling 6.5 million t at 2.47% TREO to 11.5 million t at 2.41% TREO."

Cédric Simonet, CEO, Altona Rare Earths

TANZANIA — **The Nyorinyori and Bagamoyo Graphite Projects**

"We have two graphite operations, Nyorinyori, where we expect to start production in Q4 of 2023, and Bagamoyo, which should start producing in the first half of 2024.Our portfolio will change dramatically in the next six months. We are reviewing 25 potential projects and three JVs. Right now, we are busy finalizing agreements for a copper-graphite project in Kenya."

Jason Brewer, CEO, Marula Mining

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business processes should benefit the country's growing rare earths industry. With a clear path toward a license, Ionic Rare Earths is moving towards the production of Mixed Rare Earth Carbonate (MREC) later in 2023 at Makuutu, and wants the project to play a key role in developing a magnet and heavy rare earth supply outside of China. MD Tim Harrison stated: "Secondary sourced material is starting to escalate high on the agenda for European end users, and the aim is for 15% of strategic materials to come from recycling by 2030. This opens up the supply chain for the development of the larger primary supply that will come from Makuutu once an alternative supply chain has matured."

The downstream demand from Europe will be a driver for East African rare earth projects. Ionic Rare Earths' subsidiary, Ionic Technologies, built a permanent magnet recycling demonstration plant in Belfast to process end-of-life magnets into separated, high-purity magnet rare earth oxides (REOs). Beyond Ionic's deal with Ford, Rainbow Rare Earths (which operates the Gakara RE project in Burundi) signed a supply agreement with a UK-based alloy manufacturer.

Mozambique

Promising stories are unfolding in the Mozambican RE space. Altona Rare Earths published a JORC exploration target in 2022 that demonstrated the project's potential to become a significant REE supplier in Africa, with the high-grade zones of the deposit totaling 6.5 million t at 2.47% TREO to 11.5 million t at 2.41% TREO. CEO Cédric Simonet detailed: "People can obtain mining licenses at a relatively early stage in the project's life, which helps in de-risking it."

Over the past two years, there has been a significant shift in the country's atmosphere, marked by the ongoing construction of an oil pipeline from Uganda and a substantial investment of $30 to $40 billion in the oil and gas industry in the southeastern part of Tanzania.

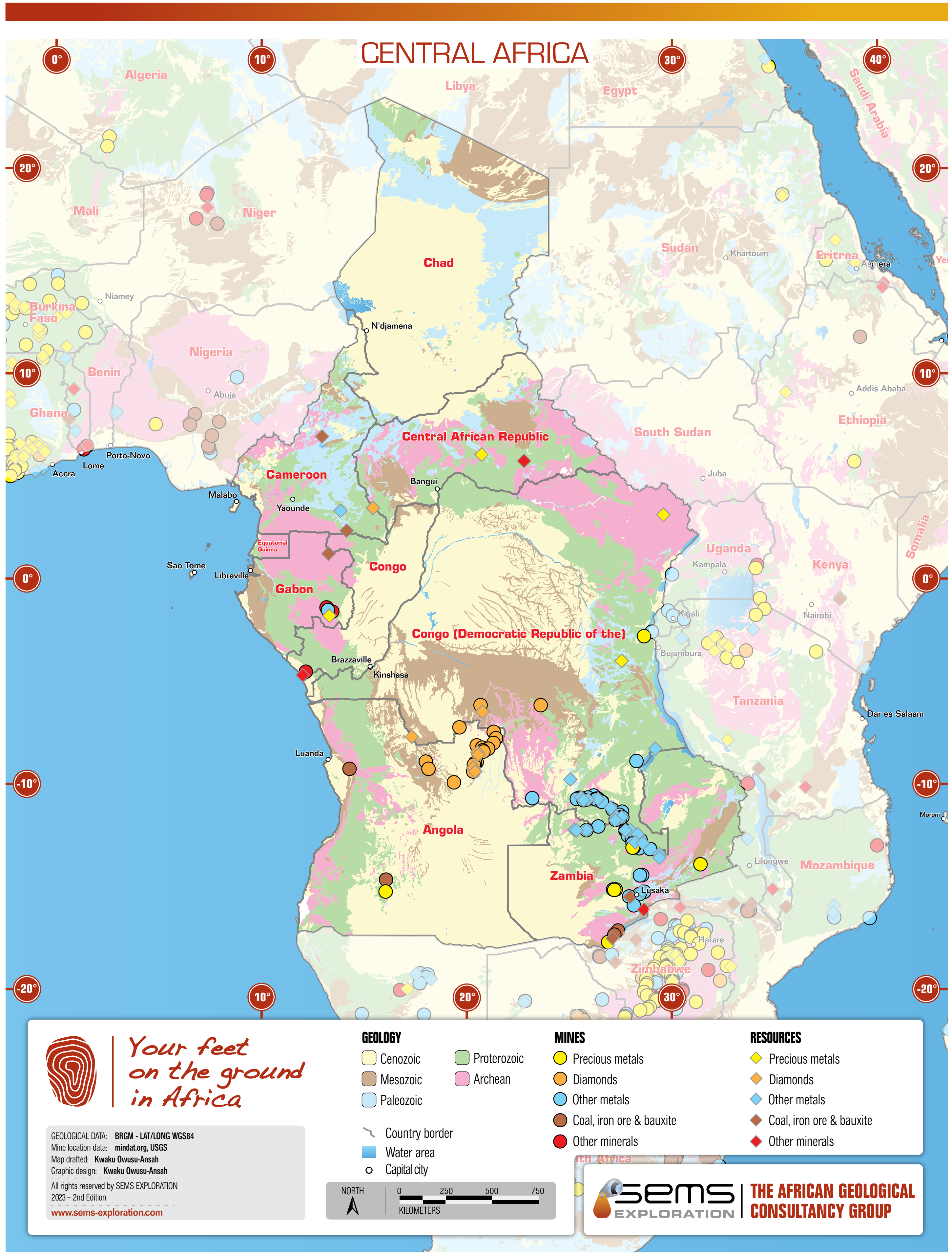
Andrew Cunningham, CEO, Walkabout Resources

The Chamber of Mines of Mozambique is working with the government to draft legislation that will help de-bottleneck the industry (there are almost as many pending license applications as existing ones: 2,700 in the country). Geert Klok, the Chamber's chairman, said: "We must make sure we have the right environment to support industrialization. Local companies will require access to affordable financing."

Malawi

Holding over 30 million t of rare earth minerals, Malawi's place on the mining map keeps growing. Leading the charge is Africa's "Rare Earths King," Lindian Resources' Kangankunde project. Having completed the Phase 1 drilling program of over 10,000 m and with Phase 2 underway, Asimwe Kabunga, Lindian's chairman, detailed: "Kangankunde is a standout example of a project in Africa that has the potential to play a central role in global rare earths supply. That may also act as a catalyst for further investment in Malawi."

Canadian Mkango Resources is developing the Songwe Hills REE project with mineral resources of 18.1 million t. ■



Central Africa
Highlighted projects

DRC — **The KCC Copper Mine and the Mutanda Copper-Cobalt Mine**

"The company invested more than US$8 billion into our two major operations – Kamoto Copper Company (KCC), a joint venture between Glencore's wholly owned Katanga Mining and the state-owned Gécamines, and Mutanda copper-cobalt mine of which the government holds 5% since the beginning of 2023."

Marie-Chantal Kaninda, President, Glencore DRC

CAMEROON — **The Bibemi Gold Project**

"A significant milestone for Oriole Resources has been the completion of a maiden resource assessment on our Bibemi project. Over the past couple of years, Cameroon's mining sector has seen significant advancements, largely driven by the completion of the World Bank-funded PRECASEM program, which involved an investment of around US$30 million in loans to Cameroon."

Tim Livesey, CEO, Oriole Resources

DRC — **The Copper Wester Foreland Exploration Project**

"In 2023, Ivanhoe commenced an expansive US$19 million copper exploration program on the greater Western Foreland licenses, which includes approximately 70,000 m of combined air core and diamond drilling, as well as ground-based geophysics and soil sampling programs, not to mention the construction of vital access roads."

Marna Cloete, President, Ivanhoe Mines

ZAMBIA — **The Copper-Cobalt Project**

"We conducted extensive drilling at our Zambian copper and cobalt project, where we found promising results. This attracted major players, including Anglo American, with whom we completed a JV in October. Our focus is on the Domes region of Zambia, which is different from the traditional copper belt in the eastern copper belt, that hosts typically larger deposits but lower grades."

Nick von Schirnding, Executive Chairman, Arc Minerals

Central Africa

Leading the charge for a local battery metals value chain

Airborne and ground-based geophysical surveys have been used for a long time, but the real change has come with the use of drones. We use drones to cover large areas as well as zones impacted by illegal activity.

N'guessan Nestor Houssou, Managing Director, Georec

Central African states were the first to embody Africa's new vision regarding the development of a battery metals strategy at the regional level. First pinned in 2022, the repercussions of the cooperation agreement between the DRC and Zambia to create "Special Economic Zones for the production of Battery Electric Vehicles" have started to materialize in 2023. Afreximbank and the United Nations Economic Commission for Africa facilitated the establishment of an Operating Company, in consortium with investors (both public and private) from the DRC, Zambia, and elsewhere. At the Battery Metals Forum in Kinshasa in September 2023, attended by Ministers and Ambassadors from the US, Europe, and African states, a pre-feasibility study for the establishment of the economic zones was presented.

Sharing the most prospective Copperbelt in the world – and competing for the number one copper producer spot in Africa – the Congolese and Zambian governments have stated their intentions to negotiate from a position of strength when it comes to their countries' critical minerals. Driven by the growing demand for copper and resting on assets like Konkola copper mines (Zambia) and Kamoa-Kakula (DRC), both ministers of mines of the DRC and Zambia delivered GBR with a similar message: The desire to sign win-win partnerships. The formula to move to a local value creation model must be affordable for capital, utilize good technology, be able to attract strong partnerships and deliver competitive value addition.

A consensus keeps growing throughout Central Africa: Artisanal mining (ASM) ought to be formalized, not marginalized. Today, artisanal mining provides a livelihood to an estimated 150,000/250,000 people in the DRC and contributes approximately 10% of the annual cobalt production in the country. In 2022, the DRC produced 73% of newly mined cobalt, meaning ASM's contribution to the world's cobalt production was around 7%. In other words, hundreds of millions of dollars in minerals with a key role to play in the green energy transition. Both the DRC and Zambian governments will have to strike a fine balance to achieve their ambition to push the value down the supply chain (ultimately allowing ASMs to capture more economic wealth) while maintaining mineral production.

Despite a long-lasting conflict in the northeast of the DRC, the country, and Zambia, offer clear pathways for foreign investors. Both countries have amended their policy frameworks in the past four years, offering stability and predictability for capital flow. Most importantly, in comparison with their Western African peers, elections do not constitute a trigger for political upheaval or mayhem. Looking ahead, the green energy transition will not happen without both countries' minerals, mostly copper, but also lithium and cobalt. For the DRC and Zambia, success will be measured on the ground. From Katanga to Ndola, those win-win partnerships will have to translate into an improvement of the life quality of local communities that sit at the bottom of the battery value chain and struggle to capture its value. ■

The Democratic Republic of the Congo

Rocky roads but huge upsides

> *Congolese billionaires do not want to invest in energy production because the procedures take years. Bureaucracy is an obstacle. Logistics too: To get from Lubumbashi to Kinshasa, a flight that normally takes two hours, I had to go via Nairobi!*
>
> Gabriel Tshitende, General Manager, Elephant Trade

Main operators:

- **Copper and Cobalt:** Ivanhoe Mines, Zijin Mining, Glencore, Eurasian Resources Group, Chemaf, MMG, CMOC
- **Gold:** Barrick Gold, Amani Gold, Loncor Gold
- **Lithium, Tin, and Tantalum:** AVZ Minerals, Alphamin, Tantalex Lithium Resources
- **Rare Earths:** Auxico Resources

The mining sector remains the main growth driver in the DRC, counting for close to 12% of total GDP in 2022, according to World Bank data. Spearheading the industry is copper, and the DRC keeps producing more of the red metal. The country produced 2.36 million t of copper in 2022, according to the Central Bank of Congo. This represents another YoY increase, particularly due to the expansion of Ivanhoe's Kamoa-Kakula complex and China's CMOC boosting copper output. The DRC is closing in on Peru to become the second biggest copper producer in the world, while the country is also the world's largest cobalt producer, accounting for 73% of global output in 2022. Considering those impressive figures, one wonders why the DRC was ranked (again) in the bottom 10 mining jurisdictions for investment attractiveness. The answer is deeper than numbers: Poor governance, failure to capture value, and poor law enforcement keep plaguing the industry.

Operational updates: Developing Katanga's copper, Producing Manono's lithium

With a size exceeding 2.3 million square kilometers, the DRC boasts an unparalleled abundance of minerals, surpassing any other nation globally. Among these valuable resources are copper, cobalt, coltan, gold, lithium, the 3Ts, diamonds, cassiterite (tin), zinc, manganese, silver, cadmium, germanium, palladium, uranium, platinum, iron ore, bauxite, coal, and limestones. The country's richness is not solely defined by the extensive list but also by the remarkable quantities and qualities in which these metals are present.

Among the operations that make the country (the size of a continent) a leading mining destination is Ivanhoe's Kamoa-Kakula Copper Complex. The JV between Ivanhoe Mines and Zijin Group produced over 333,000 t of copper in 2022, and is on track to complete phase 3 extension in 2024. By 2030, Ivanhoe expects to operate four concentrators, a smelter, and five underground mines. The total throughput of this project is 19.2 million t/y, with copper production averaging 620,000 t/y.

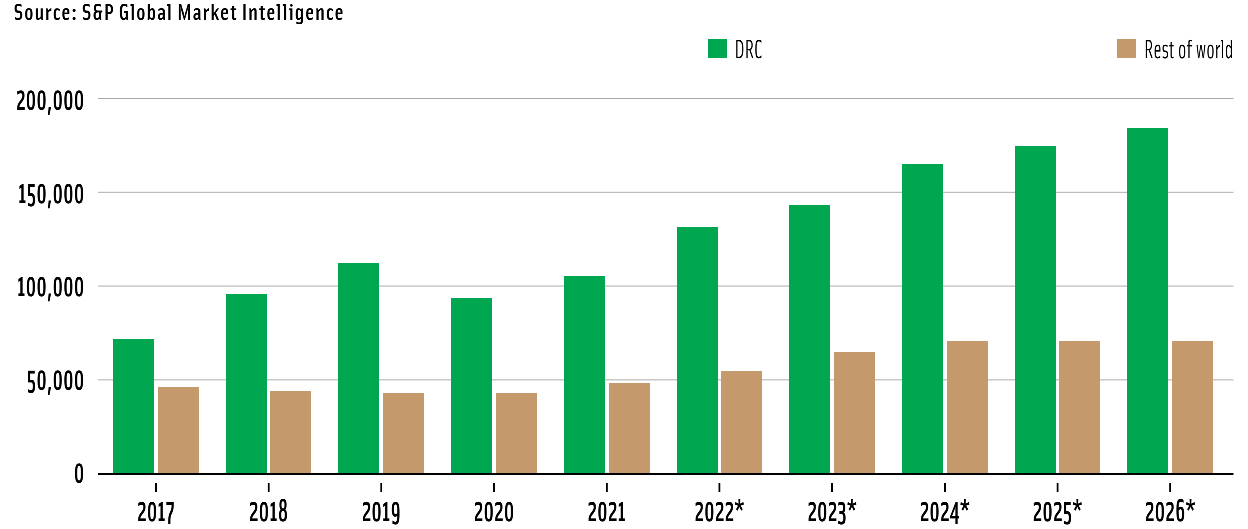
Two of the major copper and cobalt producers in the world, Glencore and Eurasian Resources Group (ERG), have continued investing in the country to enhance their operations. The latter recently invested US$250 million into a cobalt production plant, planned to be commissioned by the end of 2024. Cobalt hydroxide should be provided from ERG's Metalkol operation, one of the largest in the world.

The DRC also holds some of the biggest lithium resources in the world. 600 km north of Kolwezi is Manono, home to the world's largest undeveloped hard rock lithium project. The once-booming mining town now looks like a remnant of its past, but several projects involving the world's top miners could bring it back to life in the near term. The potential transformation of the economic fortunes of the remote town of Manono lies in the estimated 6.6 million t of lithium found in the earth, positioning it as a key player in the forefront of the green energy revolution. Mining engineers involved in the area already anticipate what the concretization of past lithium discoveries will mean for the area. Landry Meya, CEO of Akata RDC, who provides engineering and exploration services and plans to establish an office in Manono, shared: "I believe we will see significant investment in the Manono area, which positively impacts not only the mining industry but also the social and economic development of the region."

At the forefront of this booming scene is a long-lasting dispute that heated up with conflicting claims in 2023. Zijin said it would partner with state-owned company Cominières to develop the northeast tenements of the Manono Lithium project, with the Australian AVZ Minerals disputing the action. AVZ first acquired a stake in the Manono project in 2017, striking a deal to acquire a controlling 60% of the Manono joint venture.

Away from the disputed project is Tantalex Lithium Resources' Manono Tailings project, which covers 105 million t over 11 dumps, containing lithium, tin and tantalum. The firm released a PEA in 2023 showing that

Cobalt mine supply (tonnes of contained cobalt)
Source: S&P Global Market Intelligence



*projected

We must be pragmatic in our sector. In the field of major equipment, for example, it will be difficult to get Congolese companies to manage these businesses. But in traditional subcontracting, the Congolese can assert themselves and take the lion's share.

Adry Nzonzimbu, Managing Director, Minequip Technical Services

the project will have an initial production of 112,000 t/y of spodumene concentrate (SC6), with a fairly low *capex*. The backing by Glencore helped Tantalex de-risk its project, further strengthening the firm's potential to become the first lithium producer in the DRC. Hadley Natus, chairman, expanded on Manono's potential: "Bringing mines into production is a long process and seeing as our project is a tailings reclamation project, we will likely be the first lithium mine in Manono. There will be many more mines coming into production."

Turning challenges into opportunity

In the DRC, one of the first challenge to address is that of electricity. Despite a huge 100,000 MW potential hydroelectric power from the Grand Inga Dam projects, the country keeps importing electricity. The DRC hosts one of the biggest rivers in the world, which offers the opportunity for hydropower generation, but the lack of incentives and heavily bureaucratized processes are deterring funding. Gabriel Tshitende, managing director of Elephant Trade, said: "Congolese billionaires do not want to invest in energy projects because the procedures take years. Bureaucracy is an obstacle."

As private investment stalls, institutional investors look to the State to address the energy challenge. Standard Bank DRC's new CEO, Marie-Gabrielle Opese, said: "The country has great hydropower potential. It is a matter of being willing to set up required stable power supply infrastructures and to give the private sector the means to process minerals and being deliberate in terms of actions."

To address power supply shortages, Glencore invested more than US$450 million to refurbish two turbines at the 1,424 MW Inga 2 hydropower plant.

Making the law a strength

The absence of regulatory cohesion remains problematic for investors in the DRC. In 2018, the DRC amended its Mining Code to provide more clarity for investors, as the threat of having a license revoked under unclear circumstances was not bearable. Patrick Bondonga helped draft the first Mining Code over two decades ago. The co-founder of OVK Lawfirm now sees the regulatory framework as a strength: "Our legal framework is an asset to attracting foreign investment. It is designed to obtain mining rights with clear principles, priorities, transparency, and objectivity."

Growing production from the country's main copper operators –Ivanhoe Mines, Zijin Mining, Glencore, Eurasian Resources Group, Chemaf, MMG, and CMOC – led to strong demand for the services segment in 2023. With such demand came clear governmental ambitions to give local

Image courtesy by Fortuna Silver Mines

Upon entering the DRC, we initially collaborated, but we have since established our own company. Adapting to Congo's business environment, we prioritize compliance with government regulations, ensuring smooth operations.

Kris Jedrzejczyk, Managing Director, Blu Rock Mining Services

businesses priority over foreign companies. In Kolwezi and Lubumbashi, for instance, competition for operators' contracts is fierce. The law that reserves the subcontracting market for companies majority-owned by Congolese suffers from the practice of 'name-lending'. Reflecting on the situation, Adry Nzonzimbu, managing director of Minequip, shared: "In traditional subcontracting, the Congolese can assert themselves and take the lion's share. We have the expertise, the financial capacity, and the will."

Gabriel Tshitende (who is also the president of the National Club of Subcontractors) added that Congolese success in the field will require a shift in the entrepreneurial mindset: "Subcontracting is entrepreneurship: You need resources, a structure and expertise. We have compatriots who open businesses without knowing what to do with them. ■

Antoinette N'Samba Kalambayi

MINISTER OF MINES
GOVERNMENT OF THE DRC

Do you think the success of Kamoa-Kakula will act as a magnet to bring new mining investors to the DRC?

Kamoa-Kakula is a very large mine that is going to start refining copper and producing high-quality cathodes. This is going to have a very positive impact on our economy. We would like other investors to emulate Kamoa-Kakula, and they will be able to move forward and commission new mines.

We have a mining legislation in place, and the first step to start activities in the country is to set up a local commercial entity according to Congolese law and make a request to the mining cadastre to obtain claims. The DRC guarantees investor security with the incentives sanctioned by both the investment code and the mining code.

What is the potential of the DRC for critical metals needed for the global energy transition?

Our potential for critical metals is well known: We are the world's largest producer of cobalt and fourth largest producer of copper. We will soon become a large producer of lithium and other minerals like nickel, coltan and monazite, just to mention a few. Countries like the US and European countries are implementing programs to secure their supplies of energy minerals, and this is an area where the DRC can play a key role. So, the DRC turns out to be the hub of the energy transition because of the presence of all these strategic metals in our country. We are in full operation to discover new strategic metal deposits.

How can the mining industry act as a catalyst of human resource development in the DRC?

The mining sector is the main driver of the Congolese economy. We want a circular economy that first develops its human resources by training them in the use of the new technologies necessary for the growth of our industry. This includes the extraction, production, treatment, transformation and marketing of finished products. We want to add value to our mining products by processing minerals locally. ■

Benedikt Sobotka

CEO
EURASIAN RESOURCES GROUP,
CO-CHAIR
GLOBAL BATTERY ALLIANCE

What were the highlights of Eurasian Resources Group (ERG)'s DRC operations over the past year?

Since its inception in 2013, ERG has invested more than US$9 billion in the DRC. Furthermore, we have generated more than US$2 billion in taxes, dividends and royalties. We have long-term investment plans of US$2 billion – of which we are deploying approximately US$300 million in 2023 and US$500 million in 2024.

In 2023, ERG kicked off the construction of two major projects in the DRC, one being a high-quality cobalt beneficiation facility located near Metalkol in Kolwezi, that will produce high-purity cobalt hydroxide for the battery industry. A significant weightage of these high-purity materials will be supplied to a new, zero-carbon factory in Arizona, which will supply the electric vehicle industry in the US.

The second project is the COMIDE copper-cobalt project, located near our Metalkol project. COMIDE has some of the largest known copper and cobalt resources globally, confirmed by a comprehensive technical study. As a result, ERG will imminently start construction on a modern hydrometallurgical plant, which consists of three phases and is envisaged to be fully completed by the end of 2025. During the first two phases, the plant will produce an estimated 40,000 t/y of copper cathode and 7,000 t/y of cobalt hydroxide. The third phase is projected to yield up to 80,000 t/y of copper cathode and 14,000 t/y of cobalt hydroxide. With further expansion, COMIDE has the potential to reach a production capacity of 120,000 t/y of copper cathode.

How important will Africa's resources be for the success of the green transition?

If we do not invest in African industry, it is going to be extremely difficult to meet energy transition mineral demands sustainably. Most of the power on the African continent can be generated using renewable energy, and the deposits are also higher grade which means a lower carbon footprint. Africa has an even larger potential now and we are up for an African decade. ■

Zambia

Ambitions beyond wishful thinking

Main operators:

- **Copper and Cobalt:** Barrick, Glencore, First Quantum, Koryx Copper, Arc Minerals, Moxico Resources, Midnight Sun, BeMetals Corp.
- **Nickel:** Consolidated Nickel Mines
- **Uranium:** GoviEx Uranium
- **Rare Earths:** Antler Gold
- **Gold:** Zambia Gold, First Quantum

Zambia is moving extremely fast in developing its mining industry and the current president is emphasizing good governance. The government is putting money in the game which is something we do not see in many African countries. I believe we will soon see something big coming from the Zambian copper belt.

NJ Ayuk, Executive Chairman,
African Energy Chamber

Zambia boasts some of the planet's most valuable copper reserves, ranking as the world's seventh-largest copper producer. Yet, the country's production of the red metal has been constantly falling since a peak in December 2013 (close to 998 t/y). Copper alone accounts for more than 70% of the nation's foreign export revenues, while the country also hosts exploitable deposits of cobalt, nickel and manganese. The lion's share of copper production in the country is split between First Quantum Minerals, Barrick Gold, and Glencore, together producing over 75% of the country's copper.

After negative values in 2021, UNCTAD reported FDI rose to US$116 million in 2022, particularly due to mining and renewable energy projects. Peace, security, market potential, strong infrastructure, and political stability were the main factors that influenced decisions to invest and re-invest in Zambia.

