

# Critical Minerals: An African Industries Perspective



## An African Industries Perspective on Critical Minerals

During 2023, VBKOM investigated "Critical Minerals within the Energy Mix", while also looking at "A South African Perspective on Critical Minerals".

Due to increased global demand for critical minerals in the race to respond to the changes being brought on by the transition to a green economy, low-carbon energy production, and other high-tech advancements present industries with new opportunities. However, continued commodity price volatility, supply chain constraints, and geopolitical uncertainties contribute to the various risks associated with energy transitions.

The security of critical mineral supply chains holds strategic importance for many countries, given the anticipated surge in demand fuelled by the global adoption of clean energy technologies.

The African continent is rich in mineral resources with substantial mineral reserves that are key to the development and manufacturing of green technologies. Despite this, the African mining industry largely follows a "pit-to-port" model, transporting mineral ore elsewhere for processing. The Critical Minerals Africa Conference, held in Cape Town, South Africa, in 2023, aimed to address opportunities for global collaboration that could facilitate flexible mineral supply chains.

"If you want to go fast, go alone. If you want to go far, go together," African proverb.

## The role of the clean energy technologies

The spectrum of clean energy technologies requires various minerals and metals, and the requirement for each clean energy technology is diversified in the types and volumes needed. Demand for critical minerals such as cobalt, copper, lithium and nickel will increase rapidly with the transition to clean energy technologies.

### Market Movements

According to the "Critical Minerals Market Review 2023" report, published by the International Energy Agency, a few key market trends arose in the global race to transition to clean energy technologies.

- › Clean energy technologies
  - Between 2017 and 2022, the demand for critical minerals grew exponentially:
    - Demand for Lithium tripled.
    - Demand for Cobalt increased by 70%.
    - Demand for Nickel increased by 40%.
  - During 2022, the sale of Electric Vehicles (EVs) grew by 60%, while the capacity of energy storage systems was doubled. Renewable energy solutions for power generation, like Solar Photovoltaic energy and wind power, continue to increase year-on-year.
- › Commodity prices
  - Critical minerals saw widespread price increases in 2021 and early 2022.
  - Notably, nickel and lithium exhibited strong volatility during this period.
  - Prices for most critical minerals began to moderate in the latter half of 2022 and into 2023.
  - Despite the moderation, prices remain well above historical averages.
  - The higher or volatile mineral prices in 2021 and 2022 underscored the impact of material costs on energy system transformation.
  - Despite recent challenges, it's important to highlight that the current capital and operating costs for all clean energy technologies are significantly lower than what they were a decade ago.
- › Changes in global policies
  - Increasing recognition of the necessity for policy interventions to guarantee the sustainability of mineral resources. Some of the more prominent initiatives include the European Union's Critical Raw Minerals (CRM) Act, the United States of America's Inflation Reduction Act, Australia's Critical Minerals Strategy, and Canada's Critical Minerals Strategy.
  - The implications for trade and investment are evident in many interventions, and some country-specific policies have included restrictions on the import and export of raw minerals. Indonesia, Namibia, and Zimbabwe have implemented measures to ban the export of unbeneficiated mineral ore.

## > Investment and exploration

- A significant shift in developing energy transition minerals has been present in companies specialising in lithium, copper, and nickel development.
- Canada and Australia demonstrated exceptional performance with over 40% year-on-year growth, particularly in hard-rock lithium.
- Exploration activities are rising in Africa and Brazil, showcasing expanding initiatives in these regions.
- Lithium exploration experienced a 90% increase in spending, while Uranium saw a surge in spending of 60%, followed by a 45% growth rate in Nickel exploration.

## > Battery Production

- Global battery demand for clean energy applications surged by two-thirds in 2022, with energy storage constituting an increasing share of the overall demand.
- The preference for larger vehicles in conventional car markets is mirrored in the EV market, putting additional strain on critical mineral supply chains to deliver different battery storage options.
- Cathode chemistry choices are diverging towards high-nickel or lithium-iron-phosphate chemistry, while anodes are experiencing a growing adoption of silicon-doped graphite.
- Currently, the majority of recycling capacity is concentrated in China, but new facilities are emerging in Europe and the United States.
- Scrap from manufacturing processes dominates the current recycling pool, but a shift is anticipated by 2030 as used EV batteries reach the end of their first life.

