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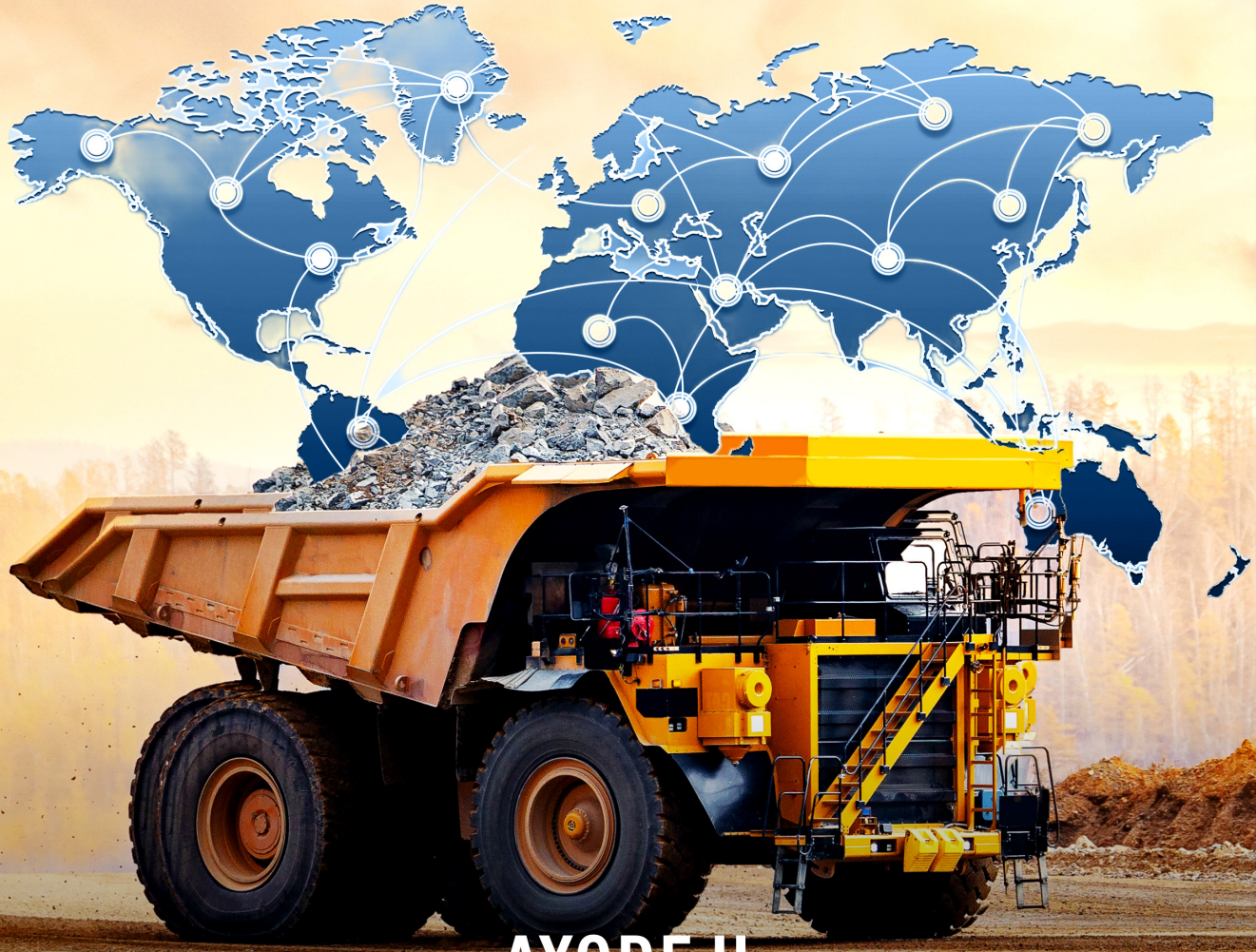
UNLOCKING AFRICA'S CRITICAL MINERAL POTENTIAL:

OPPORTUNITIES FOR GLOBAL ENERGY TRANSITION



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Executive Summary

Africa holds a significant share of the world's critical minerals, including lithium, cobalt, and rare earth elements, essential for renewable energy technologies. With the global energy transition driving demand for these minerals, Africa has a unique opportunity to become a key player in the global green economy.

This report highlights the continent's potential to unlock its critical mineral reserves, drive economic growth, create jobs, and promote sustainable development. It also identifies challenges, including governance and regulatory issues, environmental and social concerns, infrastructure deficits, and geopolitical risks.