There is one throne that Zambia eyes: Reclaiming the spot of African leader in copper production. Grappling with debt, the government aims for a copper production of over 3 million t/y in the next 10 years. Yet, there are some discrepancies on the line. A report from the Ministry of Finance and Planning forecasts that copper output will decrease by 10% next year from the 760,000 t mined in 2023 (a 14-year low), and the Ministry of Mines and Mineral Development axed its strategy around the opening of 17 new mines and increasing productivity by 200% by 2026.

Since taking office, Paul Kabuswe, Zambia's new Minister of Mines and Mineral Development, has set about getting the industry "out of court" (Konkola Copper Mines, Glencore, and First Quantum all faced legal issues). After sitting all actors at the negotiation table, Minister Kabuswe stated his ambitions: "Our key priority is to continue implementing reforms that enhance the competitiveness and sustainability of the mining sector. We will focus on ensuring a stable and transparent regulatory environment."

The government's ambitions are having positive repercussions for explorers on the ground. Beyond copper, the country is host to GoviEx Uranium's Muntanga project, of which the feasibility study is scheduled in 2024. CEO Daniel Major said: "A great advantage of Zambia is that there is talent and skills in the country, and you can find appropriate candidates for jobs. The Zambian government is supportive of mining as they want to expand the country's copper industry."

Arc Minerals operate the Zambian copper and cobalt project, and in April signed a JV with Anglo American to bolster its exploration efforts there. Executive chairman Nick von Schirnding said: " Zambia's operating environment for juniors and mid-caps has improved significantly. Under the administration of President Hichilema, there is a strong emphasis on governance and transparency."

Looking ahead, forging strategic partnerships with foreign forces will be key to putting Zambia back on the mining growth path. The top asset-holding country in Africa, the UK, understood this well, as highlighted by James Cleverly's visit to Zambia via Moxico's Mimbula mine (the first by a British Foreign Secretary to Zambia in over 30 years). This followed the announcement of a £3 billion public-private investment package in Zambia's mining, minerals, and renewable energy sectors to "support green growth" in the country. ■

Paul Kabuswe

MINISTER OF MINES AND MINERAL DEVELOPMENT

GOVERNMENT OF ZAMBIA

Can you detail the mission of the Ministry and the state of the mining industry in Zambia?

The mission of the Ministry of Mines and Minerals Development is to effectively manage and develop Zambia's mineral resources while promoting sustainable socio-economic development. Zambia has a rich mining history and remains a key player in the global copper market. We are working towards enhancing transparency, attracting investments, and ensuring the industry benefits our nation and its people.

What makes Zambia a good destination for foreign direct investment?

Zambia offers several compelling factors for foreign direct investment in the mining sector. We have abundant mineral resources, a skilled workforce and a strategic location in the heart of Africa. We are also committed to providing a conducive and stable investment environment, supported by transparent regulations and fiscal incentives.

What is your ambition as a country to be amongst the leaders of the EV battery supply chain?

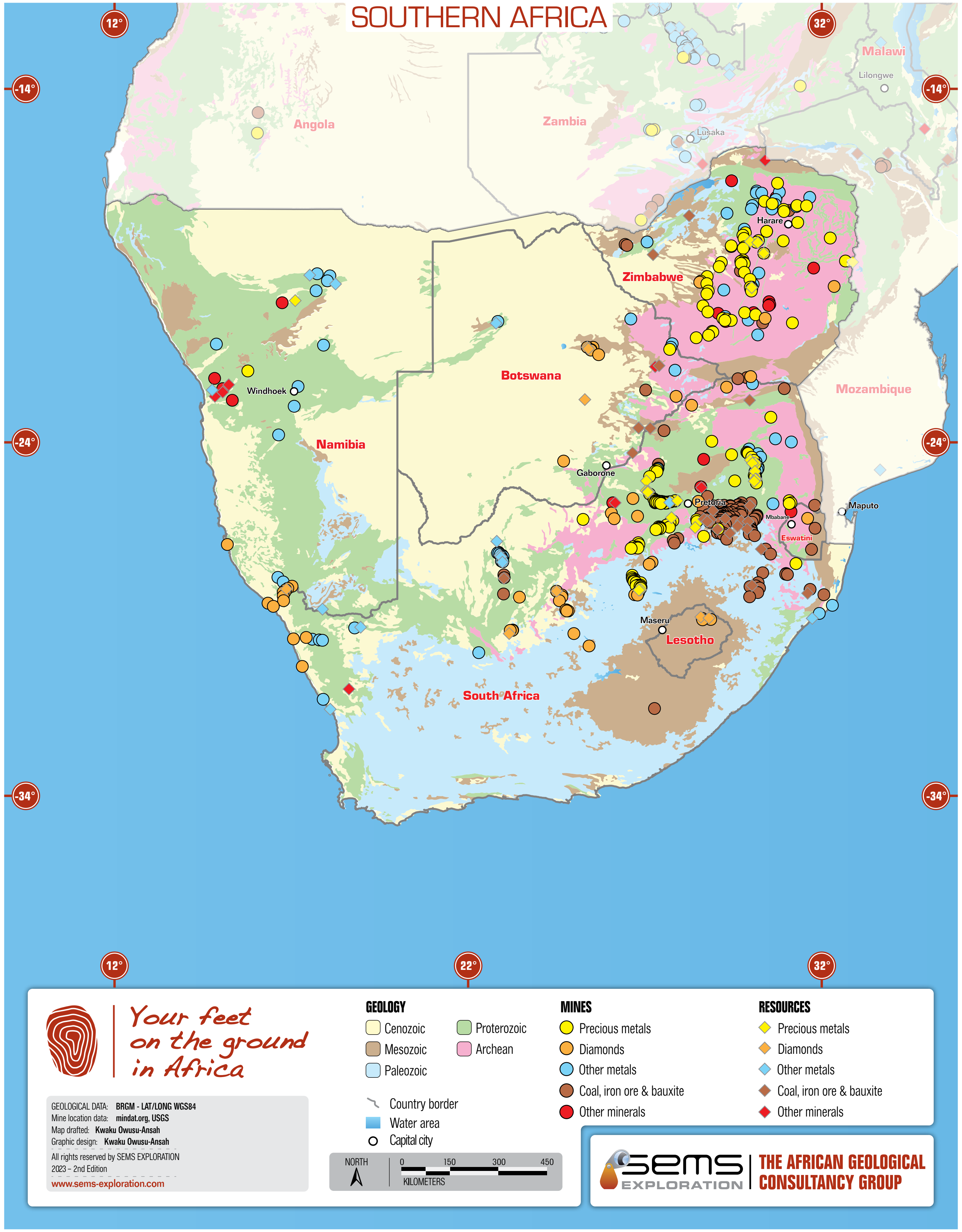
With our substantial reserves of copper, cobalt and lithium, we aim to develop a sustainable supply chain, from mining to processing, that supports the growing EV industry.

How can African countries move from an extractive model to a local value-creation model?

This can be achieved through investment in processing and refining facilities, skill development and technology transfer. We are actively working on policies and incentives to promote local value addition and industrialisation in our mining sector.

What will be the key priority for the Ministry of Mines and Mineral Development in the coming year?

Our priority is to continue implementing reforms that enhance the competitiveness and sustainability of the mining sector. We will focus on ensuring a stable and transparent regulatory environment, attracting investments, and promoting responsible mining practices. Additionally, we will work on initiatives to support local value addition and improve the overall contribution of the mining industry to our national development goals. ■



Southern Africa

Highlighted projects

SOUTH AFRICA

The Sylvania Platinum Dump Operations

"Sylvania is the first company to have the business model of recovering Platinum Group Metals (PGM) from chrome tailings and is currently the largest producer in this regard. The second part of our business is our exploration assets focused on the northern limb of the Bushveld Complex."

Jaco Prinsloo, CEO, Sylvania Platinum

SOUTH AFRICA

The Gamsberg Zinc Project

"Gamsberg 2 is in full swing, on track to be finalized by July 2024. Once complete, the expansion will see Gamsberg doubling the mining footprint from 4 million t to 8 million t concentrator capacity – boosting our current 250,000 t/y production to 500,000 t/y."

Pushpender Singla, Executive Director and CFO, Vedanta Zinc International (VZI)

NAMIBIA

The Etango Uranium Project

"The award of the Etango Mining Licence enables us to initiate the construction of crucial infrastructure like construction water pipelines and access roads. We have already completed the tendering process for these contracts, and they are awaiting an award pending the mining license."

Gavin Chamberlain, COO, Bannerman Energy

ZIMBABWE

The Zulu Tantalum Potential

"There is a definite tantalum resource at the Zulu project. Tantalum is generally widely disseminated throughout the pegmatites, particle size is very small, and milling is required to liberate the spodumene crystals at -150 microns. At that kind of liberation, the tantalum resource at Zulu is reasonably accessible and can be recovered."

George Roach, CEO, Premier African Minerals

SOUTH AFRICA

The TGME Underground Gold Project

"The objective for the first two quarters of 2024 is to secure funding for the project, initiating the construction phase. This timeline aligns with our projections to deliver an annual production output of about 100,000 oz for an impressive span of 12 to 14 years. Our production schedule remains on track, with the TGME Underground Project set to be ready for execution in 2024."

Bill Guy, Executive Chairman, Theta Gold Mines

South Africa

Adapting to survive

Main operators:

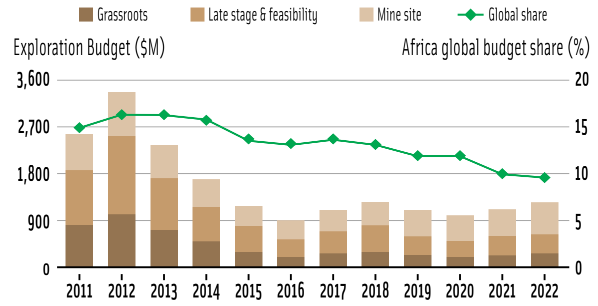
- **Gold:** Harmony, Gold Fields, AngloGold, Sibanye-Stillwater, Pan African Resources
- **Coal:** Exxaro, Jindal, Glencore, Menar, ARM
- **Vanadium:** Bushveld Minerals, Vanadium Resources
- **Diamonds:** De Beers, Petra Diamonds
- **Manganese:** South32
- **Platinum:** Implats, Sibanye-Stillwater, ARM, Anglo Platinum
- **Zinc:** Vedanta Zinc
- **Copper:** HBIS, Anglo American, Orion Minerals

South Africa remains a leading powerhouse of the African mining scene. In 2022, the industry employed 475,000 people according to the MCSA (Minerals Council of South Africa), and contributed over R493 billion to the country's GDP. Despite headwinds felt across the continent, the industry remained a trillion-rand industry for the second year (when measured in production value).

The largest contributor to the industry, Platinum Group Metals (PGMs) saw a 15% production decrease in 2022. Loadshedding by Eskom is the main factor explaining the output falling, although changing trends in vehicle demand and environmen-

AFRICA EXPLORATION BUDGET UP AGAIN IN 2022, BY 12% YOY

Source: S&P Global Market Intelligence



tal legislation promises a better outlook for 2024. Characterized by deep underground mining (with Mnopeng and Driefontein having a vertical depth of almost 1,219 m), South Africa's gold sector remained the third contributor to the country's revenue from minerals, behind PGMs and coal. Yet, the country, which was once the world's top gold producer, sees output continuously slumping, with 110 t produced in 2022 (against 189 t in 2010, according to Statista). Five firms – Harmony Gold, AngloGold Ashanti, Gold Fields, Sibanye Stillwater, and Northam – account for over 50% of total production in the country. Affected by rail and port capacity constraints, iron ore (66 million t/y) and manganese (19 million t/y) were also declining.

Beyond those figures, the short-term challenges including fluctuating commodity prices, crippling power cuts (at the alarming rate of at least two hours a day in Johannesburg), rail network constraints, and a tumbling rand have managed to hide South Africa's bigger problem; Its mineral reserves are shrinking. Should the predictions of the latest PwC South Africa Mine Report be accurate, the country could have no more than 50 years of gold, platinum, iron ore, and coal mining left.

Record performance and shareholder returns seen post-pandemic have now regressed. Infrastructure constraints, energy challenges, and lower productivity have led to lower profits and margins for operators. The country now sits among the bottom 10 of the Fraser Institute's Index for investment attractiveness, the worst it has performed since 2009.

Future-facing commodities and uranium have the potential to revitalize a struggling South African mining industry. Ralf Hennecke, managing director of BME, a bulk mining explosive and blasting technology supplier, saw promising signs in 2023: "In South Africa, our customers are demonstrating positive growth. In the Southern African Development Community there is something of a revitalization in mining, with added opportunities emerging in battery minerals and uranium."

A desperate need for more exploration

In the realm of exploration, the absence of an operational mining cadastre in South Africa, offering transparent insights into the status of mining and prospecting rights is identified as a significant barrier to investment. Andries Rossouw, who leads PwC South Africa's energy utilities & resources team, said: "Sadly, there is a desperate need for more exploration in South Africa. The Department of Mineral Resources and Energy (DMRE) and the Minerals Council of South Africa are pushing hard to get a tax flow-through scheme incentive that will support exploration in the country."

The Northern Cape is expected to play a crucial role in South Africa's development in the future. Joshua Kilani, VP of the Geological Society of South Africa, said: "The Northern Cape stands out as a prime geological hotspot teeming with opportunities. It boasts a favorable combination of essential factors, including systems, infrastructure, and established transportation networks. I firmly believe that a substantial portion of South

"There is a desperate need for exploration, and we believe that with adequate exploration activities, especially looking for minerals that were not explored in the past, there are massive new ore bodies to be found which will sustain the industry for the long term."

Andries Rossouw, Africa Energy Utilities & Resources Leader, PwC SA

Africa's future mineral deposits will emerge from this region."

The sole listed South Africa pure copper player on the Johannesburg Stock Exchange (JSE), Copper 360, currently targets 30,000 t/t of copper production from the region. With majors like Exxaro, Implats, and Sibanye making movements in Northern Cape, the province is poised for a true red-metal hunt. Copper 360 CEO Jan Nelson shared: "The entire base metal district extending from the Northern Cape into Namibia positions the region to become one of the world's premier metal provinces. We are witnessing interest from companies previously focused elsewhere, recognizing the substantial copper resources in the Northern Cape."

Energy security

Energy security remains the key concern in South Africa. Eskom, the South African giant with clay feet that provides 90% of the country's electricity, recently braced the Rainbow Nation for another winter in the dark. The National Energy Crisis Committee (NECOM) attempts to stabilize the performance of the electricity-generating coal fleet, but years of corruption and neglect are still being felt. Logistical infrastructure has also suffered, and the deterioration of Transnet, the state-owned logistics company that manages Transnet Freight Rail, has also significantly affected the mining industry.

As many businesses and households are today being run on generators or solar and battery systems, the energy crisis will remain at the top of the agenda in the coming months at least. Indeed, the MCSA reports that mining operations were running 20-30% under capacity due to the electricity constraint. Having lobbied to streamline reforms regarding energy processes, Mzila Mthenjane, CEO, MCSA, explained: "Energy security is paramount in this context because electricity is the lifeblood of industrialization. We cannot simply talk about beneficiation without addressing the fundamental need for reliable and affordable energy sources."

The sleeping giant's unparalleled potential

Coal is vital in South Africa. The seventh largest producer in the world has appreciated that fact and is now looking to invest in new technologies to capture emissions and leverage capital gained from coal to then invest in critical minerals. As European sanctions on Russian coal persist, South African coal exports to the EU surged by +677% in Jan-Dec 2022 to 15.8 million t from just 2 million t in 2021. Sandton-based Menar has several coal mines in its portfolio, along with coal development assets. Vuslat Bayoglu, managing director, said: "It is difficult to put a timeline on coal, but given the incapacity of renewables to provide baseload, I believe South Africa will continue using coal until resources are depleted."

Systemic problems, such as crime, corruption and poor governance, constitute foundational challenges for South African miners. Another is bureaucracy. There are over 5,000 permits currently awaiting government approval for exploration and mining activities. Should these be approved within the next six to 18 months, SA could witness a substantial influx of capital into the sector. "Considering the multiplier effect, mining can generate economic opportunities between eight and 10 times its initial investment", said the MCSA's CEO Mzila Mthenjane.

The maturity of South Africa's mining industry makes it an ideal playground for testing out new technologies. South Africa has been a pioneer in fuel cells, and in 2022, Engie and Anglo American inaugurated the Rhyno project at Mogalakwena platinum mine. The world's largest hydrogen-powered mining haulage truck, capable of carrying a payload of 290 t, demonstrated the country's capability of being a leader in decarbonization initiatives at mine sites. "South Africa is moving towards greater automation in mining operations, aligning with global trends. However, the successful implementation of autonomous systems necessitates dependable and low-latency networks, such as 5G or private LTE," shared Gabino De Diego, BD manager at Torsa Global, a Spanish technology manufacturing firm that opened its first African office in SA in 2023.

In conclusion, despite slipping mining profits, currency fluctuations, load shedding and logistical problems in exporting minerals because of deteriorating infrastructure, there are many signs of hope ahead for the "Rainbow Nation". Leaders of Africa's most advanced economy will most likely be intent on refocusing some of their efforts towards future-facing commodities like copper, lithium, and manganese that the South African soil is endowed with. The country can also count on – perhaps – its most bankable resource: Its workforce. Its world-famous engineers continue to lead the development of many mining projects across the continent, and those skills will be key to reshaping the industry. As put by Vuslat Bayoglu, managing director of Menar, which has its own training academy: "South Africa has a very talented workforce: Everywhere you go in West, Central, or East Africa and beyond, you will find highly educated South African engineers." ■

Namibia

Juniors' playground and a gateway to the Southern African market

> *Namibia's strategic location with regards to the global markets is fundamental, our ports and infrastructure development are crucial assets.*
>
> André Snyman, Managing Director, Walvis Bay Salt Holdings

Main operators:

- **Gold:** B2Gold, Osino Resources, Koryx Copper, Antler Gold
- **Lithium:** Lepidico, Andrada Mining
- **Zinc:** Trevali Mining, Vedanta Zinc International
- **Uranium:** China National Uranium Corporation, Swakop Uranium, Paladin Energy, Orano, Elevate Uranium, Madison Metals, Forsys
- **Graphite:** Northern Graphite
- **Rare Earths:** Namibia Critical Metals, E-Tech Resources
- **Diamonds and gems:** DeBeers (Namdeb Diamond Corporation) Sperrgebiet Diamond Mining, Sakawe Mining Corporation
- **Copper:** Dundee Precious Metals, Trigon Metals
- **Iron ore:** Lodestone Namibia

Namibia's mining industry saw double-digit (21.6%) growth in 2022, and all indicators have shown progress: mining's share in GDP contribution, turnover, and royalties paid all rose significantly in the past months. As eight of Namibia's 26 mines remain in care and maintenance, the main reason behind this fruitful period was the inauguration of Debmarine's US$7 billion Benguela Gem vessel in March, the major contributor to the 45% increase in diamond production. But there are many other reasons for Namibia to be excited as foreign investors leverage both the country's geological potential and its strategic position as an entry to other Southern African jurisdictions.

In a vast and sparsely habited country (824,292 km² with 2.5 million inhabitants), where many deposits are yet to be found, exploration opportunities are numerous. Osino Resources made a greenfield discovery at its Eureka gold project in August, and is hoping to create a new gold district in an area virgin of previous exploration. Developing the Tier-1 heavy rare earths Lodfal project in the North-West, Namibia Critical Metals (NCM) is an essential player in the exploration scene, and its CEO Darrin Campbell recognized: "Namibia is a huge country with an extremely small population, making it perfect for exploration."

With NCM spearheading the movement, rare earths players in Namibia are looking at adding value to their proposition by creating a rare earth separation plant within the country. Understanding that most rare earths deposits are relatively small, NCM, E-Tech Resources, and Ondoto formed the Rare Earth Alliance Namibia (REAN), a JV to conduct a feasibility study on a rare earth separation unit to handle the throughput of their projects locally, rather than having those sent to China. This unique deal amongst juniors who are actively competing for the same pool of capital highlights a growing trend of mining firms wearing the cap of downstream processors to navigate today's capital markets.

After a two-year legal hiatus, Koryx Copper's Haib Copper License EPL 3140 was renewed by the Ministry of Mines and Energy in July 2023, so that in October, the company resumed drilling at Haib, aiming to complete a 5,000 m diamond drilling program towards a new resource estimate. Pierre Léveillé, CEO, expanded on the operating environment: "Namibia has always been one of the best countries in Africa for junior mining companies to do business in as the country is welcoming to mining, the legal environment is well organized and the rule of law prevails."

With the longest-running uranium mine – Rossing – still in production, the fourth-largest uranium-producing country in the world will likely see its output growing in the coming years as firms like Elevate Uranium and Bannerman Energy see their flagship assets move into development. Bannerman completed a DFS for its Etango-8 project and is currently working toward securing project financing and off-take agreements. Elevate Uranium holds the largest land position for nuclear fuels in Namibia and is advancing its Koppies project. CEO Murray Hill said: "Namibia stands out as the only country in the world with a dedicated Uranium Association. Overall, the combination of a supportive government, robust infrastructure, and a knowledgeable local workforce makes Namibia an excellent jurisdiction for uranium mining."

First discovered 50 years ago, the Langer Heinrich mine is slated to restart production in Q1 2024. Additionally, projects by Bannerman and Deep Yellow's Reptile Mineral Resources, namely Etango and Tumas, are progressing well. Both have received letters from the Ministry of Mines and Energy indicating an intention to grant them a mining license. Bannerman has progressed to front-end engineering and design, while a development decision is expected in early 2024 for Reptile. Elevate Uranium has the largest tenement for uranium in Namibia, and made four uranium discoveries in the last three years.

Beyond its hydrogen potential - Namibia signed the largest hydrogen deal in sub-Saharan Africa to date, worth US$10 billion - in the short term, operators in the country will continue to leverage the country's solar grid potential. The largest gold producer in Namibia, B2Gold, saw both environmental and cost related benefits from this: "In addition to the 6 MW solar power plant commissioned in 2018, the connection of the Otjikoto mine to the NamPower Grid in late 2022 will reduce operating costs and GHG emissions," explained Clive Johnson, its president. ■

Nangula Uaandja

CHAIRPERSON AND CEO

NAMIBIA INVESTMENT PROMOTION AND DEVELOPMENT BOARD (NIPDB)

How is the NIPDB supporting the mining industry in Namibia?

The NIPDB maintains a collaborative relationship with the Ministry of Mines and Energy as one of the key stakeholders with which it actively works to eliminate bottlenecks and address constraints that may impede the industry's growth. This includes assisting existing mining operations to enhance productivity and providing guidance and support to new entrants in overcoming challenges they may face. The NIPDB also undertakes investment attraction-related missions to promote Namibia as a competitive mining jurisdiction.

We launched a one-stop center that integrates nine offices, ministries, and government agencies whose services are an intricate part of setting up a business in Namibia.

Our commitment extends to local skills development and the expansion of local value addition in mining. This involves collaborating with government agencies, industry stakeholders, and academia to build the necessary skills required for refining, processing, and other value-added activities. Additionally, we have identified strategic partnerships with companies like BHP to support local miners through grants, mentorship, and technical assistance.

Which commodities are potential drivers for exploration in Namibia?

Uranium remains a key driver, with Namibia currently ranking as the fourth-largest uranium producer globally. Moreover, critical raw materials such as lithium, graphite and cobalt are garnering significant attention. The country has entered into agreements with the EU centered on these critical raw materials, which creates an opportunity for Namibia to bring about sustainable development and prosperity for our people while contributing towards the global green energy transition.

The gold sector presents opportunities for increased activity and investment, and so does copper.

Why should international investors consider investing in Namibia?

One of the primary value propositions is the country's ambitious plans for producing green hydrogen and the recent discoveries of oil. In the next decade, Namibia has the potential to double or even triple its economy. ■

CROSS-COUNTRY COMPARISON

Source: EY, PwC, World Bank, Oxford Economics, Lovat Compliance, DRC Statistical Authorities

	Egypt	Côte d'Ivoire	Ghana	Burkina Faso	Mali	Nigeria	DRC	Zambia	South Africa	Namibia
GDP Growth % 2023	2.2	6.0	3.7	3.2	3.7	2.5	6.8	3.6	0.2	3.1
Contribution of mining to GDP % 2022	0.5-1	5	7.6	17	9	0.3	4	12	8	10
Ease of Doing Business (Ranking out of 190)	114	110	118	151	148	131	183	85	84	104
Control of Corruption (0-100)	26.4	42.5	52.8	51.9	21.2	14.6	4.3	34.4	44.8	60.0
Political Stability and Absence of Violence/ Terrorism Percentile Rank (0-100)	14.2	26.4	43.9	8.0	2.4	-1,8	6.1	50.0	19.8	64.2
Global Peace Index (Ranking out of 163)	121	90	51	150	153	144	159	63	130	56
Inflation % July 2023	36.5	4.6	43.1	1.4%	5%	24.1	9.2	12.6	4.7	4.5
VAT %	14	18	15	18	18	7.5	18	16	15	15
Royalty Rate %	5	3-6	5	3-8	3	3-5	3-10	5-10	1-7	2-10
Predominant Resources	Gold, Copper, Silver, Others	Gold, Manganese, Diamonds	Gold, Limestone, Iron Ore, Others	Gold, Manganese, Limestone, Others	Gold, Iron Ore, Manganese, Uranium, Others	Gold, Iron Ore, Columbite, Others	Gold, Copper, Cobalt, Others	Copper, Cobalt, Others	Gold, Manganese, PGMs, Coal, Others	Uranium, Zinc, Gold, Salt, Others

Production and Exploration

"Africa holds around one third of the world's mineral reserves. That is an underestimate, as not much mineral exploration has occurred. Currently, 80% of the world's exploration budget is going to OECD countries. Instead, investment should focus on African countries, such as the DRC, Zambia or Egypt."