## Clean energy technology critical mineral requirements

The demand for critical minerals in the deployment of clean energy technologies varies widely. Below is a table that the International Energy Agency developed depicting the requirement of various minerals based on the importance of these minerals for a particular clean energy technology:

	Copper	Cobalt	Nickel	Lithium	REEs	Chromium	Zinc	PGMs	Aluminium
Solar PV	●	●	●	●	●	●	●	●	●
Wind	●	●	●	●	●	●	●	●	●
Hydro	●	●	●	●	●	●	●	●	●
CSP	●	●	●	●	●	●	●	●	●
Bioenergy	●	●	●	●	●	●	●	●	●
Geothermal	●	●	●	●	●	●	●	●	●
Nuclear	●	●	●	●	●	●	●	●	●
Electricity networks	●	●	●	●	●	●	●	●	●
EVs and battery storage	●	●	●	●	●	●	●	●	●
Hydrogen	●	●	●	●	●	●	●	●	●

Relative importance of minerals for a particular clean energy technology: High: ● Moderate: ● Low: ●

Source: International Energy Agency





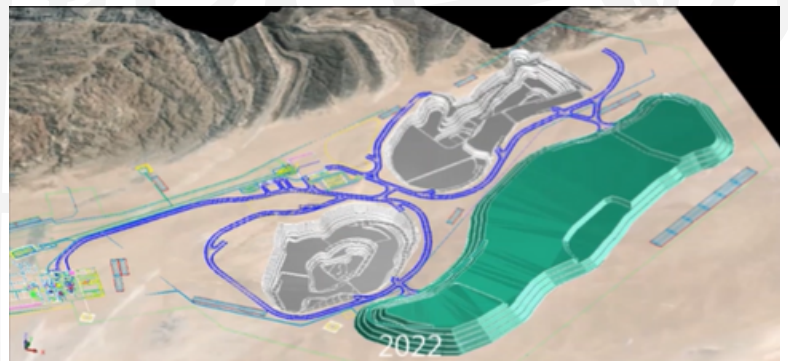
## VBKOM's Role

The mining industry is one of South Africa's most vital contributors when it comes to economic growth, but at what environmental cost?

For years, the mining and minerals industry has been classified as one of the biggest consumers of electricity and natural resources, such as water. It is also one of the biggest contributors to carbon emissions and negative environmental impacts, such as erosion, water pollution, and habitat modification.

A renewed focus on Environmental, Social, and Governance (ESG) principles alongside the clean energy transition are being driven through corporate governance and financial reporting standards within the mining industry. Environmental sustainability and conservation are two of the most topical elements of ESG, and two of the aspects that are usually most evident or measurable when change is implemented.

Environmental conservation is not a new concept, but it is one that the mining industry has been taking more seriously than ever before. Mining strategies have changed enormously in the past decade to include comprehensive environmental management systems, alternative mine planning, and greater emphasis on mine closures and mine rehabilitation.



Globally, mine designs are deliberately focusing on minimising the impact on the environment in a sustainable manner. Environmental and regulatory considerations are taken more seriously by all stakeholders and investors.

It is no longer just about the bottom line. It is about investing responsibly in the future of our people's lives and the environment. VBKOM aims to assist the mining industry in extracting the critical minerals required for the clean energy transition, responsibly and strategically through our multi-disciplinary services offering.

VBKOM has encountered many projects that are short of funds and do not have access to the right resources to find the right investors, or the projects are not adequately geared to be presented in their best possible light.

We have also encountered many potential investors and investment companies who are searching for the correct project to invest in and are not often exposed to a project's true realisable potential and seldom find a project that suits their pocket or their long-term aspirations.

Our progressive approach to project promotions includes reviews by geologists and engineers experienced in assessing project potential in all exploration, mining, and engineering spaces.

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Geology and Geotechnical | Metallurgical Engineering

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Project Management | Simulation and Decision Support

## Our Value Proposition

VBKOM is a provider of innovative business and technical consulting services and solutions for the mining and capital-intensive industries. We challenge ourselves to apply fresh thinking and to utilise our experience and technology in pioneering ways to deliver forward-thinking solutions.

Due to VBKOM's diverse pool of expertise, we can offer our clients specialised skills within a one-stop-shop culture. Our engineering, risk, and project management capabilities as well as simulation and decision-support expertise, make us an ideal partner to the mining and construction industries.

Our focus on long-term client relationships, combined with our technical skills, ensures that our clients can fully optimise their value chain.

At VBKOM, the quality of our work is guided by a simple philosophy – our success is driven only by the success of our clients and the achievement of our professional consultants. Our technical expertise comes unrivaled by using cutting-edge technology and the most advanced computer modelling systems on the market. Our capacity and consistency have earned us the trust of some of the world's most prestigious mineral resource companies. Staying true to our core values, utilising our vast project-specific experience and qualifications, and applying proven world-class methodologies and processes makes the VBKOM team a dynamic, flexible, and innovative team with a track record standing as solid proof of our competitive edge in our field.

VBKOM employees have been successful in providing solutions of an independent nature to a range of clients. We believe that independent consultants can provide optimal solutions to the Client without any risk of delivering a solution with an inherent conflict of interest. The VBKOM strategy is to form part of the owner's team, to define and protect the owner's interest within our area of influence and control. VBKOM is committed to adding value to each client through innovative, practical, and trustworthy engineering solutions. We look forward to adding value to your company.

VBKOM website and social media website:



## Sources

- > [South African Institute of International Affairs](#), accessed 16 January 2024
- > [International Energy Agency](#), accessed 11 January 2023
- > [International Energy Agency](#), accessed 16 January 2024
- > [Statista](#), accessed 16 January 2024

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