To overcome these challenges, the report recommends:

1. Strengthening governance and regulation to ensure transparency, accountability, and environmental sustainability.

2. Promoting regional cooperation to maximise benefits, minimise disparities, and foster collective prosperity.

3. Focusing on sustainable mining practices to preserve Africa's natural environment and ensure long-term ecological balance.

By adopting these strategies, Africa can unlock its critical mineral potential, drive sustainable development, and play a vital role in the global energy transition.

Introduction

Energy transition today has become more critical, extending beyond the need to reduce emissions to its socio-economic effects. One primary ingredient of the transition is the critical minerals' role in shaping the development of technologies and accompanying innovation.

Critical minerals are specific mineral resources required for modern technology, economic progress, and national security. They are designated "critical" because they are required for the production of high-tech items, energy systems, and defence technology. Some of these minerals are rare earth elements used in semiconductor production, solar panels, and wind turbines. However, their supply is jeopardised due to geological paucity, geopolitical considerations, or trade policies.

The demand for minerals has experienced a tremendous increase as the global focus shifts to clean energy. EVs, battery storage, and renewable infrastructure rely on critical minerals such as lithium, cobalt, nickel, and rare earth elements. The International Energy Agency (IEA) predicts that if the world meets its climate targets, demand for these minerals will increase four to sixfold by 2040.

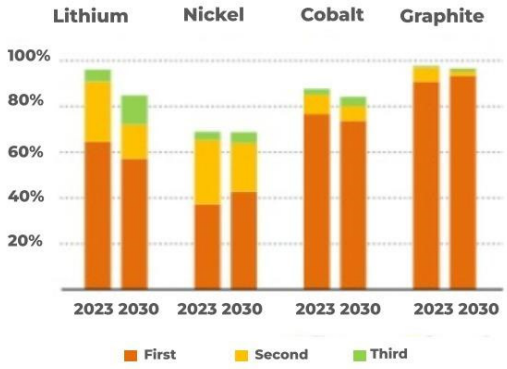

Figure 1: Share of top-three suppliers of selected critical minerals for 2023 and 2030

With Africa holding a substantial amount of the global critical minerals, the continent has emerged a key stakeholder in the narrative of global energy transition and decarbonisation strategies. Sub-Saharan Africa (SSA) alone holds 30 per cent of the world's essential mineral reserves, including quantities of lithium, cobalt, and copper, which are vital for the energy transition.

1. Africa. "Africa Needs to Leverage, Mineral Value Addition for Global Positioning - Officials." AllAfrica.com, 16 Aug. 2024, allafrica.com/stories/202408160061.html.

Critical Minerals	Country Locations in Africa
Cobalt	South Africa, Zambia, Morocco, Ethiopia, Papua New Guinea and DR Congo
Lithium	DR Congo, Mali, Zimbabwe, Namibia, Ghana
Nickel	Nigeria, South Africa, Zimbabwe, Madagascar, Botswana, Tanzania, Angola, Cameroon, and DR Congo
Graphite	Madagascar, Mozambique, Namibia, Tanzania, Angola, Ghana, and Mali
Manganese	South Africa, Gabon, Ghana, Burkina Faso, Côte d'Ivoire, Zambia, Togo, and Mali
Copper	Zambia, DR Congo, South Africa, Namibia, Botswana, Tanzania, Ghana, Mauritania
Rare Earth Elements	South Africa, Tanzania, Madagascar, Malawi, and Burundi

Table 1: Critical minerals needed for making electric vehicles and the respective African countries where they are found

These minerals are pivotal for advancing global decarbonisation goals and enabling the energy transition, making their exploration, extraction, and sustainable management critical for economic development and environmental stewardship. The building of a sustainable supply chain for African key minerals necessitates numerous critical processes and governmental frameworks. African countries must build strong legislative and regulatory frameworks that address environmental protection, social responsibility, and economic growth in the mining sector. Furthermore, using environmental impact assessment (EIA) criteria is critical for evaluating and mitigating potential environmental and human health risks.

This research brief aims to investigate Africa's great potential in critical minerals and identify the continent's distinct opportunities and problems in this area. The study's goal is to identify concrete routes for sustainable development, economic growth, and global competitiveness that are also environmentally and socially responsible. This includes examining Africa's involvement in global value chains for essential minerals, investigating its ability to support the energy transition through green hydrogen and sustainable transportation solutions, and overcoming obstacles such as infrastructure shortages, policy gaps, and geopolitical concerns. By synthesising data, case studies, and stakeholder views, the research will offer evidence-based suggestions for stimulating investment, innovation, and regional collaboration to unlock Africa's full potential in these key industries.