- Benedikt Sobotka,
CEO, Eurasian Resources Group, and Co-Chair,
Global Battery Alliance

Image courtesy of B2Gold

Precious Metals

Risk-Taking and De-Risking

Africa has always been seen as the epitome of high risk, high reward; a continent with resources as copious as the troubles incurred to extract them. In this year's Fraser Institute ranking of the best mining jurisdictions, only one African country (Botswana) makes the top 10; by contrast, in the bottom 10 only one country (China) is not African. This year, we find African gold miners taking more risks than before, compelled by the high gold price opportunity, while also doing more de-risking work to engage a more risk-savvy – not to call it risk-averse – investment climate.

The risk-reward mentality is becoming more pronounced at the two extremes as an adaptation to both global and local dynamics. At the global level, we note unusual asymmetry between a very attractive gold price (which touched a height of US$2,000/oz earlier this year, not far from its all-time high), but that is not necessarily being followed by a strong investment appetite, not in the equity markets at least, which have been the traditional financing vehicle for juniors. At the local level, the opportunity to find gold in Africa is increasingly more tempting. Africa produced 864.2 t of gold in 2022, according to data from the World Gold Council. This is more than double that of China, the biggest producer, with 375 t. Since 2010, gold production in the continent has risen by almost 60%, writes Brookings, while globally it has only grown by 26%. If the fact that Africa holds 40% of the world's gold is not compelling enough, the bonus of a high gold price and profitable returns is stirring a lot of interest.

Much of this interest is concentrated on West Africa, the world's top generator of gold discoveries in the last decade. However, declining reserves in the main gold jurisdiction, Ghana, together with instability in the Sahel, where the rest of the bulk production comes from, have also sent investors looking for new prospects further out in the continent, including in previously unexplored or deemed unsafe areas. Out there, they come across an even bigger opportunities, and bigger risks.

Africa's shifting gold geographies

Every mining jurisdiction in the world comes with its challenges, from long permitting times in Canada, to land access in Australia or sensitive community relations in Latin America. Africa's main challenge is political instability. While the geological endowment in the continent has always been the same, the above-the-ground landscape has continuously shifted. Ongoing conflicts have prevented exploration and mining in certain countries, and violence and other troubles have "preserved" many of Africa's resources untouched. For this reason, Africa remains one of the least explored mining geographies in the world.

A greater number of juniors are now working in underexplored West African countries like Liberia, Cameroon and Sierra Leone. Karl Smithson, the CEO of Hamak Gold, an early-stage explorer in Liberia, attributes the shift to countries not historically considered for gold mining to the mitigation of political and country risks over the years. "I have always held the view that politics and challenges improve over time, but geology always remains the same," he told GBR.

In Liberia, Hamak Gold joins London-listed producer Hummingbird Resources, which owns the Dugbe gold project with a 2.76 million oz gold mineral reserve estimate (MRE). Liberia has been a relatively stable democracy since 2013, though it is still scarred by the Civil War that officially ended 20 years ago. So is its neighbour, Sierra Leone, a country whose "blood diamonds" continue to stain its reputation. But gold mining could provide immense opportunities for the country: The development of the Baomahun gold project could create up to 2,500 direct and indirect jobs during the construction phase, and thus become the second largest employer in the country, informed the Africa Finance Corporation (AFC), one of the key financial institutions in the continent, which is putting US$175 million into the project. Developed by private company FG Gold, the 5.81 million oz Baomahun is one of the largest gold projects under development in the continent. Probably, Sierra Leone holds others like it.

Lower south in Cameroon, an internal crisis is still ongoing. With the help of the World Bank, Cameroon is looking to boost the mining sector by making available geological data and modernizing the mining law and licensing system. One of the main prospects identified by the World Bank-funded PRECASEM program is a land area known as Central Licence Package, operated by Oriole Resources, another British junior. Commenting on the attractiveness of Cameroon, Oriole's CEO Tim Livesey said: "In contrast to the turbulent Sahel region, Cameroon stands as a more stable jurisdiction, attracting attention from mining companies seeking a secure environment for their operations."

Indeed, in the Sahel region, the pipeline of new projects is threatened, with both Mali and Burkina Faso led by military juntas. In Burkina, production sank 15% last year as the newly imposed government struggled to contain jihadist militants now controlling almost half of the country. The leaders in Burkina have also said they are looking to reform the mining law, without giving more details. Mali, now headed by a transitional government after a coup in 2021, has suspended the issuance of mining permits until further notice.

However, projects like Cora Gold' Sanankoro or Toubani Resources' Kobado continue. Cora Gold published a FS at the end of 2022, and later secured a US$70 million loan, on top of US$20 million in equity, both supporting the construction of the mine. With the environmental permits already in the bag, the mining permit would be the final big condition to proceed to construction. Cora's CEO Bert Monro expects the moratorium on permits to be lifted soon. Similarly to Cora Gold, Toubani also proposes to the market a potentially easy-to-mine, oxide resource, progressing towards an updated DFS in the first quarter of 2024. CEO Phil Russo told GBR Mali's status as a top-tier gold producer in West Africa is likely to persist as long as the country can foster an environment where projects can transition from development to production. The fact that not many projects in the West African region have reached project study stages make projects like Kobada stand out as a compelling opportunity.

A notable example of how a country can, post-war, transform from underexplored to a gold producer in record time is Côte d'Ivoire. Five years ago, Côte d'Ivoire was still an emerging jurisdiction that took the fancy of adventurous explorers. But those explorers were rewarded with consistent discoveries, of which many have become mines. Fortuna Silver Mines is the latest to have put into production a greenfield project with the opening of the Séguéla mine earlier this year. The new output pushed Fortuna's total gold production to a record in Q3. Last year, ASX-listed Tietto Minerals similarly inaugurated the 3.83 million oz Abujar gold mine. 2024 should see more mines coming onstream, with Endeavour's Lafigué mine expected to start production.

In Ethiopia, Akobo Minerals found a small bonanza-style deposit with a headline-making average grade of 22.7 g/t Au, as published in the MRE, and with 40.6 g/t in the indicated part. Its developers say this is only comparable to Kirkland's Lake's Fosterville mine in Australia, which is considered the highest-grade gold mine globally. However, parts of the region are also highly unpredictable. This year, Ethiopia signed a peace deal with Tigrayan forces, which is hoped to mark the beginning of the end of the conflict. However, it may take a few more years before northern Ethiopia becomes operable. In neighbouring Sudan, conflict broke out in April 2023 between the Sudanese Armed Forces (SAF) and the paramilitary Rapid Support Forces (RSF), with thousands killed to date. Though far from the conflict area, Perseus' recently acquired Meyas Sand gold project, formerly known as Block 14 under previous operator Orca Gold, was put on hold, and only recently the exploration team restarted work.

In gold-rich Africa, balancing risk with opportunity is a lot about the right timing, as one can observe in the recent history of the main gold-producing countries. Rapid political and economic change, together with quick exploration-to-mining timeframes, could see the map of gold producing countries drastically changed in the next 10 years, depending on how current and new players respond to risks.

Consolidation

Though African miners and explorers share many common challenges, including jurisdictional risk, a poorer investment sentiment, or ESG risks, there are two aspects they experience fundamentally differently: One is financing, which is almost always a sore issue for explorers. The other is the decline in reserves, which is a big issue for producers, but an opportunity for juniors. A big part of the reason why many juniors, but also some producers, venture into East Africa is aging mines and less available exploration land in West Africa. Ghana, the largest gold producer, risks following in the steps of South Africa, the former leading gold country, with many

Gold prices remain at a historical high, with positive effects on gold producers, from a cash flow, EBITDA, and gross margin perspective. As long as you build a business that produces gold, as opposed to running a business focused on the promotion of a potential business, you will benefit from the stronger gold sentiment.

Stephen Mullowney, CEO, TRX Gold

of its flagship mines nearing the end of life and a weak pipeline of new projects.

Producers can respond to this threat by doing more brownfield and greenfield exploration, moving further underground where there is a case for it, or acquiring new projects. In recent years, and with the backing of a strong gold price, the sector has showed more love to brownfield projects. In a recent example, Barrick, which operates one of the top 10 largest gold mines in the world in Mali (the Loulo-Gounkoto complex), recently rebooted its Tanzanian Bulyanhulu mine, put on care and maintenance in 2019.

However, an even better way of deriving more value from existing projects is by consolidating across multiple assets. This has taken many forms this year: In Ghana, two leading mines operated by two majors (Gold Fields and AngloGold Ashanti) are to come together, a union long expected in the industry: "Earlier in 2023, we announced the intention to form a joint venture between the Tarkwa gold mine and AngloGold Ashanti's (AGA) neighbouring Iduapriem gold mine to potentially create Africa's largest gold mine. With this merger, we see a significant extension of mine life, as well as a huge upside in terms of getting the combined mine's AISC under US$1,000/oz," Martin Preece, interim CEO at Gold Fields, told GBR.

Also in Ghana, Asante Gold is on a path to transform into a mid-tier producer after acquiring two mines, Chirano from Kinross and Bibiani from Resolute Mining. With the Bibiani sulfide plant brought into production, Asante should produce over 500,000 oz/y from 2025 onwards from the two mines: "The Chirano lease is immediately contiguous to Bibiani's. The acquisition gave us an opportunity to control 53 km along the Bibiani and Chirano shear zones. This is an extraordinarily prospective trend that has produced over 8 million oz throughout its history. Since completing the acquisition at Chirano last August, we have been able to establish a life of mine of more than 10 years, just like we did at Bibiani," said its CEO, Dave Anthony.

Other examples of neighbours coming together can also be seen in Burkina Faso, with its two newest mines, Bomboré operated by Orezone and Sanbrado of West African Resources (WAF), located 14 km apart, seeking synergies in a new MoU. Together, the two mines cover a contiguous area of 1,800 km2 and could join forces on things like energy, procurement, community relations and security.

Fitch Ratings suggests deal-making in 2023 is on track to be the highest in a decade, on the back of high profits accumulated in 2021-2022. This should give explorers and developers a good audience to showcase their projects to.

Financing

Risk, an almost essential element of mining, is what (we can guess) makes the job quite thrilling for miners and, especially, explorers. Investors too must secretly seek that thrill, though it is in their nature to also dislike risks. With interest rates still biting and volatility in global economies making valuations challenging, investors have been...Selective.

Though the price of gold has provided good returns on investment, Bloomberg describes the performance of gold stocks this year as 'dull.' Gold stocks have grown at 4% year-to-date, on par with the S&P 500 index. The junior IPO sector does not seem to recover after a 10-year low in 2021 on the ASX, a decline also seen on the TSX, which has a pipeline of companies waiting for the right time to list. On the JSE, only two mining companies went public this year, and these were not in gold.

"Where companies used to be able to raise US$10 million for a project, they are now raising US$1 million, and where they used to raise US$1 million, it is now US$100,000," commented Karl Smithson, the CEO of Hamak Gold, which recently raised money for a small drilling program.

Many low-cap juniors prefer to find funding outside of the equity markets to avoid dilution. Despite being listed on the TSX, Egyptian explorer and developer Aton Resources is internally funded. For larger projects with a high *capex* requirement, developers are also looking at ways to reduce that initial cost requirement to make the bigger project more easily financeable. Tanzanian-based TRX Gold's development plan exemplifies this. TRX declared first commercial production at its Buckreef gold project this year by starting with a small (1,000+ t/d) processing plant to process the oxides. With an up-and-running (and cash-making) operation, TRX then proved that it could obtain 88.7% recoveries from the sulfide, which is the main component of the deposit. ▪

Mark Bristow

PRESIDENT AND CEO

BARRICK GOLD

With a long history of discovering, building and operating big mines successfully in Africa, we remain best placed to unlock the vast potential of the continent.

How would you assess Barrick Gold's (Barrick) performance in 2023?

As we disclosed at the time of our Q3 results, we expect our annual gold production to be marginally below the 4.2 to 4.6 million oz/y guidance range we announced at the start of 2023. This is primarily due to the delay in receiving the "Record of Decision" from the United States Bureau of Land Management in relation to the permitting of the Goldrush project, changes in the Crossroads open pit model, and some process interruptions to address long term maintenance requirements (all in Nevada). Turquoise Ridge had a stronger performance relative to 2022, thanks to a successful turnaround exercise by its new management team and the commissioning of its third shaft. The lessons learned at Turquoise Ridge, mainly about the critical importance of teamwork and planned maintenance, are now being rolled out at the other Nevada mines.

Furthermore, in the LATAM region, equipment issues hindered the ramp-up of our expansion project at our Pueblo Viejo gold mine in the Dominican Republic. The "Record of Decision" at Goldrush was eventually received in late December 2023 and we are expecting to complete the ramp up at Pueblo Viejo by the end of Q1 2024, meaning these issues are largely behind us.

In Africa, we have had another steady performance with attribution production at the 1.5 million oz/y mark, consistent with prior years and with all mines in the region expected to deliver on their guidance for the 2023 year.

As previously communicated, our 2023 copper production is expected to be within guidance, albeit at the low end of the 420 to 470 million lb/y range.

Can you discuss the role copper is poised to play in Barrick's future strategy?

We plan to double our copper production by the end of the decade. There remains significant upside potential in the gold industry, and the copper operations are strategic and additive to that.

Reko Diq in Pakistan is positioned to rank as one the world's Top 10 copper mines when it reaches full production, and the pre-feasibility study on the Lumwana Super Pit Expansion is projected to deliver a potential of 240,000 t/y over a 36-year life of mine, from a plant expansion that will increase our processing capacity to 50 million t/y.

The accelerated Lumwana work program is scheduled to deliver a full feasibility study by the end of 2024, and we are expecting production from the Super Pit to start in 2028. The Reko Diq project also remains on track to deliver an updated feasibility study by the end of 2024.

With ongoing operations and established programs in Mali, the DRC, Tanzania, Côte d'Ivoire, Zambia, and Egypt which areas of Africa does Barrick forecast growth to come from in 2024?

We believe Africa remains largely untapped despite the natural resource riches it is endowed with. As a multinational organization with a long history of discovering, building and operating big mines successfully in Africa, we remain best placed to unlock the vast potential of the continent. As such we still see great potential for world-class discoveries around our operations and further afield in Africa. With its wealth of resources and our strong partnerships there, Tanzania is a particularly promising candidate for our next multi-million oz discovery.

What is your assessment of the consolidation of the gold scene in West Africa, and what makes an attractive target for Barrick?

Any M&A target or JV opportunity needs to be more appealing and additive to us on a holistic organizational basis compared to what we can deliver through our own geologically focused and proven track-record of organic growth through exploration. If there is one thing that sets Barrick apart, it has been our ability to deliver sustained and significant growth in our reserves. Since the merger with Randgold in 2019, we've replaced 125% of our reserves. Looking to the future, we expect reserve replacement and our organic growth projects to increase production by some 30% by the end of the decade. We pride ourselves in our ability to operate in most places in the world where we can find quality assets, bar a few limited exceptions. We have built and are still operating some of the largest and most successful mines in Africa. As such we believe we are best placed to play a pivotal role in any consolidation drive in the region, should we identify opportunities that meet our clear value creation and strategic filters. ▪

Martin Preece

INTERIM CEO

GOLD FIELDS

Can you touch on Gold Fields' South African and West African operations and how they have performed over the past year?

Our Ghana operations are doing well across the board. Damang gold mine is aging, but the mine continues producing and delivering good results. The Tarkwa gold mine is a big asset, and we are certainly looking at how we can further optimize this operation. Earlier in 2023, we announced the intention to form a joint venture between the Tarkwa gold mine and AngloGold Ashanti's (AGA) neighboring Iduapriem gold mine to potentially create Africa's largest gold mine. We have started the initial negotiations with the government to hopefully conclude this transaction soon. With this merger, we certainly see a significant extension of mine life, as well as a huge upside in terms of getting the combined mine's all-in-sustaining costs under US$1,000/oz. Ghana is an excellent place for mining, and we hope that this joint venture will endorse the long-term future of the country as a stable and pre-eminent mining jurisdiction.

What technologies are Gold Fields leveraging?

At Deep South in South Africa we lose approximately four hours on a shift change twice a day as the mine is so deep. We are therefore implementing automated drilling solutions at shift change and also during the shifts. We have implemented remote loading solutions at some of our operations.

What are Gold Fields' key objectives moving forward?

Gold Fields has a steady state production base between 2.2 million and 2.4 million oz/y to 2030, with a key growth driver being the commissioning of Salares Norte in Q4 2023. This will add an average of 0.5 million oz/y to our production profile until 2030. On top of that, we hope to see production coming from the Windfall project by the back end of 2025. ■

Cobus Loots

CEO

PAN AFRICAN RESOURCES

What have been the main highlights from Pan African Resources in the past 12 months?

We had a record-breaking year in 2022 in terms of production and profits. However, in 2023, there was a slight pullback in production due to lower ounces produced at the Barberton mine operations. One major achievement has been converting the Barberton Mine to continuous operations.Additionally, we are excited about the construction of the recently acquired Mintails project. This project represents an investment of approximately US$135 million and is expected to begin production by December 2024. This development will likely push our annual gold production to near 250,000 oz and reduce our Group all-in-sustaining costs. Furthermore, we are continuing to invest in the underground infrastructure at the long-life Evander operations where we have over 32 million oz of gold resources.

Can you discuss your investments in the Block 12 concessions in Sudan?

In Sudan, we started with grassroots exploration and invested around US$5 million. When the conflict began, we ensured the safety of our staff and placed our exploration activities on care and maintenance. We have recently resumed operating. The geology resembles ore bodies in Egypt and the Arabian Nubian Shield in Saudi Arabia. We plan to continue exploration to declare a maiden resource within the next 12 months. Before committing significant capital to operational development, we need clarity on the political situation and stabilization in Sudan.

Can you explain the strategy behind Mintails and how you are turning waste into a valuable asset?

We had the opportunity to acquire 2 million oz of gold on surface for less than US$3 million. This approach aligns with our past successes in surface tailings retreatment, such as our Barberton Tailings Retreatment Plant. The US$135 million investment in Mintails will lead to an average annual gold production of 50,000 oz with all-in-sustaining costs of approximately US$1,000/oz. This is an attractive proposition for us, especially considering the extended 20-year life of the project and a payback period of under 4 years at current estimates. ■

Clive Johnson

PRESIDENT AND CEO

B2GOLD

How has the Fekola mine performed recently?

2022 was another strong year for our Fekola mine in Mali, producing 598,661 oz Au, at the top end of our annual guidance range of 570,000 to 600,000 oz/y at cash operating costs of US$537/oz and all-in sustaining costs of US$867/oz. In the fourth quarter of 2022, Fekola produced a quarterly record of 244,014 oz, largely due to the processing of additional high-grade ore from the Fekola Phase 6 pit.

In 2023, the Fekola Mine had a strong first half of the year, producing 318,191 oz. During the year, ore continues to be mined from the Fekola and Cardinal pits as we wait to receive an exploitation license for the Bantako North permit area, pending the implementation of the new 2023 Mining Code.

We continue to have a strong exploration focus in proximity to our operating mines in both Mali and Namibia, with an aggregate budget of US$38 million for the two countries. Our ongoing exploration will also continue to advance B2Gold's early-stage projects in Côte d'Ivoire.

Can you highlight some key ESG initiatives in Mali and Namibia?

Nearly 20% of our power needs at our mines in Fekola and Namibia come from renewable energy sources. In Mali, we are expanding the Fekola solar plant, which is already one of the largest off-grid hybrid HFO/solar plants on the African continent.

In Namibia, in addition to the 6 MW solar power plant commissioned in 2018, the connection of the Otjikoto mine to the NamPower Grid in late 2022 will reduce operating costs and GHG emissions by shifting from on-site power generation to national grid connection.

How is the security and political situation in Mali impacting B2Gold's strategy in the country?

The Fekola complex is located far away from any conflict zones, in the far south-west of Mali along its border with Senegal. Our operations have continued unimpeded, and we are optimistic that the Mali Armed Forces will maintain security and political stability in the country. ■

Jorge A. Ganoza

CEO

FORTUNA SILVER MINES

You have just delivered the commissioning of the new Séguéla mine in Côte d'Ivoire. How have the last months unfolded for Fortuna Silver Mines Inc. (Fortuna)?

We are coming to the end of a capital-intensive phase and have put a lot of effort into bringing the Séguéla mine into production. This is the first mine that the new Fortuna post-Roxgold acquisition delivers in West Africa, and this speaks to the successful integration of both companies. We delivered on time and on budget, through a challenging construction environment with inflationary pressures and strain on the supply chain. We poured the first gold in May 2023, and the mill has met and exceeded design capacity.

What are Séguéla's advantages in terms of production figures and exploration potential?

We have already provided consolidated guidance to the market regarding our 2023 gold production of 282,000 to 320,000 oz, in which Séguéla will contribute 60,000 to 75,000 oz/y at an all-in sustaining cost in the range of US$880 to US$1,080/oz during the second half of 2023. What drove our initial interest in Séguéla was the impressive exploration potential in this belt where we hold a commanding land position.

How does Côte d'Ivoire fare as a mining jurisdiction?

When we speak with authorities across the public sector, their support is consistent. We have a good basis for comparison as we operate in six countries, and Côte d'Ivoire is amongst the most welcoming for sustainable and responsible mining. In terms of predictability for investment and government support, I would rank it highly.

What are the key priorities for Fortuna as we enter 2024?

We are coming out of a capital-intensive phase, and now, it is about harvesting the portfolio. Concerning capital allocation, our priorities are strengthening the balance sheet and the continued advancement of our high-value exploration opportunities. ■

Jeff Quartermaine

MANAGING DIRECTOR AND CEO

PERSEUS MINING

How has Perseus Mining performed in the last financial year?

I am pleased to say that our record financial results for FY23 reflect our continued strong operating performance at all levels of the business, building up a balance sheet that is unusually robust in the gold mining industry, particularly for companies of our size. Operationally, throughout the year we have systematically been at the top end of our production guidance and below the bottom end of our cost guidance, ending the year with a total production of 535,281 oz, at an all-in-site cost of US$959/oz. While Sissingué is in its latter years, producing at about 50,000 oz/y this year, both Yaouré and Edikan are performing exceptionally well, running north of 270,000 oz/y and 200,000 oz/y, respectively. We have just released an updated LOM for Yaouré, extending its operational life to 12+ years, and including, for the first time, an underground mining operation. Meanwhile, at Edikan, we expanded our exploration into a newly acquired area north of our existing mining lease and made a first discovery, adding about 300,000 oz to the reserves and extending the mine life to FY27.

Perseus postponed making an investment decision at the Meyas Sand Gold project (formerly, Block 14) in Sudan. What is the status of your work in the country?

Our intention is to continue our activities in Sudan as long as we are reasonably comfortable that we can safely do so.

The social element of ESG seems to be the most emphasized in Africa. Why is the "S" of ESG a bigger priority for miners in the continent?

Africa is still facing major social systemic challenges which have to be addressed as priorities by all stakeholders, from lack of access to basic services and infrastructures, education, sustainable livelihoods, to food security and youth employment. I firmly believe that mining companies on the continent have a key role to play in tackling those challenges and supporting our host governments. ■

Dave Anthony

CEO

ASANTE GOLD

Asante Gold is on a path to becoming a mid-tier gold producer, after acquiring two brownfield projects over the last few years. Could you walk us through your current production plan?

For the 2023 fiscal year ending in January, we are expecting to reach a run rate of 400,000 oz/y from the Bibiani open pit and Chirano open pit + underground. We are also planning to go underground at Bibiani. The Bibiani sulfide plant should be running in early 2024, with gold recovery over 92%. This will bring our production from Bibiani to about 250,000 oz/y, to be ramped up to 350,000 oz/y in early 2025. With the 200,000 oz/y coming from Chirano, by 2025 we are looking at an annual production profile of about 550,000 oz. Currently, we have several capital initiatives to increase our recovery at both mines, boost our ounce production by 30%, and reduce AISC by 10%. We expect to bring down the AISC to between US$1,200-1,300/oz by the end of the year.

What synergies between the mines have been created with the acquisition of Chirano?

The Chirano lease is immediately contiguous to Bibiani's. The acquisition gave us an opportunity to control 53 km along the Bibiani and Chirano shear zones. This is an extraordinarily prospective trend that has produced over 8 million oz throughout its history. The exploration results achieved over the past few years suggests that we have only started to understand just how much gold this belt holds.

How has Asante's CSR mandate changed since becoming a producer?

Asante Gold inherited two very strong CSR (and ESG) programs. We were able to build on that strong track record. As a Ghanaian company that has very close ties with the local culture, we have been able to deepen the level of integration with communities and make sure the resources we make available are applied in the most meaningful ways. ■

Base Metals

The Race for Africa's Copperbelt(s)

> *The energy transition has changed the game. There is an incredible rush in the DRC, even if it's dominated by China. The USA is making a comeback, and that could reshuffle the deck here.*
>
> Cécile Amory, President, MCSC

There have been many high-profile visitors to Africa lately. Early in 2023, Pope Francis delivered a speech in front of huge crowds in Kinshasa, lamenting the exploitation of Africa's resources: "Africa is not a mine to be stripped," he said. A few months later, US Vice President Kamala Harris was touring Ghana, Zambia and Tanzania, pledging more investments in Africa's future, including in the development of minerals. Europe has also increased its outreach to Africa. The European Commission's leader, Ursula von der Leyen, told attendees at the Africa Climate Summit this September that Europe wants to partner with Africa to close the clean energy investment gap: "We are not only interested in extracting resources, but to partner with you to create local value chains."

Africa is no stranger to the scramble for its minerals by foreigners. Most African mines belong to Chinese, Australian, European and Canadian companies, while the rest are owned by South Africans. However, the urgency and scale of the energy transition, which will require massive amounts of copper, cobalt, nickel, lithium, graphite, rare earths, and other so-called future facing materials, directs a flurry of renewed interest to the place that has it all. Africa holds 30% of the world's minerals, yet many of these remain undiscovered and unmined.

That said, Africa's copper has attracted notice. The DRC jostles with Peru to be the second-largest copper producer. As copper demand is projected to reach a record 50 million t/y by 2035, from the current 25 million t/y, the looming supply shortage is a major concern. This anxiety is doubled by another one - China's dominance. China has an outsized influence in materials processing with 68% of the world's nickel refining capacity, 40% of copper, 59% of lithium, and 73% of cobalt, according to a report by Brookings.

For the past few decades, Africa's largest investor has been China. Between 60 and 80% of the mining production flow out of Africa has been financed by Chinese capital, reported Dentons Mining Law. But troubles at home, caused by Covid and a slowing economy, have reduced the total Chinese FDI to Africa from almost US$5 billion in 2021 to US$1.8 billion in 2022, according to Statista figures. This creates a gap that Europe and the US could exploit, though it is difficult to see how they could fill it.

This year's prominent visitors did not come to Africa empty-handed. Half of the EU's new foreign US$322 billion investment plan, known as Global Gateway, is directed to Africa as part of the mission to close the gap in the energy transition. The EU is looking to finalize a partnership with the DRC and Zambia to boost local industries and secure critical materials for the green transition, something that the US has already done, having signed a trilateral MoU with the two Copperbelt countries to develop an integrated regional EV value chain.

Commenting on these developments, Marie-Chantal Kaninda, president of Glencore DRC, said: "Zambia and the DRC are home to 80% of the minerals required for the production of electric vehicle batteries, and the countries have signed a cooperation agreement to facilitate the development of the electric battery value chain. Being a major producer in the DRC, Glencore also has a role to play, ensuring that we contribute to the green transition by producing responsibly."

However, these partnerships are still a long way from meeting Africa's multi-billion-dollar investment needs to realise the green energy transition. Standard Bank calculated that US$700 billion is required in the next decade, money that is not available in the local banks. Asked whether the world (not just China) is becoming more attuned to opportunities in Africa, Osam Iyahen, senior director of natural resources at the Africa Finance Corporation (AFC) told GBR: "We see a remarkable amount of interest in the African mining space, especially from the Americas. It is no coincidence Kamala Harris visited Zambia and Tanzania. Likewise, Asian countries have always shown a lot of interest and a higher tolerance for risk in Africa."

The return of majors to the African mining space confirms that trend. Almost 10 years since exiting the continent, BHP recently acquired a minority stake in the Kabanga nickel project in Tanzania. Anglo American is also returning to Zambia through an agreement with junior company Arc Minerals: Under the deal signed in late 2023, Anglo will spend US$74 million on exploration within seven years to retain a majority (70%) stake in Arc Minerals. Speaking to GBR, executive chairman of Arc Minerals, Nick von Schirnding said that the joint venture will focus on the Domes region of Zambia, which typically displays larger-but-lower-grade deposits at 0.5% to 1% grade, something that Anglo is used to because they used to own a substantial portion of the area: "Our side of the Domes region, while largely undeveloped, has shown promise through our exploration activities as well as historical exploration activity by Anglo American. We hold multiple top-ranking targets in our portfolio, which is hugely exciting. This region represents a unique opportunity, and Anglo believe in its potential, which is why they have partnered with us," said von Schirnding.

Law firm White & Case believe that capital previously flowing into oil and gas projects is now redirected to energy transition minerals as a portfolio adaptation by major investors. While Chinese firms have broad control over copper and cobalt mining projects, Africa's exploration sector remains Western-driven. 80% of exploration expenditure comes from Canada, Australia, the UK and South Africa, according to the European Council of Foreign Relations. The US is also joining that list. Last year, California-based explorer KoBold Metals allocated US$150 million to develop the Mingomba copper mine in Zambia.

The capital spend on exploration in Africa is, however, only 10% of the world's total, of which half goes to gold and very little is spent on new discoveries. In the DRC, Minister of Mines Antoinette N'Samba Kalambayi told GBR that only 8.05% of the country's potential has been explored. Identifying more deposits and connecting these to processing facilities and end-users so that Africa exports more value-added products is where Western investors could step in, tapping into existing grievances with Asian investors. Felix Tshisekedi, DRC's President, told attendees at Davos this year that the country did not benefit from a US$6.2 billion minerals-for-infrastructure contract signed by his predecessor with China: "There's nothing tangible and no positive impact for our population."

In a study published by the Moroccan think-tank Policy Center for the New South (PCNS), Congo's residents in mining towns feel that Chinese firms are less concerned with the communities compared to their Western peers. Other reports flagged serious environmental concerns over improper mining. A perception that Chinese players do not respect local content laws, however, is not entirely true. In a study by the London School of Economics, it was found that up to 95% of Chinese firms' workforce is made by African employees, as published in the Economist.

Western investors seek to counter China's dominance by promising better ESG standards. In its turn, China has been a bedrock for investment in the continent, and it can levy strong financial and technical capacity, a higher risk tolerance, as well as long-term relationships with African governments and various economic actors. African nations are not ready to ditch China, nor to trust America. Instead of choosing sides or becoming a new arena for a contest between the US and China, Africa must leverage its increased competitiveness, strike better deals for minerals, and ensure that this race for critical minerals translates into growth for its economies and populations.

The diversity of interests in Africa's copper can be observed in the latest race for the acquisition of Botswana's Khoemacau copper and silver mine, which is one of the continents' largest copper deposits. Valued at US$1.5 to US$2 billion, Khoemacau has attracted Chinese bidders like Zijin Mining and MMG, which already own assets in the DRC, but also Johannesburg-listed Impala Platinum, Exxaro Resources, and Sibanye Stillwater, as well as Australian companies South32 and Sandfire Resources. In November 2023, Hong Kong-listed MMG announced it will acquire the parent company of Khoemacau copper mine for US$1.9 billion. MMG's major shareholder is state-run China Minmetals, and has assets in the DRC, Australia, and Peru; now, also in Botswana.

While Khoemacau landed in the hands of a majority-Chinese yet very international player, another coveted copper mine, Mopani Copper Mines' ZCCM-IH mine in Zambia, found a new owner from the United Arab Emirates (UAE). The Zambian government selected UAE's International Resources Holdings as the new equity partner in Mopani Copper Mines, which the government of Zambia bought from Glencore in 2021. The Arab investor competed with household names like Zijing and Sibanye.

Whereas Khoemacau indicates international competition, a logistics project called the Lobito Corridor shows how international collaboration can be the solution to drive real change.

Demand creates supply (and logistics issues)

Ample literature supports how the world has routinely underestimated Africa. But one image helps to visualize some misconceptions about how we think of Africa: The world map itself. The Mercator map projection distorts the relative size of the countries furthest to the Equator, stretching them bigger than their true size. Africa is, actually, much bigger relative to other places than one can gauge on the map. Within its landmass, Africa can fit the US, China, India, Japan, Mexico, and many European nations combined, calculated the Visual Capitalist.

At a purely practical level, this realization helps one to correct how to estimate distances across the continent and start understanding the logistics challenge. At an interpretative level, this mis-sized view is also a metaphor for limiting misperceptions: "When American investors think of mining in Africa, they still think of cobalt, Congo and child labor," reported British newspaper The Economist.

Continuing with the subject of size, the Kamoa-Kakula copper mine in the DRC, on a path to become the third largest copper mine in the world, has a mineralization of 28 km x 23 km, twice the size of Malta. The project, a JV between Ivanhoe Mines, Zijin Mining and the government of the Congo, plans to complete Phase 3 expansion in 2024. This will boost annual production to 650,000 t/y. Additional supply is expected to drive the copper market into a surplus next year, according to The International Copper Study Group (ICSG). But long-term, the market is headed towards a structural deficit, forecasters agree. Bloomberg predicts a shortfall of around 5.4 million t/y by 2027 – this is about eight Kamoa-Kakula's production in 2024 - may push the price up by 20% to US$9,800/t.

The economic dogma that demand creates its own supply is applicable today across Africa's two major belts: The well-known Copperbelt, covering the DRC and Zambia and home to the continent's flagship Kamoa-Kakula Complex, and the emerging Kalahari Belt, crossing Botswana and Namibia. In the Copperbelt, the DRC has stolen the show in recent years, progressing fast into a top three global copper producer, but Zambia is determined to catch up. In an interview with GBR, Minister of Mines and Mineral Development Paul Kabuswe said: "Our ambition is to position Zambia as a significant player in the battery vehicle supply chain."

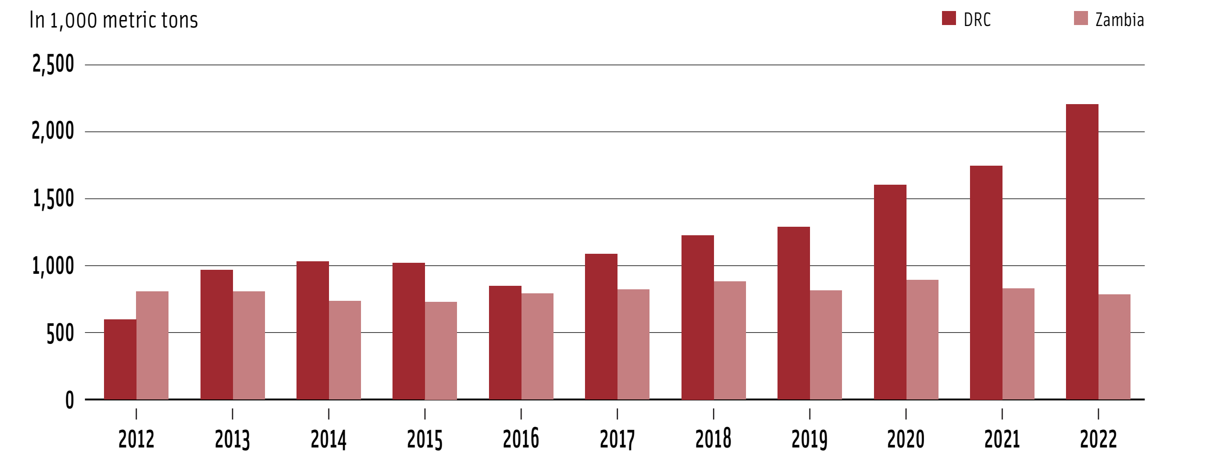
Zambia has a goal to increase its 850,000 t/y of copper production to 3 million t/y of copper. The country's mining sector was derailed by political issues under the former government, so reform has been the name of the game for the new leaders in the country.

Recently, Zambia agreed to return control of Konkola copper mines to Vedanta Resources, ending a dispute that had lingered since 2019, when the authorities seized the project. Vedanta is committed to invest over US$1.2 billion in the asset. Other important works on the Copperbelt are Barrick's Lumwana Super Pit expansion in Zambia, with a potential to add 240,000 t/y of copper production, and Eurasian Resources Group (ERG)'s US$800 million plan to revamp the Comide copper and cobalt mine in the DRC, by building a hydrometallurgical plant and conducting a large exploration program and mine development.

On the Kalahari belt in Namibia, Canadian explorer Koryx Copper Resources (formerly, Deep South Resources) had the license for its Haib copper project renewed following a legal battle started in 2021. Haib is a large tonnage, low-grade copper deposit with nearly 1 billion t of ore at 0.31% copper. Koryx Copper holds three other licenses in Zambia (Luanshya West, Chililabombwe and Mpongwe). The company's president and CEO, Pierre Léveillé, is optimistic about the opportunities to find world-

Different Trajectories for Copper Outputs in the DRC and Zambia

Source: Statista



class deposits in both countries: "Zambia has one of the most prospective copper belts in the world and there are currently six mines that are larger than our Haib project in Namibia."

In South Africa, another mine is preparing to add product into the market. Orion Minerals is advancing its flagship Prieska copper-zinc project, having drawn financing from three different sources: South Africa's Industrial Development Corporation (IDC), streaming and royalty company Triple Flag Precious Metals, and cornerstone investor Clover Alloys Group (among other equity investors). Errol Smart, the company's CEO, wants to change its development profile so that it goes into production in the next months in order to secure this funding: "After completing the BFS in 2020, we were planning to go the traditional financing route of normal debt and equity, which can be very challenging for a junior in the South African environment. Changing our development profile allows us to go into production in the next nine to 12 months, whereas in the original BFS, we had envisioned three years of construction for the massive 2.4 million t/y of underground copper ore operation. With the current plan, we can reach the same production threshold within five years while generating cash, so it is about being more opportunistic and grabbing the low-hanging fruits. "The newest guy in town, specifically in "Joburg" town, is Copper 360, a company that debuted on the Johannesburg Stock Exchange (JSE) in April 2023, after a reverse takeover of copper producer Big Tree Copper and copper miner SHiP Copper. Fusing the assets of both companies together, Copper 360 aims to build South Africa's first solvent extraction plant purely dedicated to copper and produce 30,000 t/y of copper over the next two years.

Increased copper activity is exposing logistics challenges, especially in landlocked Central Africa. The relative logistics-related cost of mining in Africa is believed to be at 250% of the world average, found Policy Center for the New South (PCNS). In an interview for Politico, CEO of the Africa Finance Corporation (AFC) Samaila Zubairu estimated the infrastructure investment need at US$130 to US$170 billion (the higher number includes maintenance costs). Her colleague, Osam Iyahen, senior director for natural resources at the AFC, told us: "We do not get to choose where the materials are coming from, so developing the infrastructure becomes extremely important for the bankability of a remote project."

A welcome sign is the development of the Lobito Corridor, a railway that connects Congo and Zambia to Angola's Lobito port, as an alternative to the more distant port of Durban in South Africa, and other less frequented ports like Beira in Mozambique, or Walvis Bay in Namibia. The Benguela railway had been broadly abandoned and needed the coming together of three leaders - João Lourenço in Angola in 2017, Félix Tshisekedi in Congo in 2019 and Hakainde Hichilema in Zambia in 2021- to be revamped. Now, the EU and the US have confirmed a commitment to support the three governments in developing the 1,290 km corridor, with an unconfirmed US$250 million in financing from the US Development Finance Corporation (DFC) and talks to expand the corridor to the Tanzanian coast. Following these developments, Ivanhoe Mines announced Lobito as the preferred exit point for its cargo and signed an MoU with operator Lobito Atlantic to transport Kamoa-Kakula's copper concentrates by rail to the Atlantic port. Lobito Atlantic is a consortium of operator Vecturis, commodities trader Trafigura and infrastructure company Mota-Engil.

Amaury Luyckx, CEO of Polytra, a leading logistics player in the continent, shared his thoughts: "The Lobito Corridor has the potential to become the fastest, most reliable and efficient corridor among all existing five. What will happen next is an interesting chicken-and-egg question: Shipping lines do not regularly call the Lobito port, because there is not enough business there, but not enough business accumulates because the shipping lines do not call the port. Personally, I am quite positive that more shipping lines will go to Lobito, especially now that freight rates have come down. Of course, the other ports will need to react and become more attractive."

There are also positive developments in terms of road infrastructure: An US$850 million road project connecting copper-cobalt mines in the DRC through Zambia to Dar es Salaam port in Tanzania will help cut 241 km from the existing journey. The road will be built by GED Africa, a company backed by a Hungarian construction firm. ■

Marie-Chantal Kaninda

PRESIDENT
GLENCORE DRC

Can you give an overview of Glencore's activities in the DRC?
Glencore has been operating in the DRC since 2007, and has invested more than US$8 billion into our two major operations – Kamoto Copper Company (KCC), a joint venture between Glencore's wholly owned Katanga Mining which holds 75%, and the state-owned Gécamines who holds 25%; and Mutanda copper-cobalt mine, of which the government holds 5% since the beginning of 2023 up to the renewal of the mining license due to a requirement in the mining code. The company has approximately 8,700 employees and 7,650 contractors working for us, making Gelncore one of the largest regional employers. Overall, DRC is the world's largest cobalt producer, accounting for 73% of global output in 2022. Glencore is one of the major cobalt and copper producers in the DRC.

What are the challenges and opportunities of the mining ecosystem in the DRC?
There are infrastructure challenges in the DRC, but these challenges give rise to other opportunities. For instance, Glencore invested more than US$450 million to refurbish two turbines at the 1,424 MW Inga 2 hydropower plant, and in addition, we are upgrading approximately 2,000 km of transmission lines to transport hydropower to our operations in Kolwezi. Restoring the two turbines will not only resolve some of our challenges but also the community in Kolwezi and Kinshasha as some of the power is allocated to them.

From an ESG perspective, Glencore creates employment opportunities locally, and we ensure that our employees receive good salaries and that their working conditions are good. We also have the Enterprise Development Program (EDP) focused on developing local entrepreneurship. We also work with artisanal and small-scale miners to open up opportunities for alternative livelihoods. For example, we have a program for women where we allow them to create new cooperatives in sewing, agriculture, and various other businesses. Furthermore, to keep children away from artisanal mining, Glencore has a summer camp program where the children can be engaged during the school holidays. ■

Marna Cloete

PRESIDENT
IVANHOE MINES

With record production at Kamoa-Kakula, how have Ivanhoe Mines' operations in the DRC performed so far in 2023?
We have achieved remarkable success so far this year at the Kamoa-Kakula Copper Complex, surpassing previous records and remaining on track to meet our guidance and development goals. Our operations continue to deliver outstanding results for the second quarter, achieving record production of nearly 104,000 t of copper. Our cash cost also remains within our guidance range of US$1.40-1.50/lb. Since entering Phase 1 commercial production on July 1 2021, the Kamoa-Kakula joint venture has generated an excess of US$1.8 billion of net cash from operating activities. This has funded both the Phase 2 and Phase 3 expansions to date. With the completion of Phase 3, which includes additional mining areas, an additional 5 million t/y concentrator, a power project, and a smelter, copper production capacity at Kamoa-Kakula is earmarked to expand to 650,000 t/y from the end of 2024.

The Kamoa-Kakula resource represents a multi-generational opportunity already transforming the DRC mining sector. By the end of this decade we expect to have four concentrators and a smelter in full operation, with five underground mines.

Can you expand on your investments in exploration?
In 2023, Ivanhoe commenced an expansive US$19 million copper exploration program on the greater Western Foreland licenses, which includes approximately 70,000 m of combined air core and diamond drilling, as well as ground-based geophysics and soil sampling programs. Work is underway on a Mineral Resource estimate for both the Makoko resource and the Kiala resources. Our unwavering belief is that the Western Foreland harbors the potential for even more deposits of the Kamoa-Kakula magnitude in terms of both scale and grade. Turning south, the Mokopane Feeder, adjacent to the Platreef project, is a gravity anomaly that is four miles long and three miles wide. We think it is the source of the Bushveld Complex and according to Robert Friedland it could be the largest mineral discovery of our species! ■

Pierre Léveillé

PRESIDENT AND CEO
KORYX COPPER INC

Koryx had the Haib Copper License renewed in July. What does this milestone mean moving forward?
The Haib Copper License EPL 3140 has officially been renewed by the Ministry of Mines and Energy of Namibia on July 7, 2023, and is valid for a period of two years from the date it was renewed. We have also had significant support from our stakeholders in the area as for them, renewing the license means we will start employing people on site again. We plan to resume work shortly but first need to raise funds and fix the gravel roads that have washed away since we left the site two years ago.

Can you speak of the advantages of the Haib project?
Haib is a large tonnage low-grade copper deposit with nearly 1 billion t of ore at 0.31% Copper. With the deposit being low grade, it was important for us to find cost-efficient extraction technology. We tested different technologies and the deposit showed to be amenable to bio heap leaching. As the deposit is starting at the surface we have a low-strip ratio of 1.41:1, at a low *capex* of US$340 million for an operation that has an after-tax NPV of US$957 million and an after-tax IRR of 29.7% at a copper price of US$3.00/lb.

We have started assaying for molybdenum with Teck Resources and have realized that molybdenum accounts for approximately 10% of the overall grade. This can increase the copper equivalent grade by at least 10%.

What is Koryx's exploration strategy for the three copper exploration licenses in Zambia?
We have done an additional 1,980 samples at Luanshya West, and are also awaiting assay results from Chililabombwe where we did 140 samples. Further work will be planned for Luanshya West to get started in October 2023. At Luanshya West, Koryx has identified 10 copper anomalies and 13 cobalt anomalies with a peak value of 634 ppm for copper and 558 ppm for cobalt. ■

Errol Smart

CEO
ORION MINERALS

Could you bring our audience up to date with the latest developments at your flagship Prieska copper-zinc project in South Africa?
After completing the BFS in 2020, we were planning to go the traditional financing route of normal debt and equity, which can be very challenging for a junior in the South African environment. Looking for alternatives to unlock the value of Prieska, Orion came up with a different strategy that relies on a "go small to grow big" mantra. Changing our development profile allows us to go into production in the next nine to 12 months, whereas in the original BFS, we had envisioned three years of construction for the massive 2.4 million t/y underground copper ore operation. With the current plan, we can reach the same production threshold within five years, while generating cash, so it is about being more opportunistic and grabbing the low-hanging fruits. On this basis, we secured funding from South Africa's Industrial Development Corporation (IDC), as well as a streaming agreement with Triple Flag, which means the trial mining exercise is fully funded. With this, we will do feasibility optimization to test for different mining methods and determine the initial scale of the starting operation.

Prieska currently has a JORC Mineral Resource of 31 million t @ 1.2% Cu, 3.6% Zn VMS (volcanogenic massive sulfides) resource. Could you give us a sense of the regional upside potential?
The Areachap belt has enormous upside potential. The most exciting project we have been nurturing for some time is Jacomynspan, which is a massive ore body with Ni-Cu-PGE-Au mineralization. We only drilled about 1/7 of the total outcropping ore, and this alone is already 65 million T JORC Resource. But more than exploration, what we are focused on the technology advances to efficiently harvest this sulfide nickel material, which in the past was a metallurgical challenge. ■

Jan Nelson

CEO
COPPER 360

Can you provide an overview of Copper 360 in 2023?
Copper 360 emerged from the amalgamation of two companies, with the primary entity being the Copper company founded by our chairperson, Shirley Hayes. She consolidated a package comprising 12 mines and 60 prospects, securing a single mining license. Through a reverse takeover, we integrated this with a company my colleagues and I were establishing. Our focus was on constructing South Africa's first solvent extraction plant dedicated solely to copper, utilizing neglected rocks which we rehabilitated. This fusion of assets, technical expertise, and engineering capabilities led to our listing on the JSE earlier this year. Copper 360 boasts an ambitious growth trajectory, targeting 30,000 t/y of copper production over the next two years.

Our SX/EW (Solvent Extraction and Electrowinning) plant has been in production for two years processing oxide material left behind by previous miners. It produces about 1,200 t/y of copper. With the recent addition of a new mill and enhanced recovery systems, we are doubling our capacity this year. Additionally, we are completing the construction of a concentrated plant for sulfites from the Rietberg mine, aiming to produce close to 600 t/y of copper concentrate by the end of next year. In 2024, our projections indicate approximately 6,000 t of copper metal, increasing to 20,000 t/y in 2025 and reaching 30,000 t/y in 2026. Despite our focus on smaller, high-grade deposits, our all-in-sustaining cost remains below US$4,000/t. Our strategy of building smaller, modular plants allows for quick start-ups and lower capital costs.

What opportunities will the MRE update at the Rietberg mine?
Thanks to 80 years of work by Newmont and Goldfields, we gained access to a wealth of information. The initial upgrade was substantial, taking us from 5,275 t in 2022 to nearly 80,000 t in measured and indicated categories. ■

Battery Metals

How could Africa become more integrated?

> *Forecasts from various agencies point to a structural deficit for the next five to six years in the lithium market. In the desperate scramble to secure feedstock for conversion facilities, significant premiums are being paid.*
>
> Keith Muller, CEO, Atlantic Lithium

Africa holds 47% of cobalt reserves, 21% of graphite, 85% of manganese, 5% of nickel, and 4% of lithium, as published by the Centre for Strategic and International Studies. Many believe that those figures, especially in lithium, could be even higher. Furthermore, very little is known about the deposits of many rare earths like neodymium, used in NdFeB magnets, which lie within the great continent.

What is different about this new demand-driven cycle is that it attaches mining, an industry that still lives in the public imagination as primitive, dirty, dangerous, environmental harmful, to the new economy shaped by the green transition. The industry is finally seeing more recognition in mainstream media as the "inevitable solution to net zero". With this, the industry has the opportunity to finally show how it has changed, and how it is changing, as the extraction of battery materials creates a new generation of miners that are more technology, ESG, and partnerships-driven.

For Africa, in particular, this turn is significant. Africa is not well-known for its "green" metals. This is because no one looked at these resources before, suggests Jason Brewer, the CEO of Marula Mining, a miner and developer of lithium, graphite and rare earths projects across South Africa, Zambia and Tanzania: "There is an abundance of battery metals in the continent that just have not been the focus of attention but, as soon as explorers start looking into them, they will find them. Those hunting for the best and biggest assets will find them in Africa."