Overview of Africa's Critical Mineral Reserves

Lithium

Africa has one of the largest lithium deposits in the world, including commercial quantities in Zimbabwe, Namibia, Ghana, the Democratic Republic of the Congo, and Mali. The US Geological Survey estimates Zimbabwe's total lithium reserves at 310,000 MT. Another country is Namibia. Namibia has considerable lithium reserves, with many projects and mines located around the country. The Karibib Lithium Project is significant for its known quantities of 2.29 million tonnes at 0.52% lithium content and probable reserves of 7.14 million tonnes at 0.4% lithium content. The Uis Mine has a resource estimate of 138 million tonnes with a grade of 0.73% lithium oxide and a contained metal of 1.45 million tonnes of lithium carbonate equivalent. Other projects, such as the Dâures Constituency in the Erongo Region, include lithium deposits, but the specific reserves are not publicly available. Namibia's lithium-rich pegmatite belt is a highly promising region, with numerous businesses, notably Askari Metals Limited, actively exploring and developing lithium projects in the area.

Lithium-ion batteries have become an important enabler of sustainable energy solutions. They power electric vehicles, renewable energy systems, and energy storage devices and reduce dependence on fossil fuels, thereby reducing humanity's contribution to greenhouse gas emissions.

2. There are around 25 million tons of identified global terrestrial cobalt deposits. Most of these resources are found in sediment-hosted stratiform copper deposits in Zambia and Congo (Kinshasa).
U.S. Geological Survey. (2023). Mineral Commodity Summaries 2023. Retrieved from: https://pubs.usgs.gov/periodicals/mcs2023/mcs2023.pdf pg 60-61.

3. Africa's lithium resources - Congo (Kinshasa), 3 million tons Mali, 840,000 tons; Zimbabwe, 690,000 tons; Namibia; 230,000 tons; Ghana, 180,000 tons; Total = 4,940,000 tons. Definition: Resource—A concentration of naturally occurring solid, liquid, or gaseous material in or on the Earth's crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible.

Project Name	Country	Operator	Estimated Resource	Capital Investment	Annual Production	Mine Life	Additional Notes
Arcadia Lithium Project	Zimbabwe	Zhejiang Huayou Cobalt (China)	15.8 million tonnes measured, 11.8 million tonnes proven	$422 million	400,000 tonnes of lithium concentrate	12 years	Advanced-stage construction, one of the world's largest hard-rock lithium resources.
Ewoyaa Lithium Project	Ghana	Atlantic Lithium (Australia)	14.5 million tonnes at 1.31% lithium oxide	$125 million	2 million tonnes of spodumene	12.5 years	Expected to commence production in 2024, generating ~$4.8 billion in revenue over its lifespan.
Bougouni Lithium Project	Mali	Kodal Minerals (UK)	17.9 million tonnes at 1.48% lithium oxide	$154 million	220,000 tonnes of spodumene	8.5 years	Located in the Birimian Greenstone Belt; conditional funding secured for development.
Manono Lithium Project	DRC	AVZ Minerals (Australia)	401 million tonnes at 1.65% lithium oxide; exploration target up to 1.2 billion tonnes	$545.5 million	700,000 tonnes of high-grade lithium material	20 years	Among the largest LCT pegmatite deposits globally, substantial exploration is underway.
Kaduna Lithium Project	Nigeria	Ming Xin Mineral Separation Nig Ltd. (China)					First lithium project in Nigeria, with plans for EV battery manufacturing.

Table 2: Summary of key information about ongoing lithium projects in Africa as adapted from [source]

4. Global Identified land-based resources averaging approximately 0.5% nickel or greater contain at least 300 million tons of nickel.
5. Graphite exploration has recently been concentrated in Africa, with projects being worked on in Tanzania, Madagascar, Mozambique, and Namibia. Australia, Canada, and Sweden all had additional projects in advanced development phases. Production is anticipated to start in 2023 at mines being built by Canadian and Australian companies, respectively, in Tanzania and Madagascar.
6. South Africa accounts for approximately 70% of the world's manganese resources. - U.S. Geological Survey. (2023). Mineral Commodity Summaries 2023. Retrieved from: https://pubs.usgs.gov/periodicals/mcs2023/mcs2023.pdf pg 115
7. African Energy Council. Africanenergycouncil.org, 2024, africanenergycouncil.org/5-ongoing-lithium-projects-in-africa/.
8. Namibia Ministry of Mines and Energy. Overview of Critical Mineral Deposits in Namibia. Aug. 2023.