The scale and extent of the continents' mineral base are poorly understood. At the last Mining Indaba conference in Cape Town, geophysical data company Xcalibur Multiphysics signed a partnership with Africa Finance Corporation (AFC) to conduct large-scale geophysical mapping of natural capital projects, prioritizing critical raw materials for the energy transition. Meanwhile, dozens of explorers have been able to define significant resources scattered across the continent, proving Africa's value in the energy transition.

Battery materials are not concentrated in one part of Africa but scattered across the map. Our interviews have taken us to countries such as Malawi and Uganda that are emerging as new mining frontiers, but also to prospective but somewhat forgotten mining places like Zimbabwe, now recognized as the main place for lithium in the continent, and even to the well-known jurisdictions of Ghana, DRC, South Africa and Angola that are proven to hold more than gold, copper or diamonds.

The lithium, graphite and rare earths sector in Africa is mostly made up of juniors and developers, as well as a few quite young producers. Larger companies tend to participate indirectly in this market as shareholders, financiers or off-takers. Recently, DRC-focused lithium developer Tantalex Lithium Resources entered an offtake agreement with Glencore to finance up to one-third of the *capex* requirement for the Manono lithium tailings project. Atlantic Lithium, developing the Ewoyaa lithium mine in Ghana, has 70% of its total *capex* financed by Piedmont Lithium, an Australian miner.

Chinese firms have also consolidated their presence in these critical markets, picking up some of the best projects available. Two of the largest lithium projects in Africa were acquired by Chinese groups: the Arcadia lithium project in Zimbabwe, believed to be one of the world's largest hard rock lithium resources, is now owned by Zhejiang Huayou Cobalt after the Group acquired it from Australian junior Prospect Resources. The 10.8 million t Bikita lithium mine, also in Zimbabwe, was bought by Chinese conglomerate Sinomine Resources Group earlier in July.

Many of these financed developers are integrating forward, defining a resource, and then developing processing solutions. By doing so, they are building completely new value chains that have long been consecrated to China. The value-addition opportunity is huge. According to an interview with the CEO of AFC published by Politico, exporting raw materials such as cobalt, lithium and nickel has a net value of about US$12 billion, but if Africa can move to battery and cathode production, the value jumps 20 times to US$240 billion. Osam Iyahen, senior director for Natural Resources at the AFC said: "It is a catch-22 situation because developers might go for the tried-and-tested model of shipping to China, where they have a captive off-take market and a mature processing environment with guaranteed returns rather than taking the risk of building the processing facility. As an African-based organization, we can take that downstream processing risk. In Gabon, for instance, we are building a smelter to achieve full value chain integration for manganese. Without that layer of beneficiation, the ore would be shipped to China or other jurisdictions with adequate beneficiation capacity. Most investors want to do the same, but they do not have the right means, so by partnering with AFC they gain institutional and political cover."

Just like an explorer goes from defining the potential to determining the feasibility, the next question we need to address is "Can beneficiation be done locally?" Remi Piet, co-founder and senior partner at Embellie Advisory, a boutique consultancy specializing in socio-political risk mitigation for mining companies in emerging markets, helped us unpack the challenges: "Though there is a consensus on the potential, the feasibility of developing full battery ecosystems is tricky. First, what EV technology will attract the most investment remains to be seen. Then, jurisdictional risk remains a significant factor at play. Other significant limitations are the lack of expertise in downstream processing, as well as unreliable energy inputs. Investments in EV mineral projects must be coupled with international partnerships to really nourish downstream value creation. But, so far, we have not seen any regional answers."

The navigation of these aspects noted by Piet is giving rise to a new brand of mining companies, increasingly more integrated, both vertically but also with partnering organizations, and that holds much-sophisticated knowledge to transform the material extracted from the ground. In particular, for rare earths project developers, creating an integrated extraction-to-processing structure has been the rule rather than the exception. "Rather than a pure mining play, I see Ionic Rare Earths as being at the forefront of working with the supply chain on providing both primary (mined) and secondary (recycled) sources of feed for the Western supply chain to emerge," said Tim Harrison, managing director and CEO of Ionic Rare Earths, the developer of the Makuutu project in Uganda.

Ionic built a permanent magnet recycling demonstration plant in Belfast to process end-of-life magnets into high-purity magnet rare earth oxides (REOs), as it wants to provide both primary raw materials from the mine in Uganda, as well as secondary sources using its patented technology. ■

Lithium

The Cathode

With LFP (lithium-ion-phosphate) cathode batteries continuing to dominate the battery sector, lithium prices had a very strong run in the last two years. After hitting all-time highs at the end of last year, lithium carbonate and hydroxide prices started to fall in 2023, a correction that was expected, and, in some ways, even welcome. Lithium stocks remain robust yet volatile positions, with demand poised to outpace supply in the coming years. When that happens is uncertain, with various sources indicating different timelines. Fitch Solutions says supply will enter a deficit in 2025, – EV sales will reach 13.3 million this year but will jump to 30 million by 2030, says S&P Global.

"Forecasts from various agencies point to a structural deficit for the next five to six years in the lithium market. In the desperate scramble to secure feedstock for conversion facilities, significant premiums are being paid. This will continue unless substitutes are found, and there is already interest in sodium batteries emerging as alternatives for lithium-ion," said Keith Muller, the newly appointed CEO of Atlantic Lithium, which is developing one of the most advanced lithium projects in Ghana.

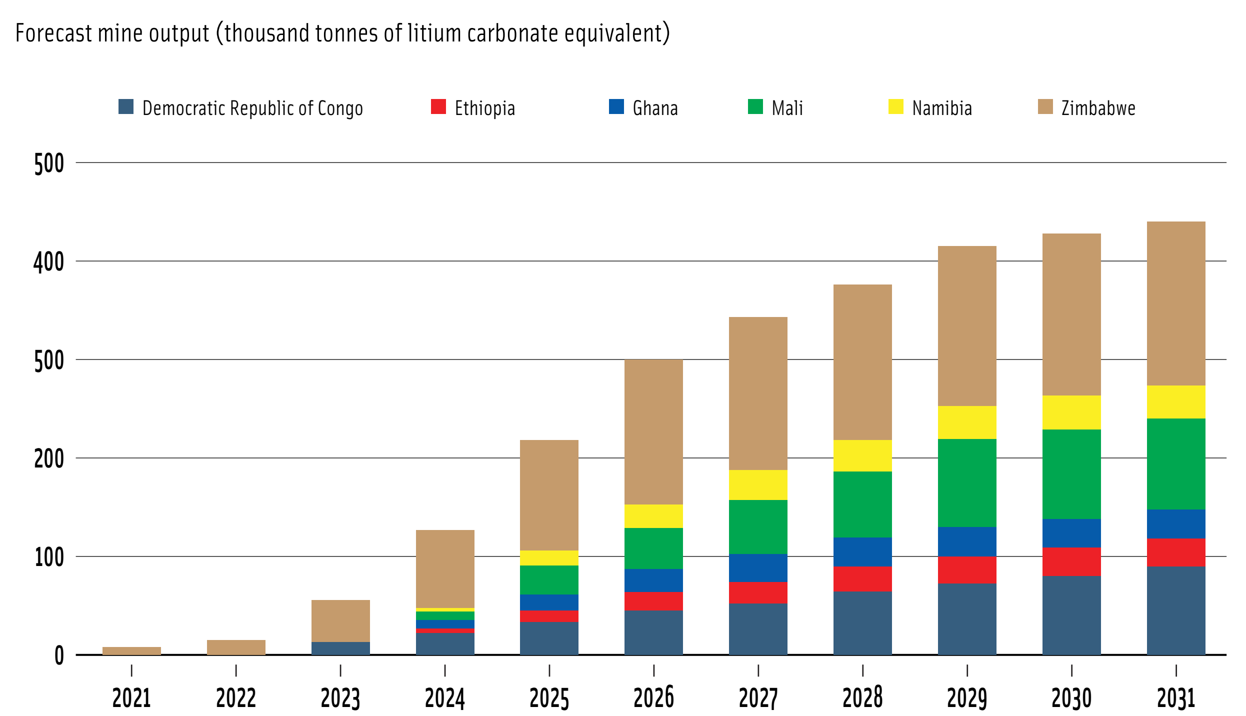
Muller believes it will be healthy for the lithium market to stabilize so that alternatives do not become more attractive. "As an industry, we must work together, aligning converters and investors, to bring lithium molecules – be it spodumene, petalite, lepidolite, and brines - into the market. If we don't plug this gap, there is a risk of substitution," he said.

Africa has a dozen or so lithium projects at various stages of development across Central, West, and Southern Africa, which give the continent a diverse and attractive pipeline moving forward. In West Africa, Atlantic Lithium has published the DFS for the Ewoyaa project in Ghana, defining 3.6 million t spodumene concentrate production over a 12-year LOM. In Mali, two projects, Bougani lithium developed by Kodal Minerals, and Goulamina lithium developed by Leo Lithium, are currently underway. While Kodal is unfazed by the new mining code instituted in the country, Leo Lithium went on a voluntary trading halt in relation to the application of the new mining law, without giving away more information on the suspension.

In Central Africa the former Manono tin mine on the Kibaran belt in the DRC has given birth to two company-making projects: the Manono project, developed by ASX-listed company AVZ Minerals, and the Manono Tailings project, developed by Canadian Tantalex Lithium Resources.

Southern Africa sees the most activity with the largest number of projects concentrated in Zimbabwe: The Bikita lithium mine of Sinomine Resource Group, the Arcadia lithium project of Zhejiang Huayou Cobalt, and the Zulu mine of Premier African Minerals, among the largest. Namibia also hosts multiple projects under development. Most are brownfield. These include the tantalite and petalite deposit of Karibib, developed by Australian company Lepidico, and the Uis mine, where Andrada Mining is extracting lithium concentrate. In South Africa, London-listed Marula Mining has started processing stockpiles at the Blasberg lithium mine and, fully funded, is preparing to move into the hard rock operation.

Forecast mine output (thousand tonnes of lithium carbonate equivalent)
Source: Financial Times



The focus of many of these developers has been to speed up to early production, taking advantage of the high lithium prices. Many have adopted Lego-like processing facilities that allow them to process easily available concentrates. For example, Atlantic Lithium opted for a DMS (dense media separation) processing plant, so that it could start production and generate revenue before financing the construction of the main DMS plant. "Generating cash flow from an initial production phase also helps us close our funding requirement, while fast-tracking production allows us to capitalize on the high lithium prices while they last," said Keith Muller, the CEO.

Beyond demonstrating the viability of extracting and processing lithium, some companies are also looking at the next step. Over in Namibia, Lepidico is building a "proof of commercialization" chemical conversion plant in Abu Dhabi where it will convert lithium mica concentrate into lithium hydroxide. In its five-year growth strategy, Lepidico is looking to connect the upstream from the Namibian mine (Karibib) to the downstream in UAE, with a view to "get to free cash generation as quickly as possible, and, in doing so, demonstrate the commercial viability of our process technologies," as Joe Walsh, managing director at Lepidico told us.

"We know that the mineral concentrator in Namibia readily lends itself to expansion, and we are already expanding our resource base in the Karibib region to support that expansion. For this additional mineral inventory, we are already looking at a phase two chemical plant where we currently have two concepts. The first is a sister plant to the one that we are building in Abu Dhabi at a similar scale of approximately 5,000 t/y of lithium hydroxide output; or a larger plant that has a capacity of up to 20,000 t/y. Realistically, to be able to achieve that, we would need to secure other third-party sources of lithium mica concentrates. Over the last year, we have seen a significant increase in third-party interest with unsolicited inquiries about our technology and our ability to process third-party concentrates. Having a larger phase two plant would see Lepidico developing the world's first global market for lithium mica concentrates outside of China," Walsh explained.

Developing companies in the lithium space must think from an early stage about the end-use of the raw materials extracted, something that the mining industry has not traditionally been involved in beyond ensuring economic grade. The new focus on technology, which requires miners to think like chemists, creates additional risks and brings the industry into unfamiliar territory. For that reason, brownfield, ready-to-mine, albeit smaller projects, are becoming more attractive, since they compensate for the risk of early-stage exploration. Marula Mining is a notable example; the company is exclusively focused on identifying projects that can be brought into production in a 9-to-12-month timeframe, as it has done with the Blesberg lithium project. Now, Marula can safely move into the next phase, having started to process spodumene into carbonate from Blesberg at a test facility in Johannesburg. It wants to establish a standalone processing plant with an initial capacity of 2,400 t/y, which can later be boosted to 12,000 t/y. This would produce about 1,200 t/y lithium carbonate.

The lithium, but also graphite and rare earths sectors, are changing the nature of junior companies, who are becoming more entrenched in secondary processing rather than pure exploration. However, that focus may create blind spots in finding those greenfield elephant deposits that require years of traditional exploration work. ■

> *The DRC has one of the biggest lithium reserves in the world. I believe we will see significant investment in the Manono area, which positively impacts not only the mining industry but also the social and economic development of the region.*
>
> Landry Meya, CEO, Akata DRC

HN

Hadley Natus & Eric Allard

HN: CHAIRMAN
EA: CEO
TANTALEX LITHIUM RESOURCES

Can you discuss Tantalex Lithium Resources' (Tantalex) recent highlights and outline the main takeaways from the PEA at the Manono tailings project?

HN: In January, we brought out our MRE, followed by a positive PEA in October, and recently we closed on a strategic financing with Glencore for US$5 million and a third of the *capex* required for Manono. We plan to keep this pace up in 2024, release our FS in Q2 2024, and have the project fully funded before the end of the year.

EA: The main takeaway from the PEA is that the project will have an initial production of 112,000 t/y of spodumene concentrate (SC6), and we are confident we can increase the current six-year mine life with additional resource definition works in 2024.

What synergies will the deal with Glencore unlock for Tantalex?

EA: This deal with Glencore is a big de-risk to the project. We do not have the mining risk – as it is a tailings project – and now we reduced our sales and marketing risk through that partnership with Glencore.

How did operations unfold at the TiTan plant and the Pegmatite Corridor project?

EA: In 2023, we put a lot of effort into building our TiTan tin and tantalum alluvial plant located about 40 km south of Manono. TiTan is the most modern alluvial tin and tantalum concentrate plant in the DRC and our provincial and community stakeholders have taken a big role in bringing this project to realization.

What is the potential for Manono to become a major lithium hub in Central Africa?

HN: Looking at players coming into Manono now – AVZ, Zijin, ERG – it will become Kolwezi 2.0. These are not small names, and it is because the material is there. In one area in Manono across 2.5 km, you have a 400-million-t resource at 1.65%, most likely the largest undeveloped resource in the world. Lithium-wise, the DRC has the potential to be far bigger than Australia. ■

Joe Walsh

MANAGING DIRECTOR
LEPIDICO

Can you give an update on Lepidico's activities over the past year?

Lepidico has completed front-end engineering and design and we have started the detailed design and engineering phase for our integrated project, where we are redeveloping two open pit mines at Karibib in Namibia for their lithium potential, and building a new mineral concentrator that produces a lithium mica concentrate for export. This export product will be shipped to Abu Dhabi where we are building our proof of commercialization chemical conversion plant, which will convert the lithium mica concentrate into lithium hydroxide, along with cesium and rubidium which are also on the US government's critical minerals list, and three saleable bulk byproducts: SOP fertilizer, an amorphous silica which goes into construction, and a gypsum residue. Extracting these six products means that our chemical conversion facility will produce no solid process waste, making it an extremely sustainable process.

What are Lepidico's objectives with its chemical conversion plant?

We know that the mineral concentrator in Namibia readily lends itself to expansion, and we are already working on expanding our resource base in the Karibib region to support that expansion. For this additional mineral inventory, we are also already looking at a phase two chemical plant where we currently have two concepts. The first is a sister plant to the one that we are building in Abu Dhabi at a similar scale of approximately 5,000 t/y of lithium hydroxide output; or a larger plant that has a capacity of up to 20,000 t/y. Having a larger phase two plant would see Lepidico developing the world's first global market for lithium mica concentrates outside of China.

Can you speak to the operating environment in Namibia?

The country has a well-functioning Chamber of Mines, and there is a robust mining law. Namibia has a reasonable landmass, but a tiny population of approximately 2.6 million people. In Namibia, we have good access to government and decision-makers within the ministries. ■

Graphite

The Anode

"We are foreseeing a material deficit soon, primarily around 2026. This projection is in line with the current modest deficit in graphite supply, but it is expected to grow substantially, outpacing even the deficit in lithium supply."

Tom Revy, Managing Director, Evion Group

Synthetic graphite, produced from crude oil, makes up about 90% of the market share of the graphite used in batteries, based on data from Verified Market Research. But rising concerns over emissions associated with the production of artificial graphite, together with technological developments in the production of natural graphite at high purities, creates room for more growth in the supply of battery-grade natural graphite. This will transform the graphite mining sector, which has historically produced the mineral for industrial uses like steel.

Africa already has a strong footprint in graphite production, supplying 9% of the world's material. However, the production of graphite for battery use is a new game that not every graphite producer can play. While there is no shortage of graphite deposits in the world, there is a shortage of economic graphite, or those materials that are both of high quality and can be extracted at low costs. Thankfully, Africa affords both that low-cost environment and remarkably high purities. For example, Madagascar is particularly renown for the some of the highest purity and largest graphite flakes in the world, as well as being the second-largest graphite producer after China, though by a large difference. Last year, China produced 850,000 t, while Madagascar produced 170,000 t. But Madagascar jumped from fifth place to second place between 2021 and 2022, thanks to new capacities. More capacity is coming.

One of the new mines entering production this year was NextSource's Molo, which announced first production in June. At the first phase, which is fully financed, NextSource will produce at a nameplate capacity of 17,000 t/y, but it wants to ramp up to 150,000 t/y after a Phase 2 development – this would be the largest mine in the country.

The ability to scale up by almost nine times is down to the modular platform that NextSource has chosen. The mine was built offshore, dismantled, and then shipped and reassembled in Madagascar. The construction in Madagascar took 45 days. The company is among the few to develop a fully integrated ecosystem to supply its Superflake graphite into the battery chain: First, it has secured two off-takers, one with Thyssenkrupp and another with a Japanese anode material supplier that has the expertise to upgrade the material into coated, spheronized purified graphite (CSPG) for battery use.

NextSource announced the building of a battery anode facility in Mauritius as part of a JV with its partners. The plant will be modeled after an existing one in China, from where the current Japanese partner sources the material. All of these steps are time-consuming and require a collaborative approach, as well as testing at different stages, which is why the battery-grade graphite supply will take a long time before it can respond to the imminent demand.

Early-stage players are also thinking about developing integrated downstream graphite value chains. Evion Group, which listed on the ASX five years ago, has two graphite projects in the southern region of Madagascar, where it identified feldspar sediments with graphite intrusions. "Our aim has never been limited to mining; we have been committed to downstream processing as well," said Tom Revy, the company's managing director: "This integrated approach, from exploration to downstream processing, has become increasingly crucial in today's market, given its ability to navigate the complexities of capital markets effectively. The minerals in the ground dictate the products we can create, which means we cannot simply change a product's characteristics during downstream processing."

The company has a project in India to transform the flake material into higher-value products and is looking at a PFS for a battery materials plant in Europe. Other significant projects in Madagascar include Graphmada, operated by Greenwing Resources, but also the Sahamamy and Vatomina graphite projects owned by Tirupati Resources Mauritius (TRM). Besides Madagascar, Mozambique and Tanzania stand out. Mozambique hosts the continent's largest graphite mine, Balama, owned by Australian company Syrah Resources, which also has an active anode material facility in the US to process the feedstock. In terms of development projects, Magnis Energy is advancing the 174 million t (estimated) Nachu project, expected to produce 236,000 t/y of graphite flake, while EcoGraf estimated a total reserve of 128 million t at the Epanko natural flake graphite project, which could produce another 300,000 t/y and link up to a battery anode facility in Australia. A similar project is Bunyu, also developed by an Australian company, Volt Resources. Bunyu could process 400,000 t/y from the 127 mineral reserves found in Eastern Tanzania. Volt has an interest in a Ukrainian processing facility, from where it can export to neighboring markets in Europe.

As can be observed from the examples we have mentioned, anode facilities linked up to the processing of graphite anode material from Africa are being built around the world. The only African country that will see this development done locally is Mauritius, with the investment planned by NextSource. For now, Africa continues to rely on the specialized expertise of other countries but, as more African miners become ingrained in that knowledge, African countries must be ready for the knowledge transfer by providing the necessary infrastructure and regulations.

Geert Klok, chairperson of the board for the Chamber of Mines of Mozambique (CMM), commented: "Companies will require access to affordable financing, whereas with interest rates of around 30% loans are very expensive in Mozambique. We would also require an industrial policy to support the growth of an advanced mining sector, together with both soft (people) and hard (roads, energy) infrastructure, which are lacking." ■

Rare Earths

Africa in an ABC (Anything But China) Strategy

> *"The West wants our rare earths product, but they are legislatively stagnant which is hindering investment into Africa. Secondly, the transport of the same volume of material over the same distance to the US or Canada is double the price than what it would be to Hong Kong."*
>
> Graham Soden, Director, CEO and Mine Manager, Steenkampskraal

The current furore around rare earths (REE) gives unmistakable déjà-vu. The most attractive of 17 rare earths, including neodymium, praseodymium, dysprosium and terbium, have seen impressive price gains in the last few years. The last time this happened was in 2011, when China put an embargo on REE exports, sending prices skyrocketing and everybody looking to resurrect old projects or discover new ones. However, once China lifted the export limits a few years later, prices came back down and most projects outside of China died out. The world returned to the status quo – a dependency on Chinese supplies. Fast-forward to the present day, this time around there was no need for China to curb supply for the market to react. Fears of disruption alone have been enough to cause a new wave of demand, or, more specifically, the reawakening of an old need: For a REEs supply chain outside of China.

China controls the REE market to a fault, supplying over 90% of the world's rare earths. But China did not always pull the strings. In the 1980s, 99% of REE supply came from the US, according to The Institute for Defense Analyses, an American NGO. Producing nations like the US, France and Japan transferred much of their production to China to benefit from lower costs. In 1997, a consortium of mostly Chinese companies bought Magniquench, the largest REE company in the US at that time. Gradually, China grew into a monopoly, effectively dictating prices and driving out competition. Following the 2011-2014 Chinese export quotas, most Western competitors collapsed, unable to compete as China was flooding the market with cheap products. Molycorp, the last remaining major REE producer in the US, went bankrupt in 2015, left with a US$1.7 billion debt for a half-finished processing facility; the company was rescued by a consortium headed by Chinese Shenghe Rare Earth Company.

Over 400 REE ventures that attempted to diversify supply from China failed between 2010 and 2020, according to a report by Perry World House (University of Pennsylvania). The only American REE producer left is MP Materials, operating the Mountain Pass mine in California. In Australia, Lynas is the main REE producer that survived. In Europe, Canadian-listed Neo Performance Materials operates the only separation plant for REEs, in Estonia. Recently, Swedish state-owned LKAB discovered the largest deposit of REEs in the continent, though environmental permits are to be a challenge in bringing the project to production. Currently, there is no mining of REEs in Europe.

The appetite for creating an REE supply chain outside of China is more ravenous than ever. Unlike a decade ago, rare earths are recognized by most states as "critical" metals. Neodymium and other rare earths are required to make wind turbines and permanent magnets for batteries, with demand projected to spike in the coming years. The current market for REEs is expected to more than double in 10 years from its current value of US$9 billion, according to Project Blue, a market intelligence company. Much of this growth comes from the renewables and battery storage markets. But the biggest motivator for REEs is China's risk factor. The policy to strengthen America's rare earth supply chain is one of very few that both US Presidents Donald Trump and Joe Biden broadly agreed upon. The EU also earmarked REEs as a priority in its recent Critical Raw Materials Act, which aims to see no third country supplying more than 65% of any strategic raw material.

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Asimwe Kabunga

CHAIRMAN
LINDIAN RESOURCES

Could you share the outcomes of the Phase 1 drilling program at Kangankunde? What is the focus of Phase 2?

The Phase 1 drill program of 10,000 m has been completed safely, ahead of time and on budget and it has been a very successful program. The assays have delivered some very high grade total rare earths oxide (TREO) intersections that are very broad, and these results conclusively prove that Kangankunde is what we knew it to always be - a rare earths asset that will rank amongst the world's very best.

In terms of the Phase 2 drill program, we are drilling two very deep diamond drill holes where the focus is to test the depth of mineralisation at Kangankunde.

How does Kangankunde compare to other rare earth assets in Africa?

In our view there isn't a direct comparison to among the other rare earths projects in Africa, because Kangankunde is singular in terms of grade and scale. There are also some other key defining characteristics that set it apart, starting with the fact that the rare earths mineralisation at Kangankunde is non-radioactive.

We think Kangankunde is a standout example of a project in Africa that has the potential to play a central role in global rare earths supply, and that may act as a catalyst for further investment in Malawi and other African jurisdictions – signs of which are already starting to emerge.

Could you us on the recent developments at your bauxite assets in the Northern Territory, in Guinea?

In May we signed a six-year Supply Agreement for the Gaoual bauxite project with a China-based conglomerate. This brings real balance sheet strength to our bauxite operations and will help fast-track the development of Gaoual. We are also actively advancing our other bauxite assets in Guinea, starting with the Woula project, which holds 19 million t and is located close to port facilities. ■

Tim Harrison

MANAGING DIRECTOR AND CEO
IONIC RARE EARTHS

What have been the main highlights at Makuutu in the past 12 months?

Our Makuutu Rare Earths project in Uganda is the world's only development-ready ionic adsorption clay (IAC) magnet and heavy rare earths project with its product available for Western consumers.

In late 2022, the Makuutu Environmental and Social Impact Assessment (ESIA) was approved by Uganda's National Environmental Management (NEMA) and we have had tremendous support from the government and the local community for the project. In early 2023 we completed the stage 1 feasibility study on RL1963, the first tenement progressing to a Mining Licence Application (MLA) at Makuutu. The stage 1 study showed a low capital development and long-life asset potential producing a magnet and heavy rare earths basket. In total, we have another five tenements which are also progressing toward development.

Post completion of the MLA, the government gave approval to start work on the project's demonstration plant, now in construction and expected to commence producing mixed rare earth carbonate (MREC) products later in 2023. We are also progressing well in securing land access agreements for the land associated with our MLA.

How have operations unfolded at Ionic Technologies?

Over the past 12 months, we have received several grants with strong support from the UK Government. We built a permanent magnet recycling demonstration plant in Belfast where we are now sustainably processing end-of-life magnets into separated, high-purity magnet rare earth oxides (REOs). We recently announced partnerships with UK-based metal and alloy manufacturer Less Common Metals (LCM), and magnet supply chain engagement with the products now being used by Ford for the potential use in electric motors to be manufactured at their Halewood plant in the UK.

How has the new Mining Act reshaped the operating environment in Uganda?

Uganda implemented a new Mining Act in 2022, and we have been working with the Government to get the updated regulations in place to reflect the changes in the Act. ■

Mark Billings

EXECUTIVE CHAIRMAN
AUXICO RESOURCES CANADA

What were Auxico Resources' main achievements in 2023?
Auxico Resources Canada Inc. (CSE: AUAG, OTCQB: AUXIF) achieved significant milestones in 2023. In the DRC, we successfully exported approximately 1,000 t of rare earth concentrates through a sales agency agreement with Central American Nickel; this positions both companies as key players in the global rare earth market. Looking ahead to 2024, our goal is to expand these exports. In Colombia, we secured the necessary environmental licenses and permits to enter into small-scale production, with a final export license in progress.

Can you elaborate on your vertical integration strategy to navigate current capital markets?
While selling concentrates is profitable, the real potential lies in processing and refining these minerals, constituting 80% of the industry's profit. Unlike traditional approaches, we have separated mining and processing, choosing to conduct the latter in Canada, particularly in Québec, pending certain government support.

Our current strategy involves utilizing pan concentrates from artisanal miners in the DRC, yielding a remarkable 60% total rare earth oxide, and grades up to 16.92% neodymium and 4.12% praseodymium. These exceptionally high-grade monazite sand-hosted concessions and an efficient separation process with minimal capital and operating costs, position us as one of the most cost-effective operators in this space. Our goal is to create a high-value end-product through a strategic partnership between Canada on one side, where further processing and refining would take place, and Colombia and the DRC on the other side, as key supply sources. Looking ahead, we are exploring partnerships to establish critical mineral refining capabilities in Canada and other locations. This not only contributes to national security but also mitigates dependence on a single source, aligning with our commitment to solving supply chain vulnerabilities. ■

Darrin Campbell

CEO
NAMIBIA CRITICAL METALS

What have been the main highlights for Namibia Critical Metals over the past year?
Namibia Critical Metals continues to develop our Lofdal heavy rare earth project, which is a globally significant deposit of dysprosium and terbium; critical metals used in the production of permanent magnets used in EV motors and wind turbines. The project is fully licensed with a 25-year mining license and is development funded under our joint venture with the Japanese government agency JOGMEC (Japan Oil, Gas and Metals National Corporation). JOGMEC has completed term two of their earn-in and now owns 40% interest in the project, and they are currently spending another C$$10 million to earn another 10% interest. Over the past year, we have significantly advanced with the start of a pre-feasibility study (PFS) which is fully funded by JOGMEC. We are currently in the middle of pilot plant flotation and hydrometallurgical testing with SGS Canada to finalize our flow sheet and improve on efficiencies that were put out in the preliminary economic assessment (PEA) in November 2022. We expect to deliver the PFS by mid-2024.

Namibia Critical Metals also announced the formation of the Rare Earth Alliance Namibia (REAN), which is a joint venture with two other rare earth companies: E-Tech Resources, which is exploring the Eureka monazite deposit in central Namibia, and Ondoto Rare Earth, to conduct a feasibility study on a rare earth separation plant in Namibia. We are investigating the feasibility of building a separation plant that can handle the throughput of all three of our projects to separate into individual rare earth metals directly in Namibia.

What differentiates Namibia as a mining jurisdiction?
Namibia is a huge country with an extremely small population, making it perfect for exploration. There is a well-established mining sector and the country has a well-established regulatory framework.

From day one, we made it a key priority to fully engage with the community and provide as much support as we could. We have addressed several issues, including funding a local orphanage in a nearby town. ■

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Within this puzzle, Africa offers an attractive hunting ground for REE reserves. Out of the total 120 million t REE global reserve, China represents about 44 million t (37%), and Africa, only 4 million t (3,3%), but current discoveries are believed to represent only the tip of the iceberg. Besides low discovery and production costs, short development timelines, and high grades, features that have allowed Africa to become a significant player in the global mining of other resources, in the REE space, Africa brings something else: Variety, which might be just what the world needs to battle Chinese hegemony.

REE deposits are most abundantly found across the eastern and southern parts of Africa, with five countries standing out for holding half of the known REE deposits, according to the Institute for Defense Analyses. These are Mozambique, Angola, South Africa, Namibia and Malawi. Other countries with known activity in the REE space are the DRC, Uganda and Tanzania. One of the highest-grade rare earths (REE) deposits in the world is Steenkampskraal, found in the Western Cape province of South Africa. The asset had been mined by Anglo American in the 1960s, before being put to bed due to the lack of demand for REEs. Another attempt at reviving the project was back in 2011, but the subsequent fall in prices saw its former owners, Great Western Minerals Group, filing for insolvency. Steenkampskraal is finally to produce its first concentrate in 2024.

Similar to Steenkampskraal, Kangankunde is another top-tier rare earths deposit from the 2011 era. Then, it belonged to the Australian company Lynas, but it was recently bought by a smaller Australian player, Lindian Resources. Lindian's share price grew by more than 1,000% in a year following the acquisition. The proud owners of the Malawi project call Kangankunde "the King": "There is no direct comparison among the other rare earths projects in Africa. Kangankunde is singular in terms of grade and scale. The best comparisons to Kangankunde are most likely the Mount Weld mine in Western Australia and The Mountain Pass mine in California," said Asimwe Kabunga, chairman of Lindian, which recently declared a mineral resource estimate (MRE) of 261 million t at 2.19% total rare earth oxides (TREO).

Besides sheer size, the best positioned for success are those mines that can be brought fastest to production. Africa only had one REE mine, the Gakara high-grade, low-volume rare earths project in Burundi, operated by Rainbow Rare Earths until 2021, when production ceased at the request of the government. While the company seeks to solve the dispute with the government, it has also diversified to other projects in the continent, focusing on the flagship Phalaborwa Rare Earths project in South Africa. The PEA released by the London-listed company at the end of 2022 showed the mine could deliver over 26,000 t of separated magnet rare earth oxides for 14 years. The PFS is now underway.

While the majority of projects in Africa contain mostly light REEs, very attractive are the two heavy rare earth projects: Lofdal, of Namibia Critical Metals, and the Makuutu Rare Earths project in Uganda, of Ionic Rare Earths. Lofdal is described by its developers as the "world's only development-ready ionic adsorption clay (IAC) magnet and heavy rare earths project with its product available for Western consumers." Similarly, Namibia Critical Metals CEO Darrin Campbell differentiates Lofdal as "as one of the largest deposits in the world of the truly rare earth metals dysprosium and terbium outside of China."

Heavy REEs include scarcer and more expensive elements like dysprosium and terbium, used in the fabrication of EV motors and wind turbines. Both projects are well-advanced. Namibia Critical Metals is fully licensed and is preparing to deliver a PFS by mid-2024, while Ionic obtained ESIA approval, completed in early 2023 a Stage 1 FS on the first tenements, and is working on a demo plant to produce mixed rare earth carbonate (MREC).

Even as more mines in Africa prepare to start production in 2024 and later, these are only the seeds to growing a new REE supply chain. An REE deposit alone is not enough without the required financing and processing expertise to extract the independent earths. In terms of financing, more governments are stepping up. Lofdal is funded through Japanese JV partner JOGMEC (Japan Oil, Gas, and Metals National Corporation); Rainbow received US$50 million from the US government. However, even with the financing to produce concentrate or carbonate at the site, China still controls nearly all processing for REEs. While the mining, crushing, grinding, and production of a concentrate, and extraction of REE from mineral concentrate to produce a mixed total rare earth oxides compound takes place at the mine site, the separation process and the end-use manufacturing of magnets and other products are dominated by specialist Chinese companies. Lynas is an exception, processing in Malaysia. Catching up on the knowledge that China perfected over 20 years is the biggest obstacle to a diversified REE supply chain.

"The challenge is that the West wants our product as it is of high grade, but they are not breaking down our doors as they are very legislatively stagnant, which is hindering investment into Africa. Secondly, the transport of the same volume of material over the same distance to the US or Canada is double the price than what it would be to Hong Kong. For these reasons, from an economic perspective we would consider selling our product to the East in favor of selling to the West," commented Graham Soden, director, CEO, and mine manager at Steenkampskraal.

Other projects have already taken the easier route of shipping to China. For example, Peak Rare Earths, developing the high-grade Nguella project in Tanzania, will supply NdPr to Chinese company Shenghe, the largest importer of rare earths in China and its largest shareholder. Construction is expected to be completed in 2026. But others are developing the technology outside of China. For instance, Auxico Resources, a Canadian company with diversified assets in Colombia, Bolivia, Brazil and the DRC, has exported approximately 1,000 t of rare earth concentrates obtained from artisanal miners in the DRC and sold through a sales agency agreement with Central American Nickel. Moving forward, it wants to mechanize the operation and grow exports to 1,000-1,500 t/month: "Our goal is to develop a rare earth processing facility in Canada using proprietary and environmentally friendly ultrasound technology to produce high-grade elements such as neodymium or praseodymium. While selling concentrates is profitable, the real potential lies in processing and refining these minerals, constituting 80% of the industry's profit. Unlike traditional approaches, we have separated mining and processing, choosing to conduct the latter in Canada, particularly in Québec, pending certain government support," said Mark Billings, executive chairman of Auxico Resources Canada.

Currently, no company in Africa is developing or planning to develop mid-stream processing within the continent, reported the African Development Bank (AFDB). According to the bank's assessment, except for South Africa, all other potentially endowed African nations have exceptionally low capacity along the value chain. The size of a project also conditions local processing, for only a large deposit would justify the construction of expensive local facilities. To raise the prominence of REE players in Namibia, three REE companies (Namibia Critical Metals, Tech Resources and Ondoto Rare Earth) formed the Rare Earth Alliance Namibia (REAN). "One of the challenges most rare earth projects have is that most of them are relatively small deposits, and the options of where to send your product for final separation are very limited, mostly to China. We are investigating the feasibility of building a separation plant that can handle the throughput of all three of our projects to separate into individual rare earth metals directly in Namibia," said Darrin Campbell, the CEO of Namibia Critical Metals.

If the variety of Africa's REE projects can be brought closer together into clusters, Africa could finally see itself going beyond mining, something that it has not always managed with other metals. ▪

Diamonds

Are diamonds still forever?

"Diamonds are forever," said the genius marketing campaign of De Beers, a diamond company, in 1947, connecting the gemstone with love and marriage. From there on, a diamond ring has become the quintessential item for popping the question, a symbol of status, romance and luxury. Today, the diamond jewelry market is valued at US$86.5 billion, but generational and cultural shifts, together with the emergence of the lab-grown diamond industry, threaten the natural diamond market, pushing for changes all the way to the back of the value chain – diamond mining, most of which is in Africa.

2023 has been a tough year for the natural diamond sector. Prices for polished diamonds dropped by about 20%, causing rough diamond prices to plunge by 35%. Diamond companies, which tend to be vertically integrated, registered big losses. De Beers, the largest player in Africa and second-largest globally, with operating mines in Botswana, Namibia, South Africa and Canada, saw its revenues drop to US$2.8 billion in the first half (H1) of 2023, which is US$800,000 less compared to the same time last year. Lucara, a Canadian diamond producer out of Botswana, achieved revenues of US$56.9 million in H1 2023 against US$49.9 million in H1 2022. Similarly, London-listed Petra Diamonds, with mine sites in both South Africa and Tanzania, reported a 42% drop in revenue for the full financial year of 2023, while its UK peer Gem Diamonds, which mines out of the Letšeng mine in Lesotho, shed 28% of its revenue in the first two quarters of 2023.

Typically, the industry does not intervene in supply dynamics, but in an unusual move, the highly concentrated global diamond industry took OPEC-style measures to choke off supply and lift prices. The two biggest diamond companies, Russian state-owned company Alrosa and its main competitor, Anglo-American-owned De Beers, both limited diamond sales. Alrosa stopped selling diamonds for two months, while De Beers allowed its customers to refuse purchases without impacting future allocations, against its usual policy. India also self-imposed a halt on imports. These measures have, so far, worked, with prices expected to continue improving as the holiday (and engagement) season unfolds, from Thanksgiving to the Lunar New Year and Valentine's Day.

While profits in the natural diamond market were free-falling, man-made diamond companies saw higher sales, even as prices were also affected by a hawkish economic environment. Lab-grown brands like Brilliant Earth or Dorsey reported gains in their recent financial statements.

The lab-grown diamond industry is only the challenger, not the challenge. The real issue is in the underlying cultural currents that make synthetic diamonds more appealing: Customer values are shifting, favoring inclusiveness over exclusiveness, transparency over exotic stories of stone origin, and experiences over luxury belongings, all of which favor the desirability of lab-grown diamonds. Until recently, the lab-grown market has mostly focused on the price argument, but now it can also win a symbolic battle, posing lab-grown diamonds as democratizers of something consigned to the wealthy alone, or by making claims of more ethical and sustainable sourcing.

Diamond mining is at the mercy of a consumer-driven market. What consumers in the three largest diamond markets, the US, China and India, think about

> *Blockchain technologies are set to play a crucial role in ensuring the traceability of natural diamonds. An encouraging development in this area is the recent collaboration between De Beers and Sarine, involving De Beers's blockchain Tracr system and Sarine's 'diamond journey' technology.*
>
> Richard Duffy, CEO, Petra Diamonds

diamonds impacts the whole industry, but there is still much that can be done at the African mining site and throughout the diamond value chain to support the industry.

For instance, more diamond buyers ask about the origin of their stone, and the focus on origin grew amid US sanctions on Alrosa, the Russian diamond giant, fast-tracking more source-verification and traceability programs. With 66.4% of the world's rough diamonds coming from Africa, different countries in the continent fall into the spotlight. In countries like the Democratic Republic of the Congo, Angola, or Mozambique, some diamonds continue to be smuggled illegally, with approximately 30% of the revenues lost to the black market, according to the African Diamond Council. The industry needs to work with governments to clean up supply and develop stronger local value chains. Gaborone in Botswana and Kimberly in South Africa are emerging as alternative hubs for diamond cutting, in competition with Dubai, Antwerp, Tel Aviv and Surat, in India. The more diamonds are polished in Africa, the shorter the trip and carbon footprint to the end market, something that aligns with environmentally conscious buyers.

Smaller gemstone companies like the Kenyan Porini Gems are following in the footsteps of bigger companies, choosing to integrate backward and gain better control, and transparency, over the supply chain. In 2023, Porini acquired a 743-acre mining area with 49 mining claims, while also taking steps towards starting a manufacturing plant for cutting gemstones, in a move to streamline regional gemstone processing: "The decision to centralize operations in Kenya is driven by the belief that it will enhance efficiency and contribute to the local economy. By having all operations on-site, Porini Gems aims to optimize processes and reduce reliance on external sources, aligning with both economic and sustainability goals. This approach also minimizes the environmental impact associated with transporting materials to and from external locations," said Diana Atieno, the founder of Porini Gems.

Ultimately, the re-sellability value of natural diamonds is what grants these stones "foreverness." Diamonds have never been able to become a "safe haven" investment like gold due to the difficulty of ascertaining the quality, the origin, and the real value of the gemstone, since diamonds are sold at a very high mark-up price. However, as diamond mines near the end of production and very few major new mines have been discovered in the last few decades, the second-hand market is anticipated to grow, potentially becoming the main market for diamonds. The secondhand market may become the largest available "mine".

Those hoping to discover significant diamond deposits still look to Africa. De Beers and other majors focus particularly on Angola. Recently, Rio Tinto took a 75% stake in Angolan state-owned company Endiama to explore the Chiri kimberlite in Angola's Lunda Sul region. De Beers also returned to the country to explore for major kimberlite deposits. Angola, sitting in the central African craton, is extremely prospective, but regulations imposed under previous governments and rampant corruption led to an exodus of explorers and miners in the early 2000s. Now, the country wants to become one of the world's three largest diamond producers. Recently, Catoca, the country's state-owned diamond company, began mining at the Luele deposit, discovered 10 years ago. Luele is believed to be the only new major new diamond mine of this decade, estimated to hold 628 million carats of diamonds, according to a report by Reuters.

In conclusion, while 2023 was a harsh year for the natural diamond industry, signs point towards recovery in 2024. Experts forecast that early 2024 is expected to witness a demand resurgence due to seasonal restocking. Nevertheless, the release of previously withheld supply from late 2023 is likely to counteract any significant upward price momentum. ■

Benedito Paulo Manuel

DIRECTOR-GENERAL OF THE SOCIEDADE MINEIRA DE CATOCA
CATOCA

What measures have you implemented at Catoca to guarantee long-term profitability and growth?
We have exercised the necessary caution, adopting very strict production plans in terms of cost control and fairly modest sales price forecasts. This allowed us to mitigate negative impacts, giving us room for manoeuvre in cases where there is some negative variation in prices. Another measure that has had an effect has to do with slowing down sales and waiting for the best times when the international market sees a slight reduction in supply and a consequent rise in prices.

To ensure the company's growth, we are committed to increasing diamond reserves by locating new kimberlites and participating in other mining projects, such as the Luaxe mine, known as one of the largest reserves discovered in recent years. On the road to development, within the framework of our vision for the company's development over the next 10 years, we aim to enter other business areas within mining, taking advantage of the vast potential opportunities offered by the Angolan and African markets.

Catoca had a very profitable 2021. What is the current business scenario?
2021 was one of our best years in terms of financial results and this was due most notably the improvement in operational efficiency and significant gains in terms of cost reduction. Market behaviour also played an important role in that the Catoca diamond was selling at a good price, above US$120 per carat.

But today, the mine's geotechnical conditions naturally impose a gradual and substantial rise in production costs, after 28 years of existence. This is aggravated by the low grade recorded at this stage, when we are overcoming a very rocky area of the mine.

What is your vision for the future of Catoca?
Our experience, our technological expertise and our financial strength make us a key player in the growth of mining in Angola in particular and in Africa in general. That's why we are already taking steps to enter other areas of the mining chain outside of diamonds. ■

Diana Atieno

FOUNDER
PORINI GEMS

Can you discuss the decision-making behind the strategic move to acquire mining areas in 2023?
In 2023, Porini Gems achieved a significant milestone by successfully acquiring a substantial mining area covering 743 acres with 49 mining claims. This strategic move allows us to conduct independent mining operations, eliminating the need for external partnerships. The initiation of a manufacturing plant for cutting gemstones represents a major highlight, intending to streamline regional gemstone processing. A feasibility study by a South African consulting firm is currently underway, with anticipated completion in the next 3 to 4 months.

What mining methods are being considered for gemstones?
Considering the flat topography of the land and the proximity to a National Park, Porini Gems is leaning towards a tunnel-based mining approach. This method is chosen to minimize environmental impact and address concerns about disturbing animal routes. The project aims to generate employment not only in mining operations but also in supporting roles for maintaining and managing the area.

Can you provide an update on Porini Gems' portfolio?
Porini Gems has diversified its portfolio to include loose stones, custom-made jewelry, pearls, and minerals. Tsavorite gemstones, originating from the Tsavo region, are highly sought after due to their exceptional luster and brilliance.

What are your key priorities for Porini Gems in the coming two years?
In the coming 12 to 24 months, Porini Gems will focus on developing the mining project. The company looks forward to integrating on-site mining, processing, and manufacturing to enhance operational efficiency and foster economic growth in the region. Education initiatives and value addition continue to be central to the company's vision. Porini Gems is open to collaborating with experts to strengthen capabilities and further boost the growth of the gemstone industry in Kenya. As Porini Gems progresses, it aims to assume a pivotal role in positioning Kenya as a significant player in the global gemstone market. ■

Uranium

A nuclear power renaissance?

Main countries: Namibia, Niger,
Emerging: South Africa, Tanzania, Mali, Zambia, Malawi

Events like Fukushima were primarily natural disasters that led to challenges in nuclear facilities, not nuclear disasters per se. Addressing the emotional aspects of nuclear energy is essential. As we seek reliable, clean energy sources, nuclear energy will be an important component of the global energy mix.

Murray Hill, Managing Director, Elevate Uranium

The fate of nuclear energy took a dramatic turn in 2023. Realizing that the Paris Agreement's sustainable goals will not be met with renewable energies alone, at COP28 the UAE, France, the US, and Saudi Arabia called to triple nuclear production capacity before 2050. While two-thirds of the world's uranium production comes from Kazakhstan, Canada and Australia, renewed activity from mines in Africa point to the continent becoming a hotspot for uranium in the coming years.

The global context is ripe for what has been coined a nuclear renaissance. After a decade of stagnation following the Fukushima Daiichi nuclear accident, Japan has announced plans to restart many of its reactors. France has reversed its anti-uranium stance, now intending to construct six new reactors and a dozen small modular reactors. The UK has embarked on an ambitious initiative to build eight new reactors and 16 small modular reactors. Even in anti-nuclear Germany, recognition of geopolitical energy realities has led to an extension of the life of the nation's last three operating nuclear power plants.

Renewed interest in uranium stems from several factors. First, the pressing need to phase out of fossil fuels. Second, the acknowledgment that – at least for now – renewable alternatives, such as solar or wind power, are insufficient for supporting the green transition. Issues like strains on energy grids, which are drawbacks of renewables, are viewed as strengths of nuclear power. In the context of the green transition, uranium possesses advantages that governments – and capital markets – decided not to overlook anymore. The CEO of Deep Yellow, a firm developing the Tumas uranium deposit close to Namibia's Husab and Rössing mines, John Borshoff, analyzed: "While renewable sources like wind and solar are vital for a sustainable future, they have intermittent availability, and energy storage solutions are still developing. Nuclear power offers a stable, reliable, and emission-free source of continuous electricity."

The uranium bull market could reshape the production scene in the near term. Uranium significantly outperformed other commodities in 2023: Prices rose by 20% on average according to the World Nuclear Association (WNA), and reached UD$80/lb in November 2023, a 15-year high. The WNA forecasts that global demand for uranium will increase to nearly 130,000 t/y by 2040, a significant rise from the estimated 65,650 t in 2023. Elevate Uranium's managing director Murray Hill said: "I anticipate that the uranium price will exceed US$100/lb in the future. This higher price is necessary to incentivize companies like ours to produce uranium and meet the increasing demand for nuclear reactors in the green transition."

Duane Parnham, managing director and CEO of Madison Metals, a junior advancing the Madison South and North zones adjacent to the Rössing and Husab uranium mines in Namibia, concurred with his peer: "Despite geopolitical challenges and a lack of new uranium mine development in the past 15 years, the current backdrop suggests a more sustainable and prolonged period of higher uranium prices compared to 2007

Similar geological endowment, different growth trajectories

Will Africa be able to carve itself a thicker slice of the global uranium (yellow) cake? The continent is home to three of the 10 largest-producing uranium mines in the world, responsible for about 16% of global production in 2022. In Namibia, Husab and Rössing, two open-pit operations, produced 5,613 t/y of uranium, while Niger's SOMAIR open-pit produced 2,020 t/y, according to the WNA. And while a Coup in Niger threatens the country's production and export capabilities (25% of all EU uranium imports come from Niger), several developments in other African jurisdictions promise future growth.

Thanks to its political stability, its well-defined regulatory environment, and its long history of uranium mining, Namibia is poised to play the leading role in Africa's nuclear push. Since the discoveries of Rössing and Langer Heinrich in the 1970s, the country has built a strong uranium industry. Slated to restart production in Q1 2024, Langer Heinrich will be the third operating mine in the country. Projects by Bannerman and Deep Yellow's Reptile Mineral Resources, namely Etango and Tumas, both received their licenses in 2023. While Bannerman is collecting construction financing to build the Etango 8-million-ton operation, the Tumas project is set to commence construction in 2026. In the Namib desert, ASX-listed Elevate Uranium upgraded its MRE at the Koppies project by 136%, with the resources standing at 48 million lb of uranium oxide equivalent.

At the other end of the spectrum lies Niger, which highlighted the political and instability threats to investment in mining ventures. On 26 July, General Abdourahamane Tiani, president of the newly-formed Conseil National pour la Sauvegarde de la Patrie (CNSP), proclaimed himself head of state, overthrowing President Mohammed Bazoum. This cast a shadow on the future of uranium exploration and development in the country. Having advanced the Madaouela project to the final feasibility stage, Canadian GoviEx Uranium is awaiting clarity before moving forward. Developing the highest-grade uranium project in Africa at the Dasa project, Global Atomic was affected by the halting of US Development Bank funding financing pending a return to democratic elections.

The uptick in uranium projects moving from early development to late stages is creating positive growth trajectories for African engineering firms. Surfing on high prices and the push from African governments to benefit from the

Over the past year, there has been a notable uptick in uranium projects advancing from early development to higher stages. The uranium market's resurgence, reflected in companies like Deep Yellow Resources, showcases substantial growth potential. We have recently secured feasibility studies for several significant gold and uranium mines worldwide.

Jaco Lotheringen, Managing Director, Ukwazi

uranium bull, engineers have seen the demand for feasibility studies and demonstration uranium plants grow. South Africa-based engineering firms noticed such trends. GoviEx Uranium tapped engineering firm Ukwazi to undertake the FS at the Muntanga project in Zambia. Similarly, METC Engineering finished constructing a demonstration uranium plant in Tanzania and is also involved in Global Atomic's Dasa project in Niger. Explaining his approach, managing director Nick Tatalias stated: "METC considers nuclear power as a key component in future clean power supply. This is why we have several uranium projects on books and are looking at the resurrection of thorium reactors, because they are cleaner, cannot melt down, and can be made for smaller users."

The fundamentals look strong for African uranium players going forward. Across the continent, several juniors are closely monitoring the prices, awaiting the perfect timing for the latter to incentivize more moves toward production. ▪

Gabi Schneider

EXECUTIVE DIRECTOR
NAMIBIAN URANIUM ASSOCIATION

Can you introduce the Namibian Uranium Association (NUA) and outline its main strategic aims?

The NUA is the representative body of the Namibian uranium industry. Members of NUA include all Namibian uranium mining operations, most of Namibia's leading uranium exploration companies, and associated contractors.

Namibia, known for its uranium potential since the discoveries of Rössing and Langer Heinrich in the 1970s, faced environmental challenges in the central western part of the country, with its dense cluster of explored and mined deposits situated in the Namib Desert and partly within national parks.

Recognizing the cumulative impacts on the environmentally sensitive region, the NUA proposed a strategic environmental assessment to the government, completed in 2010. Subsequently, a strategic environmental management plan was developed and is now being implemented in collaboration with the government. Our efforts extend to working groups focusing on radiation safety, groundwater quality, air quality, and specific interests like the Swakop River Farmer's Working Group.

Can you discuss upcoming projects at the development stage poised to contribute to the country's uranium production?

First, we must highlight Langer Heinrich, currently in the restart phase and slated to commence production in Q1 2024. This marks the addition of the third operational mine in the coming year. Additionally, projects by Bannerman and Deep Yellow's Reptile Mineral Resources, namely Etango and Tumas, are progressing well. Both have received letters from the Ministry of Mines and Energy indicating an intention to grant them a mining license. Bannerman has progressed to front-end engineering and design, while a development decision is expected in early 2024 for Reptile. Elevate Uranium has the largest tenement for uranium in Namibia, and made four uranium discoveries in the last three years. Beyond that, there is renewed activity on the Valencia deposit owned by the Canadian company Forsys. Should indeed all mines get to nameplate production and current exploration projects develop into new mines, Namibia would be in the same size category as Kazakhstan, with over 20,000 t/y of uranium production. ▪

Coal

Unclear transition timelines

Following the Paris Agreement, the world believed that coal's days were numbered: To keep emissions in check, fossil fuels must be left behind, starting with the most polluting one. A broad timeline was established stipulating that the EU and OECD should phase out coal by 2030, China by 2040, and the rest of the world, including most emerging economies in Africa, by 2050.

And yet, almost 10 years on, the expiration date for coal is still unsure, leaving the industry, together with its investors, confused, while policymakers are still fiddling with the right wording. Two years ago, at the Conference of the Parties (COP), the meeting where nations meet to take stock of the progress made on the Paris Agreement, a last-minute change from "phase out" to "phase down" brought the COP26 president Alok Sharma to tears. At COP28 in Dubai, the agreement to "transition away" from fossil fuels was deemed monumental, but it was criticized by The Alliance of Small Island States (AOSIS), a group of countries that are most vulnerable to climate change, for including "a litany of loopholes."

When it comes to policies deciding coal's exit, the choice of words is key. For example, policies that restrict lending for coal projects apply for miners that derive a certain amount (usually 25%) of their revenue from coal; but diversified giants like Glencore do not meet that threshold, which means they can still obtain financing unabated. Almost every big bank in the US continues to finance Glencore.

Regulatory vagueness is taken for flexibility and replicated in banks' policies. Goldman Sachs pledged to stop financing thermal coal miners that do not have a diversification strategy "within a reasonable timeframe." The Economist reported the bank continues to finance big coal companies.

Africa, and particularly South Africa as one of the world's top 10 coal producers, has little influence in deciding coal's exit date, but is very much impacted by this decision.

Between the "real" and the "just" transition

The relationship between coal and economic growth has become a toxic one for the planet, but the divorce between the two will likely be messy. By 2026, China and India will account for 70% of coal use, whereas the EU and US for a mere 3%. Such discrepancies complicate the dialogue on the removal of coal.

If the West pushes for a "real" energy transition, many developing and emerging nations ask for a "just" energy transition, that is inclusive and leaves no one behind, therefore requiring more clemence and adaptations to the rules. As part of the Just Energy Transition Partnership (JETP) with multiple Western nations, South Africa aims to phase out coal by 2035, and retire almost half of its current coal plants by 2030, but in early 2023, the country suggested it may delay shutting down many of its coal-fired power stations due to an ongoing – and worsening – domestic electricity crisis and record load-shedding. The government did not specify a timeline.

"500 million Africans have no access to electricity; pushing the continent to take the most expensive route to power (renewables) is an unfair ask," commented Emmanuel Ngulube, the CEO of E&T Minerals, a South African coal trader.

Those asking for more decisive measures, including a ban on coal, argue that the consequences of not doing enough will be far more dire than those of cutting off coal from the energy mix. Indeed, many coal-reducing policies and promises fall short of implementation. Out of 1,400 companies in the thermal coal value chain, brought together under the "Global Coal Exit List" by a consortium of NGOs, only 71 announced coal exit dates, while 577 are still developing new coal assets.

Besides national interests and miners' interests, there is a third stakeholder to take into account: lenders. The best way to transition away from coal, regulators agreed, is to cut its lifeline - ban coal financing. Over the last decade, most majors decided to quit coal, divesting heavily, and most large banks announced that they will restrict investments in the coal value chain.

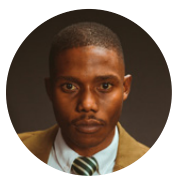
Yet the coal industry is far from famished today. Banks like Singapore-based DBS, Swiss bank UBS, and UK's Standard Chartered continue to finance coal trading. Mining financing is not gone either. Urgewald, a charity, found out that coal miners obtained loans worth US$62 billion between 2019 and 2021, with big names like Japan's Sumitomo or Mitsubishi writing the biggest loans, followed by the Bank of China and America's JP Morgan Chase and Citigroup. In 2022, US$13 billion went towards the world's 30 top coal producers, according to the same source. Even as financing is predicted to become increasingly more difficult, especially in rich countries, Asian banks seem ready to fill the gap.

In the last two years, the coal business also became more profitable, the price of coal reaching a historic high of US$440/t. Shares of listed producers of metallurgical and thermal coal experienced big wins this year. It is feared that this windfall would create an appetite for more investments in coal projects and threaten the commodity's phase-out, however, the profitable period, which continues to this day as prices remain well above pre-pandemic levels, benefits those already in the business without incentivizing more investments going forward, precisely because investors and miners cannot anticipate demand in the longer term.

In terms of coal-to-power, only 39 coal-fired power plants with a total capacity of 51 GW provide 30% of all electricity on the continent – 2.4% of the world's total. Most of this capacity (85%) is in South Africa, according to Energy for Growth, a think tank. According to the Global Energy Monitor, an NGO that tracks global fossil fuels projects, only two coal-fired plants appear "likely," including the 1.6 GW Kusile project in South Africa and the 335 MW Hwange project in Zimbabwe. A further 16 projects with 5.8 GW potential capacity are still unclear. Jindal Steel and Power has also just announced a 0.6 GW coal plant in Botswana, but no other new coal projects are to be commissioned in Africa by 2026.

The few M&A transactions this year focused on coking coal, a metallurgical coal used in steel-making. Glencore closed a deal to buy Teck Resources, while BHP decided to hold on to its higher-quality coking coal assets, turning back from its 2020 decision to sell these. In thermal coal, South African Thungela Resources is to acquire a coal asset in Australia, diversifying its footprint.

That coal is moving towards eventual extinction, seems to be an accepted fact, but until a date is settled, coal remains the main energy source for many countries.



Everybody is talking about 'getting rid of coal' but few understand its importance for a just transition. Though we are all striving to phase off fossil fuels, the world cannot simply turn off its coal-fired plants overnight.

Emmanuel Ngulube, CEO, ET Minerals

Vuslat Bayoglu

MANAGING DIRECTOR

MENAR

On the production side, South Africa is very competitive thanks to shallow and high-quality deposits, but on the logistics side, rail shortfalls are a big impediment.

Could you provide an operational update since last year?

2022 was a very strong year for us. At our open-cast thermal coal mines we produced 2.5 million t run of mine (RoM) from Khanye Colliery and 1.7 million t RoM from Phalanndwa. Canyon Coal mines collectively achieved over 5,200 fatality-free days. Kangra, our thermal coal mine in Piet Retief, also reached its production targets and we added two shafts called Udumo and Belgarthen to ramp up production. Meanwhile, the Zululand Anthracite Colliery has a difficult geology presenting various challenges, but we benefited from the high demand following the supply cut-off from Siberian Anthracite, a Russian player and the largest anthracite producer globally. Finally, our East Manganese mine is also producing in line with our guidance, but manganese prices have flattened out. Coal prices have also come down dramatically from their peak at over US$400/t in September 2022 to about below US$100/t, and this is because the European winter turned out to be quite mild, leaving significant volumes of coal and gas in stock.

What are the main updates at Menar's development assets?

We started mining at our 200,000 RoM t/month Gugulethu mine, and by October this year, we expect to have the first washed coal after some delays on the civil work due to very heavy rains. Our teams are currently working on the box cut. By the time we reach the second phase of operations an estimated 430 jobs would have been created. The mine has a LOM of 7 years open cast + 20 years underground. Our flagship and first mega-project 600,000 t/m (RoM) is Bekezela, where we are waiting for the final Water Use License as well as working with Transnet to build the siding on the property to minimize both transportation costs and the CO2 footprint associated with trucking. We are already in discussions with a potential offtaker, ready to push the button on production as soon as we have the license. Thuso, our third development asset, is fully licensed, but given that this is an underground project with higher operating costs, we will watch the market conditions closely before bringing it into production.

What would you say is a realistic timeline for the phase-out of coal from the energy mix?

It is difficult to talk about a timeline, but what I see is that coal is needed because it provides baseload capacity to enable renewables. While solar energy may be enough to power a household, it does not have the industrial-scale capacity to power an entire nation. This is why countries like Germany are opting for a renewables-plus-gas solution. In South Africa's case, the baseload generator can be either imported gas, nuclear or coal. The government is looking at a combination of fossil fuels and renewables, for which there are ongoing energy bids to create renewable energy capacity in the Northern Cape. That said, bringing that energy to major centres like Cape Town, Durban or Johannesburg will again require significant capital investment in transmission lines, which is another challenge. China takes a very pragmatic approach to the matter: keep whatever is working unless one can prove that the alternative will also work. Ironically, China's grid is heavily dependent on burning coal, but the country is also the largest exporter of solar panels that the entire world buys – solar panels produced using power generated from coal. Given the incapacity of renewables to provide baseload, and the fact that gas is not enough for all the countries in the world, I believe South Africa will continue using coal until resources are depleted. The July 2023 G20 meeting in India underlined the difficulty of setting timelines. This group of countries couldn't agree on the best approach to balance the ideals of decarbonisation and specific-country realities of the need for baseload power generated by coal.

How competitive are South Africa's thermal coal and anthracite on international markets?

Production costs and logistics are the two main items that impact the competitiveness of energy coal. On the production side, South Africa is very competitive thanks to shallow and high-quality deposits, but on the logistics side, rail shortfalls, especially in terms of the availability of locomotives, are a big impediment. Anthracite deposits sit close to the port; our Zululand operation is just 80 km away from Richards Bay.

Given South Africa's diverse mineral and metals base and rich mining history, what commodities do you think are the most promising for the country's future?

In the last few decades, the world has been mining iron ore, chrome, copper-cobalt, manganese, nickel, and coal primarily for China, which had been growing at a very accelerated pace. China's GDP growth slowed down, and without another supernation coming close to that kind of growth, the construction and infrastructure-related commodities will see a weaker demand in the years to come. At the same time, power and battery metals are becoming the favourite because of this large market. This gives South Africa an opportunity, especially in PGMs used for clean technologies, but also in coal and manganese (80% of the world's manganese resources are sitting in South Africa). The country has a very rich mineral endowment, as well as good infrastructure in terms of roads, rail, power, banking and judicial system, and, importantly, a very talented workforce: everywhere you go in West, Central, or East Africa, you will find highly educated South African engineers. Investors looking to develop new resources will probably look at the low-hanging gold exploration projects with a low-strip ratio, whereas South Africa's gold sector is quite mature and the ores rather deep, but in PGMs, manganese, chrome, coal, and vanadium, the country offers a clear competitive edge at low capital risks.

Services, Equipment and Technology

"Generally, Africa has been a late adopter of new technologies, largely due to a lack of skills in many countries. However, the need for improved efficiency and safety has increased interest in adoption."

- Johan Strydom,
Managing Director, Normet Africa

Image by Sorasak at Unsplash

Logistics and Trade in Africa

The drive towards better regional integration

The Lobito Corridor has the potential to become the fastest, most reliable, and efficient corridor among all existing five. I am positive that more shipping lines will go to Lobito now that freight rates have come down. Shipping is back to being a volume game and Lobito can offer that opportunity for extra volumes.

Amaury Luyckx, CEO, Polytra Group

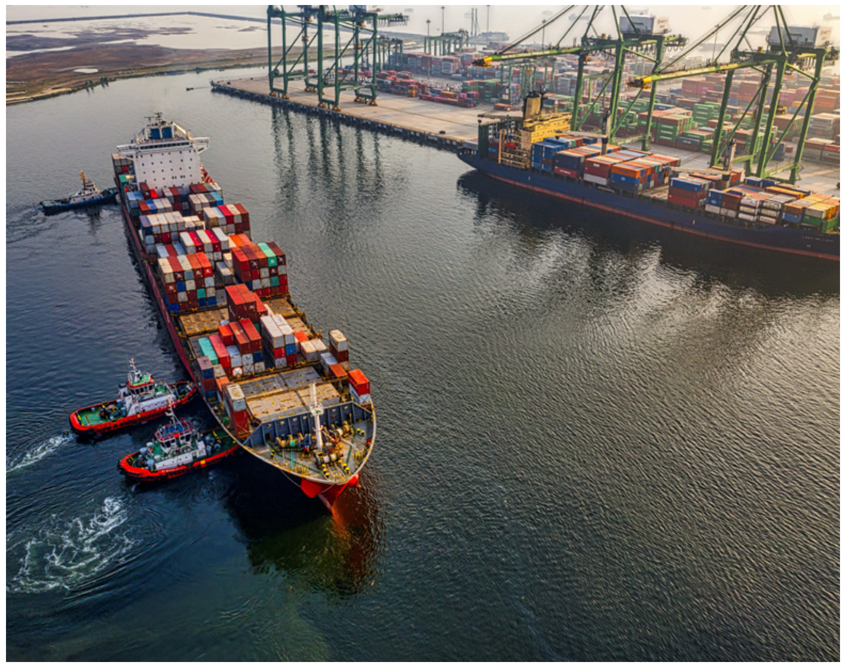


Image by Tom Fisk at Pexels

Broken logistics has long been one of the three "scourges" (along with corruption and energy insecurity) threatening the development of mining across many African states. Despite a surge in demand from Europe looking to replace sanction-hit Russian coal, railway disruptions in South Africa caused coal exports from the Richards Bay Coal Terminal to hit the lowest levels in 30 years. Yet, factors like the demand for critical minerals, bolstered copper production, and multi-million investments in a trade corridor investment to compete with China, are all promising signs for logistics firms assisting mining companies.

The heightened demand for Africa's critical minerals has led to a rise in transportation needs, and this trend should only but strengthen going forward. Despite cost increases linked to the inflationary environment, both freight and cargo markets have known a boost in 2023. In Africa, the most significant production uptick was felt in the Copperbelt of DRC and Zambia, particularly following the second phase of production at Ivanhoe's Kamoa-Kakula. Amaury Luyckx, CEO of Polytra Group, one of the largest freight forwarders for the mining industry in Africa, shared: "The global demand for commodities, especially those related to the energy transition, such as copper and cobalt, has given a boost to the market."

In 2023, the Biden administration unveiled plans to invest in "The Lobito Corridor", a new railway project that will link Zambia and the DRC to the Angolan port of Lobito, rather than the traditional eastern route east to the Dar El Salaam port. The project entails the construction of approximately 550 km of rail line in Zambia, along with 260 km of feeder roads within the corridor, thus establishing a significant trade route from the Copper belt to the Atlantic Ocean.

The Angolan authorities chose Africa Global Logistics (AGL, former Bolloré Logistics, acquired by MSC in 2022) as a bidder for the Lobito container and multipurpose terminal. Eric Melet, CEO logistics and railway solutions at AGL, stated: "Historically, the Lobito corridor was an important corridor for copper transport. Based on projected volumes, the Lobito corridor should once again become a major gateway to reduce the transport bottleneck in the Katanga region, southern DRC, and Zambia."

Africa will continue to push for more regional integration, the development of transportation infrastructure, better connectivity, and digitalization. Several initiatives, both by governments and private logistics firms, are underway to improve digital penetration. Swiss-HQed air and sea logistics leader Kuehne+Nagel opened a branch in Abidjan in 2023, increasing its presence to 18 African countries. "Our digital ecosystem, providing real-time tracking, has proven instrumental, especially for projects located in remote locations" stated Kerry-Lee Swartz, national road logistics manager, Southern Africa. ■

The State of African Logistics

Executive insights

"Digitalizing logistics is key to increasing efficiency and relieving bottlenecks, and AGL is continuously working towards optimizing the numerous interfaces needed in our industry with customs, ports, and customers of course. Considering the energy transition, implementing advanced technologies and innovations is critical, and we are seeing many initiatives in areas such as biofuels and renewable energy generation which we are embracing."

Eric Melet, CEO Logistics and Railway Solutions, Africa Global Logistics (AGL)

"High-interest rates and taxes are currently a major issue in Ghana, and the fluctuating fuel price is also a challenge. Suppliers' credit is also an issue due to currency fluctuations making the cost of truck purchases very high. The regulation in Ghana is much more stringent than in other West African countries when it comes to axle weight, taxes, and others."

Ghassan Husseini, Managing Director, Crown Transport & Logistics

"Logistics is a critical economic activity for South Africa, primarily due to the concentration of economic activity in Johannesburg, Gauteng, and placing reliance on exporting goods through coastal regions, primarily by rail and to an extent road. The deterioration of performance of Transnet, the state-owned logistics company, which also manages TFR, has significantly affected the mining industry."

Mzila Mthenjane, CEO, Minerals Council of South Africa

"Local content regulations in several countries, particularly Ghana and Nigeria, have imposed restrictions on international logistics providers. As a result, many customers have to dismantle their supply chain into segments, working with multiple providers to navigate these regulations, which adds cost, impacts quality, and ultimately the competitivity of their activity. This has introduced inefficiencies, delays, and higher operational costs."

Serigne Ndanck Mbaye, CEO West Africa and Country Manager Ghana, DHL

"Renewables present a significant upside growth potential in the future, and we are keen to contribute our best in this space. Also, working with other sectors, we have noted a growing interest in more sustainable logistics solutions, a trend gradually more prominent over the past few years and which we anticipate becoming even more powerful as we move forward."

Kerry-Lee Swartz, National Road Logistics Manager, Southern Africa, Kuehne+Nagel

"The objectives of the foreign trade reform are to simplify trade via a one-stop shop, to guarantee the traceability of operations, to reduce the costs of commercial operations, and to comply with international standards. We are committed to improving the competitiveness of the DRC."

Yann Le Roux, Managing Director, SEGUCE

Focus on Tailings Management

Progress after first GISTM deadline

A year after the Jagersfontein tailings dam collapse, miners keep moving toward the implementation of the Global Industry Standard on Tailings Management (GISTM). The International Council on Mining and Metals (ICMM) members were handed robust roadmaps, the first deadline being August 2023, when all tailings storage facilities (TSFs) with "extreme" or "very high" potential consequences were ordered to comply with the Standard. All TSFs will have to do so by 2025. According to Vis Reddy, chairman, SRK Consulting (SA) & regional coordinator (Africa), SRK Global: "The learning curve precipitated by the new GISTM standards has affected not just consulting engineers and their clients, but also government regulators and third-party operators managing tailings facilities. This has led to improvements in best practices and, importantly, to higher minimum standards that are more broadly applied."

Risk mitigation remains a major challenge for tailings management, and equipment providers have noticed the increased scrutiny of African miners' mitigation measures and environmental approaches. "Demand in the tailings segment is driven by ESG and mining houses' sustainability efforts. We see that both tailings management and hydrometallurgy solutions will be a big area of interest for customers in Africa moving forward," detailed Metso's VP minerals in Africa, Charles Ntsele.

Technology and innovation are key drivers of safety improvement in the tailings space. Recognizing this, Fraser Alexander established a team dedicated to mechanized dry-stacking filter plants for tailings management. The firm developed its Digital Tailings Risk Management System, and is exploring methods for unlocking value from existing waste. Lourens de Koning, COO, explained: "We continuously explore innovative methods to extract added value from historical tailings. This strategy has already proven successful in the gold industry and is gaining traction in the platinum sector."

Extracting resources from mine wastes contributes to the long-term sustainability of a mining operation while creating new value. ▪

EXPERT OPINION ARTICLE

Integrating engineering into ESG

By Andrew van Zyl
MANAGING DIRECTOR,
SRK CONSULTING (SOUTH AFRICA)

Mining executives worldwide have again rated environmental, social and governance (ESG) factors as the most pressing business risks for mining for 2024 – a priority that continues to reverberate through the world of engineering.

For while C-suite decision-makers try to balance the many demands of their businesses, it is predominantly the engineers and scientists who must find and apply the necessary solutions. According to the latest EY report, the world's leading miners continue to make progress on a range of ESG, climate change and license to operate risks – but are under pressure to do even more. This pressure cascades through the industry, onto all stakeholders including consulting engineers and other service providers.

This is as it should be. It is pressure that contributes to positive change, but equally there is accumulated learning on which to build solutions, and vision that drives these priorities proactively.

So, when considering the uncertainty that the future holds, it is worth taking stock of how far we have come. For instance, the industry has transitioned relatively quickly beyond its simple understanding of our impact on our natural and social environment. Two to three decades ago, the focus was on avoiding pollution, and on progressing worker rights and safety.

Today, the sector has advanced to a deeper appreciation of mining's role in communities, measuring this against the United Nation's Sustainable Development Goals. We have broadened our understanding of the world that we are trying to be part of, and the future towards which we want to contribute. This means that engineering itself is being done differently, and with even higher goals in mind.

Whereas quite recently a mining project would have been designed with ways to just replace the vegetation disturbed, today that project is considering in detail the biodiversity of its site – even before any decisions can be made on viability or the relevant engineering solutions. Just recreating 'a green space' is no longer enough.

In the same way that the natural sciences inform our planning, so the social sciences have come into their own in designing, running and closing mines. Engineering now embraces stakeholder mapping, community engagement and local economic resilience – all scientific responses to optimise local community impact. New standards for tailings management now include interaction with local stakeholders, and collaborative disaster management plans.

These aspects are among the leading ESG factors that executives and managers have cited to EY researchers. Another is water stewardship, which again requires collaborative engagement with local and other stakeholders. Diversity, equity and inclusion are also high on the list.

There is a great deal of work that lies ahead, but mining's bedrock of expertise and ingenuity – and considerable momentum in the right direction – are cause for optimism. ▪

Image courtesy of Fortuna Silver

Leveraging Natural Resources

Growing appetite for renewable energy

The trend that emerged a few years ago strengthened in 2023: African governments have realized that they were not leveraging the huge potential of their natural assets to measure the real wealth of Africa. Most power in Africa can be generated using renewables, particularly hydro, and the Congo Basin is the best example of a carbon sink not being monetized. In the near term, solar remains the option of choice for Africa's mine operators, with a growing appetite for hybrid solutions to power their operations.

In Zambia, First Quantum's Kansanshi mine (the largest copper-gold mine in Africa) is poised to run fully on renewable energy, consisting of a 230 MW solar PV plant and a 200 MW wind farm. In Mozambique, Syrah's Balama graphite operation integrated a system that allowed the firm to transition from a 24/7 reliance on diesel to operating 100% on solar and battery during daylight hours. Engaged in 94 mines across Africa, UK-based solar power firm Solarcentury engineered that solution, and CEO Jason de Carteret explained: "What sets Balama apart is that by running fully on renewable energy during the day, we achieved a yearly level of 36% renewable energy usage, making it one of the greenest off-grid mines in Africa."

The ongoing energy crisis in South Africa, which is affecting the throughput of mines, is another case for the widespread adoption of solar energy. As around 30% of the energy consumed by mines is electricity, challenges have led to diversification and an acceleration of investments in renewable and off-grid solutions. Seriti, Exxaro and Anglo-American all invested in such projects, and data from the MCSA shows that South African firms are developing a combined 6,500 MW of renewable energy. Mid-tier gold producer Pan African Resources estimated its loss due to electricity scarcity to be around 10,000 oz in the latest financial year. In response, the firm commissioned a 10 MW solar power plant at the Evander gold mine, added 12 MW at a solar plant in Barberton, and concluded a 40 MW off-site power purchase agreement. CEO Cobus Loots detailed: "This strategic move towards renewable energy helps reduce our reliance on Eskom and ultimately lowers our cost profile."

Renewable solutions also contribute to mining firm's decarbonization targets. South African giant Sibanye-Stillwater launched its first utility-scale renewables projects in June 2023. The Castle Wind Farm will generate 89 MW of wind energy, a major step in the firm's target of delivering 550 MW of renewable energy by 2040. In neighboring Namibia, B2Gold's Otjikoto mine generates 100% of its electricity using a hybrid HFO and solar power plant. In Mali, the firm started constructing the expansion to the Fekola solar plant, already one of the largest off-grid hybrid HFO/solar plants in Africa. The expansion should increase solar power capacity by 22 MW, to a total of 52 MW.

Independent from the sunshine, Africa's hydro resources offer huge opportunities for mining projects. The Mpiana Mwanga hydroelectric dam is currently being rehabilitated and could power up to 60 MW in the Manono area, home to Tantalex and AVZ's lithium projects. The DRC hosts one of the biggest rivers in the world, and the Grand Inga Dam remains the symbol of a failed opportunity to leverage natural capital to answer power shortages. Glencore invested more than US$450 million to refurbish two turbines at the 1,424 MW Inga 2 hydropower plant, to allow for more hydropower generation.

Step-by-step approaches are required before riding the solarcoaster. 600 million people in sub-Saharan Africa lack electricity according to UNCTAD. Therefore, the amount and volume of mining projects that will grow their share of renewable energy will have to be carefully measured and consider existing infrastructure challenges and grid capacity. As put by Jason de Carteret: "To address Africa's energy challenges, it is essential to approach solar expansion with measured steps. Large-scale projects, without careful planning, risk overwhelming existing grids." ■

Southern Africa, especially South Africa, has shown great promise in terms of solar adoption. The region has been at the forefront of embracing new technologies and transitioning away from fossil fuels.

Hadyr Koumakpai, GM Africa, JA Solar

The Critical Minerals Rush and its Effect on the Value Chain

The rush for lithium, nickel, copper and cobalt is being felt across Africa, particularly by service providers. Many have dedicated entire sections of their team to future-facing commodities, while others have reshaped their services to satisfy a new type of demand. Demand trends that emerged in 2022 – namely, balancing costs, inflation, and decarbonization directives with an unprecedented push towards critical minerals – strengthened in 2023, with an increased focus on long-term ESG considerations.

The leading players below give their take on the growth they have experienced – and the one they forecast – as the world transitions away from fossil fuels:

"Over the past year, ERM saw significant growth fueled by the global demand for critical minerals. We have been involved in multiple advisory projects driven by the GISTM with a growing focus on mine closure and waste management."

Sifiso Siwela, Africa Manager, ERM Sustainable Mining Services (Previously CSA Global)

"We are witnessing a significant shift towards diversified commodities, particularly in the context of the green transition and the heightened demand for minerals like lithium, cobalt and graphite. Fraser Alexander's approach to this evolving landscape is characterized by a commitment to contributing value to our mining clients and exploring opportunities within our core competencies."

Lourens de Koning, COO, Fraser Alexander

"With sustainability becoming increasingly important, there is an increased demand for solutions that can improve efficiency and safety and have a lesser environmental impact. Orica is looking at certain commodities that we think will start growing fast in the next year – the future-facing commodities such as lithium, nickel and cobalt in which we will see increased demand due to the cleaner energy transition."

Victor Morales Baeza, VP EMEA Mining, Orica

"Our innovation efforts are driven by three key imperatives: to increase production by drilling more meters per hour, help our customers cut costs (by using less fuel), and reduce the carbon emissions at their operations. As a specialized rock drilling tool producer, we are perfectly positioned to deliver continuous R&D and improvements in our field of expertise."

Martin van Gemert, Regional VP (Africa), Mincon

"The increased demand for our services was primarily driven by the scramble for critical raw materials. Our teams are also more focused than ever on ESG work, providing ESG consulting and advisory services. This momentum continues well into this year."

Sodhie Naicker, Managing Director, DMT Kai Batla

Equipment and Technology

Africa's electric drive: Overcoming present hurdles for future gains

Solving climate change includes solving ground transportation emissions. As Glencore keeps ordering more battery electric vehicles (BEVs) for its mines across the world, mines in Africa's most mature mining jurisdictions have also seen a growing deployment of electric solutions. Mining powerhouses with established footprints in the continent like BHP, Rio Tinto and Fortescue have all stated that mines will be electric going forward.

West Africa, with its burgeoning mining sector, is witnessing a rising interest in BEVs for underground transportation due to lower emissions, reduced operational costs, and enhanced safety features. Similarly, majors in Central and Southern Africa discussed the will to decarbonize their fleet, as up to 25% of Scope 1 and 2 emissions can be attributed to mobile haul fleets. For now, OEMs are testing battery-powered trucks at their proving grounds in Europe, North America and Australia, but signs point toward the next 24 months being the time when BEVs conquer the underground in Africa.

Equipment manufacturers and dealers must first face a more pressing matter: That of labor shortages. This challenge is common across the continent, where the general trend is for qualified youth to travel outside their home countries in search of better opportunities. Having distributed equipment for over a century to mining operations worldwide, BIA Group is expanding its footprint in Africa with the surge in demand linked to the green transition. Its VP sales, Romain Bia, noted: "The mining sector is experiencing substantial growth, primarily driven by factors such as the energy transition and political stability. This heightened demand has resulted in a labor shortage in some regions."

Dealers and manufacturers have taken it upon themselves to tackle the labor challenge. Normet, a world-leading technology company specializing in underground mining, recently invested in a large new facility in Johannesburg. "The facility will boast a state-of-the-art training facility with virtual reality capability to train our customers' operators and do maintenance training of artisans", detailed managing director for Nortmet Africa Johan Stryndom.

Similarly, Neemba (former JA Delmas Network) will launch its own training academy in Côte d'Ivoire in 2024 to nurture the next generation of mining talents in West Africa. Along with it, the firm plans to develop a center focused on innovation in Senegal, to cover the demand generated by the green transition across the region. Adiline Haykal, the firm's managing director, commented: "With a vision to professionalize the heavy equipment sector, we allocate an annual budget exceeding €4 million for training programs. The aim is to create a talent pool for the entire industry."

Alternatives to BEVs are also being explored. In 2022, Anglo and ENGIE inaugurated project Rhyno at the Mogalakwena platinum mine. The project, still at the pilot stage, is the world's largest hydrogen-powered mining truck, capable of carrying a payload of 290 t. But so far, hydrogen and other biodiesels are much more expensive and less scalable than electric battery options.

The old saying goes that in Africa, everything takes time. Yet, although adoption is slow initially, once the technology is implemented into a mining operation and its benefits are demonstrated, it appears clear that electric technology will spread throughout the continent.

The place of AI and automation in African mining Automation is not a new concept in Africa, but it is having trouble taking off. In 2019, Resolute Mining's Syama mine in Mali became the first fully autonomous mine in the world. In the past five years, the share of autonomous equipment – particularly haulage and trucks – rose in Africa's major mining operations (Barrick's Kibali and Bulyanhulu mines saw improved data quality by using autonomous LiDAR technology), albeit at a significantly slower pace than elsewhere. Barrick, BHP, Glencore and Rio Tinto's autonomous efforts are comparatively much more advanced in their Chilean, Australian, or Canadian operations.

Yet, endemic challenges like safety at mining sites might accelerate the pace at which operations automate their machines and processes. Safety is a global issue for mining firms, but in the past, incidents have often taken bigger and more tragic proportions in Africa, where a single landslide at Glencore's Mutanda mine in the DRC caused upwards of 43 deaths in 2019, and most recently, 13 died when an elevator carrying workers plummeted around 200 m down the shaft of Impala Platinum's Rustenburg mine. Eazi Access distributes the JLG brand, which added SkyGuard and SkySense technologies to their equipment to automatically avoid accidents. "Not only is there a trend towards electric and automation, but AI is also coming into the mix to help improve efficiency and productivity. Automation brings not only increased efficiency but also increased safety to operations" shared Brett Kimber, Eazi's CEO.

> *Technology adoption goes hand in hand with jurisdiction maturity, and I believe that over the next five years, underground electric equipment is going to be more normalized in the most advanced jurisdiction of Africa.*
>
> Johan Strydom, Managing Director, Normet Africa

Having launched the Omni Remote Blasting System (ORBS™) in August, leading manufacturer Orica saw tremendous growth in the West African and SADC regions. According to Victor Morales Baeza, VP EMEA Mining: "Increased safety requirements are certainly driving the adoption of autonomous technologies in Africa. "

A concrete example of the rise in automated solutions in Africa has been with adoption of collision-avoidance systems. In January, South Africa passed a law stating that all underground diesel-powered trackless machines must be provided with means to automatically detect the presence of any pedestrian within its vicinity. This will undoubtedly create opportunities for technology and equipment companies. Bell Equipment's latest articulated-dump truck integrates pedestrian detection systems (PDS) and collision avoidance systems (CAS). Bell Equipment CEO Leon Goosen shared: "While having a fully autonomous product may be still a long way into the future for some African operators, we can offer a "follow-the-leader" concept. It has a massive impact on reducing operating costs. Africa is not as quick on the uptake, but it will be one day.

Beyond approval from mining boards, automation adoption will be driven mostly by the continent's capability to sustain the weight such technology has on networks and infrastructure. "South Africa is moving towards greater automation in mining operations. However, the successful implementation of autonomous systems necessitates dependable and low-latency networks, such as 5G or private LTE," shared Gabino De Diego, BD manager at Torsa Global, a Spanish technology manufacturing firm that opened its first African office in SA in 2023.

One characteristic of modern mining is the large volume of data generated. Beyond interpretation, AI can help companies with the maintenance of their operation, and find ways to lower energy consumption. In this field, most innovations emerge out of South Africa. The country hosts the highest number of AI specialized firms in Africa and is a hub for engineers and equipment providers to develop and test their innovations. Loesche developed an AI based mill control system, and AI-based machine surveillance software. "This helps maintenance managers, production managers and process engineers to run equipment more efficiently at lower energy consumption and higher throughput," commented managing director Christian Gerhard.

Going forward, digital mines will establish higher benchmarks for the health and safety of workers, potentially playing a role in reskilling through educational and training initiatives. In essence, they have the potential to disrupt the mining sector in Africa. South Africa leads the way, but other African nations are making strides to progress beyond the early stages of AI adoption. In 2018, Mauritius became the first African country to unveil a national AI strategy. A year later, Kenya released its strategic plan, emphasizing blockchain and AI as pivotal technologies for business enablement. Egypt has taken proactive steps by establishing a National Council for Artificial Intelligence. Despite slow adoption and infrastructure-related challenges, other mature jurisdictions worldwide have shown that the long-term benefits of adeptly harnessing digitalization exceed the associated capital risks. ■

A New Generation of Geological Demand and Geophysics Innovation

Critical minerals and terrain conditions call for novelty

The rush for critical minerals key to the success of the green transition has led many West African firms to explore beyond the gold on their properties and diversify their portfolios. This is notably the case of Thor Explorations. Beyond its Segilola Gold mine and its Douta Gold project, the firm created a lithium-focused subsidiary (Newstar Minerals) to leverage its first-mover advantage in Nigeria and tap into the growing financial support for lithium projects.

Adapting to changing market needs requires improved technical knowledge and different technologies. As induced polarization (IP) resistivity – a technique utilizing the distributed array system – remains a preferred choice for gold projects, electromagnetics has been more frequently used for critical minerals. To best adapt to the market's hunger for lithium discoveries, SEMS Exploration, a reference geological consultancy in West Africa, formed a dedicated team solely focused on lithium exploration, especially in pegmatite-rich areas like Côte d'Ivoire, Ghana, Nigeria, and Mali. Managing director Simon Meadows-Smith stated: "We recognize the importance of infield XRF analysis. This method facilitates efficient sample preparation and analysis, and we have seen its increasing significance in lithium exploration."

Another innovative approach that is reshaping the geological and geophysical scenes in Africa is the growing use of drones. Having been late adopters of such high-tech innovations, African firms now recognize how drones are profoundly impacting exploration. The latter provides enhanced exploration and planning, improved safety, and increased operational efficiency. In modern mining, drones are essential tools that contribute valuable data, minimize risks, and promote environmental sustainability. Joshua Kilani, VP at the Geological Society of South Africa (GSSA), commented: "Companies are increasingly valuing the speed, cost-effectiveness, and safety benefits that drones offer compared to traditional ground surveys, especially in challenging terrains, which involve harsh conditions, community disruptions, and other potential hazards."

N'guessan Nestor Houssou, managing director of GEOREC, a geoscientific consulting that recently established a presence in the Central African Republic, said: "We use drones to cover large areas as well as zones impacted by illegal activity. The drone can fly at lower altitudes and take photographs of the whole area in just a few hours." ■

> *Sound geological knowledge and field experience remain essential. While we are open to utilizing AI for tasks like database management, we believe technology should enhance, not replace, the role of geologists in exploration.*
>
> Simon Meadows Smith, Managing Director, SEMS Exploration

Momentum for Technology Adoption in Africa

Executive insights

"In mid-2023, we sold our first complete solution to Idwala Carbonates in Kwazulu-Natal, which now has an AI mill operation system and also an AI machine surveillance system taking care of the mill gearbox, classifier and fan. In October 2023, cement player Dangote Group also signed for a solution for one of their plants in Delmas. Loesche plans to continue investing in further developing our AI solutions."

Christian Gerhard, Managing Director, Loesche South Africa

"The mining industry has historically been conservative and liked to be the "first to be third" when it comes to implementing new technologies. Mining operators are risk averse as they cannot afford any downtime, and therefore technologies must be de-risked before they will consider adoption."

Richard Doyle, Managing Director, JUWI

"Leaders are increasingly exploring tech solutions to enhance workplace safety. Contrary to concerns about job loss due to automation, the African context underscores the significance of people. Looking ahead, Blockchain is emerging as a compelling technology, especially when tied to ESG mandatory reporting."

Shaun Vorster, Partner, Mazars South Africa

"The demand for minerals and metals supplied is going nowhere, so we must figure out a way to extract and process these in a sustainable way. Considering the overall cost envelope of the locations where minerals come from, the only way we can achieve sustainable and cost-effective mining is through the deployment of technology."

Jeannette McGill, VP GM Metals & Mining, Aspen Technology

"Technology is driving efficiency, decarbonization, and profitability in the mining industry through digital transformation. For the past years, Vodacom has been driving "Connect" solutions for the mining sector in the DRC."

Khalil Al Americani, CEO and Managing Director, Vodacom Congo

"The market has embraced digitalization and all the convenience that comes with it, but people still love to connect, network, and come and "kick the tires." Our approach today is hybrid: We facilitate optimal digital experiences for our customers."

David Dahirel, VP Sales, Ritchie Bros

Environmental Consultancies & Labs

Sustainability: Not just a buzzword in Africa

Most mining jurisdictions in Africa have not yet reached the level of maturity as their North American or Australian peers, explaining the delay in enforcing – and applying – best environmental practices. Yet, with investors increasingly focusing on ESG, image risk is a driver for companies to implement sustainable practices in their operations. Environmental consultants in Africa have a generational opportunity to change mining practices for the better. An agile balance of borrowing foreign techniques and leveraging local talent will be key going forward to unlocking Africa's mineral resources in a sustainable, ethical, and capital-efficient way.

Image by Liz Martin at Unsplash

The future of mining will include addressing current environmental water-related challenges and implementing improved methods for handling wastewater generated during the extraction of any type of ore body. By 2025, the UN predicts that half of the world's population will live in water-stressed areas, with the most people concentrated in Africa. Recent data shows that particularly, the sub-Saharan region is falling short of the ambitious target set by the 2030 Agenda for Sustainable Development, which aims to achieve universal access to reliable water and sanitation for all (SDG6).

Improving practices despite laxist regulation

Local and foreign service providers are actively working with miners to improve their environmental practices. In the DRC, one of the world's leading consultancies, WSP, assisted Ivanhoe Mines' Kamoa-Kakula copper complex in decreasing its GHG emissions, notably following the completion of the direct-to-blister copper smelter expected in Q4 2024. Sean Doel, managing director, earth and environment for WSP Africa, precised: "The mining industry's efforts to be more sustainable create great opportunities for us to assist with things such as efficient water and energy management."

Environmental stewardship is certainly a goal for most African miners, but the road to excellence remains long. Mines face a unique challenge when managing a positive water balance, where the influx of water exceeds the amount consumed. While it may seem counterintuitive given water scarcity concerns in many regions, a surplus of water poses its own set of problems for mining operations. Contaminant leaching becomes a concern, as the surplus water can mobilize harmful substances, impacting both the mine site and surrounding ecosystems. Additionally, managing and treating the excess water becomes a logistical and environmental challenge, requiring robust infrastructure and sustainable practices to avoid negative consequences. Striking a balance between effective water management, environmental stewardship, and operational efficiency becomes paramount for mines grappling with a positive water balance to ensure responsible resource extraction and minimize ecological impact. As put by Adrien Cerino, managing director of Veolia Ghana, "A common challenge for mines in West Africa is that they are positive water balance mines, meaning that there is a water accumulation on the mine and this excess water must be treated before releasing it into the environment."

> *There is an increased focus on ESG in the mining industry and Veolia is developing the technologies and solutions to support the industry in its ecological transformation. As investors focus on ESG, companies are encouraged to implement sustainable solutions.*
>
> Adrien Cerino, Managing Director, Veolia Ghana

Achieving sustainable mineral testing

On the path to ecologically sustainable mining, one challenge is more prevalent in Africa than elsewhere: artisanal and small-scale mining (ASM). While being a key economic driver for many West and Central African countries, artisanal mining is often done at the expense of the earth – and people. UNIDO estimates that mercury amalgamation from ASM gold mining results in the release of an estimated 1,000 t/y of mercury.

In the context of the green transition, sustainable geochemical assay services have grown in demand, and local labs are eager to meet it. Out of South Africa, African Mineral Standards (AMIS) offers certified reference materials (CRMs), crucial tools for mining laboratories to validate and calibrate their equipment and analytical methods, and is pushing to drive green practices in the industry according to its general manager, Jumien Peceur. In late 2023, Intertek Minerals' Ghana branch introduced the PhotonAssay technology at its Tarkwa laboratory in Ghana. This analytical technique employs high-intensity X-rays to excite gold atoms, producing unique gamma-ray signatures that are then measured to determine gold content. Importantly, it reduces the use of chemicals, allowing firms to improve their sustainability initiatives. Speaking to the adoption of this first-of-its-kind technology in Africa, Sampson Koduah, West Africa general manager, explained: "Our Centre of Excellence in Perth, Australia, has seen the adoption of this groundbreaking technology from top-tier gold miners, and we anticipate a similar uptake in West Africa."

> *Mineral assaying is currently Intertek's key business in Ghana. With investors and mining companies focused on innovation and sustainability, Intertek has continuously sought to enhance and expand our service offerings to include environmental testing.*
>
> Sampson Koduah, West Africa General Manager, Intertek Minerals

The traditional metrics of capital competitiveness and cost efficiency must consider environmental initiatives, without the latter affecting the driver of any capital-driven business. Graham Tusler, CEO of Digby Wells, a leading environmental consultancy working on projects across Africa, summed up the challenges ahead for African miners: "While positive human and environmental impact is crucial, achieving a balance between responsible practices, capital efficiency, and meeting global needs will be an ongoing challenge. Investors will continue to demand transparency and measurable positive outcomes from mining projects." ■

Where do service, equipment and innovation players see opportunities next in Africa?

BLASTING

"We are pursuing exciting prospects even though there is volatility in some areas of West Africa. In the Southern African Development Community there is something of a revitalization in mining, with added opportunities emerging in battery minerals and uranium."

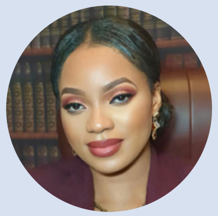
Ralf Hennecke, Managing Director, BME

ESG

"Beyond impressive geological wealth, several African jurisdictions such as Zambia, Tanzania, Côte d'Ivoire and Senegal, have started to offer the legal frameworks and political stability needed for successful sustainable mining investments. Careful due diligence of mining sites and local stakeholder relations remains of paramount importance to avoid ESG and reputational risks."

Remi Piet, Co-Founder and Senior Partner, Embellie Advisory

FINANCE



"At trend-gauging conferences like Mines and Money, the recurrent focus on the DRC underscores its pivotal role and the positive investor sentiment the country's mining sector currently garners, boasting over 65% of the world's vital battery mineral reserves."

Tania Eyanga, CEO and President , Central Africa Markets Private Equity Association (CAMPEA)

LEGAL

"The DRC is attractive because of the quality of its minerals. Our legal framework is also an asset. It is designed to obtain mining rights, with clear principles: Priorities, transparency, and objectivity."

Patrick Bondonga, Co-Founder and Lawyer, OVK Lawfirm

LABOR

"The mining sector is experiencing substantial growth. This demand has resulted in a labor shortage. To address this, we work closely with our customers to attract individuals with the right skills. We collaborate with universities to identify and nurture talent."

Romain BIA, VP Sales and Marketing, BIA Group

SOLAR

"The key to solar integration in mining is showcasing tangible benefits—cost savings, reliability, improved ESG, and, crucially, the potential for higher commodity prices due to greener practices. Economic incentives will be the driving force behind a more widespread embrace of solar."

Jason de Carteret, CEO, Solarcentury Africa

EQUIPMENT

"Mali presents a notable greenfield opportunity, although recent political challenges have impacted growth. Côte d'Ivoire has shown tremendous growth in the past six years. Guinea stands out due to the size and progress of the Simandou iron ore project, making it one of the most promising countries in the coming years."

Adiline Haykal, Managing Director, Neemba

RENEWABLES

"ENGIE is in the process of acquiring South Africa-based renewable energy developer BTE Renewables from Actis to accelerate our growth in the African continent, with governments and industries across the continent understanding the need to shift to clean energy."

Jonathan Debasc, Managing Director: Flexible Generation, Africa – ENGIE

CONSTRUCTION

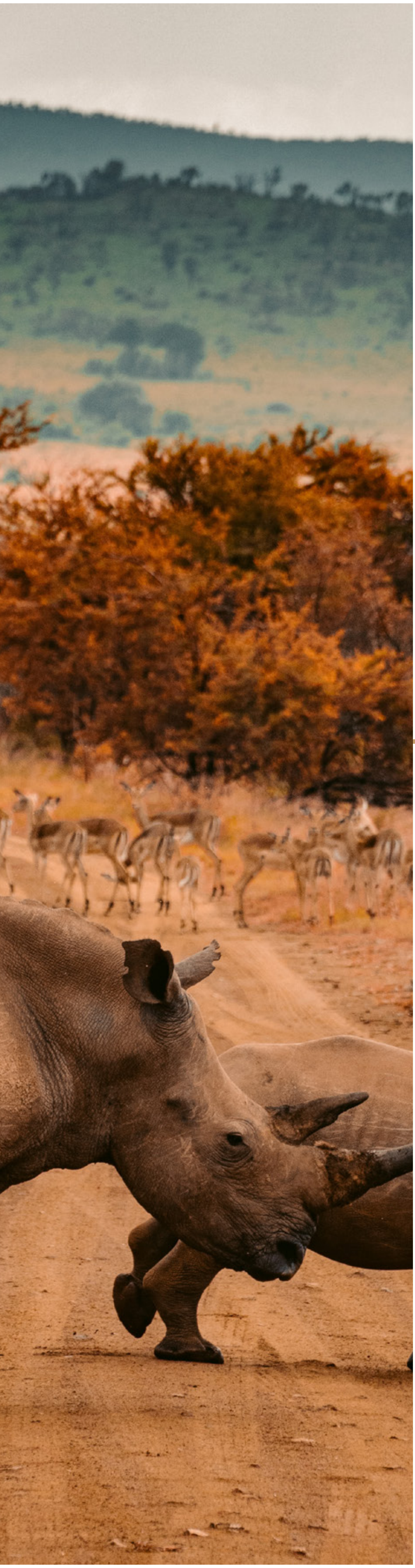
"It is positive that the West is beginning to look at Africa differently, planning to secure more strategic minerals, as this should propel further investment. However, it is important for the continent that contractors operate by the same principles and with the same intentions to empower and develop the skills of our local people."

Gary Teichmann, Executive, The Teichmann Group

RECYCLING

"One of the most significant opportunities remains the potential of establishing mining tire recycling facilities in the Southern African region. Market acceptance is expected to be positive as many mature customers want to comply with ESG requirements and there are currently no alternatives for mining companies to recycle their mining tires."

John Martin, VP Southern Africa, Kal Tire's Mining Tire Group



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We would like to thank the honorable ministers, executives, and authorities who took the time to meet with us.

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