To many people, lithium-ion batteries have opened a world of possibilities both in terms of mobility and connectivity. For example, electric cars, made from great use of lithium, can offer a clean, quiet, and more efficient way to travel compared to traditional gasoline-fueled cars. Lithium-ion batteries have further enabled the use of smartphones, laptops, and other portable devices that have greatly revolutionised ways of living, working, and communicating.
The technology of lithium batteries is still under improvement by researchers, working with new materials, various designs, and manufacturing techniques in the interest of enhanced performance, safety, and sustainability. New findings include:

- **Solid-State Batteries:** These batteries replace liquid electrolytes with solid material in traditional Li-ion batteries for improved safety, energy density, and charging speeds.

- **Lithium-Air Batteries:** Lithium-air or lithium-oxygen batteries can give even better energy density than conventional Li-ion batteries, which are very demanding for electric vehicles and renewable energy systems.

- **Recycling and Repurposing:** Due to the increasing demand for Li-ion batteries, the recycling and reuse of used batteries are becoming increasingly important. Researchers are developing new methods for recovering valuable active materials like lithium, cobalt, and nickel and reusing spent batteries in secondary applications.

- **Advanced Materials:** Graphene, nanomaterials, and advanced ceramics are new material areas under study for improving performance, safety, and sustainability in lithium-ion batteries.

Therefore, lithium-ion batteries will play an indispensable role in the road to a sustainable, connected, and mobile world. Further development of the lithium battery's technology creates new avenues of opportunity in energy storage, transportation, and communication as a way of developing a brighter, sustainable future for coming generations.

Cobalt

Cobalt is another important mineral in the production of necessary civilisation-based technologies like advanced batteries, jet engines, rare-earth permanent magnets, petroleum catalysts, and tool parts for construction, manufacturing, and mining.
Cobalt from the Democratic Republic of Congo (DRC) has a significant global footprint. In 2020, 70% of globally mined cobalt came from the DRC. This comes from a fraction of the large cobalt deposit that the country sits on. According to research, DRC holds around 56% of the world's cobalt reserves, with the majority of the country's cobalt reserves located in the copper and cobalt belt of southern DRC, specifically in the provinces of Lualaba, Haut-Katanga, and Tanganyika. This significant reserve is of estimates suggesting that the country's cobalt reserves could last for several decades.

However, the mining of cobalt has been environmentally disruptive to the people of Congo. Evidence reveals that the people are plagued by water contamination, making them sick and poorer. The extraction and processing of cobalt in the DRC have been linked to various environmental and social concerns, including water pollution, soil contamination, and human rights abuses. A recent report titled "Beneath the Green: A Critical Look at the Environmental and Human Costs of Industrial Cobalt Mining in DRC" uncovered the severe environmental and human costs of the DRC's cobalt boom, exposing that toxic contamination from industrial mines is causing harm to local people and poisoning water sources. According to the report, at least 22 scientific studies show severe pollution in the area, and residents suffer from a variety of health problems, including skin disorders, respiratory issues, and reproductive health problems. This concern must be addressed if the world will achieve sustainability for all, especially with the ultimate need for cobalt mining from Congo.

Rare Earth Elements (REEs)

In 2021, South Africa, Tanzania, Madagascar, and Burundi were among the major African nations producing rare earth minerals. Together, Tanzania and South Africa possessed 1.6 million tonnes of rare earth reserves or 2% of the world's total.

9. Republic of Namibia Government. "Motion on the Illegal Lithium Mining in Uis District by Hon Seibeb." Parliament of the Republic of Namibia, 2023, www.parliament.na/wp-content/uploads/2023/04/Motion_on_the_illegal_lithium_mining_in_Uis_District_by_Hon_Seibeb.pdf.
10. Brandt, Chloe. Lithium Mining in Namibia -Dâures Constituency. 2023.
11. Gulley, Andrew L. "One Hundred Years of Cobalt Production in the Democratic Republic of the Congo." Resources Policy, vol. 79, no. 0301-4207, Dec. 2022, p. 103007, www.sciencedirect.com/science/article/pii/S0301420722004500, https://doi.org/10.1016/j.resourpol.2022.103007.
12. Huber, Sophie Theresia, and Karl W. Steininger. "Critical Sustainability Issues in the Production of Wind and Solar Electricity Generation as Well as Storage Facilities and Possible Solutions." Journal of Cleaner Production, vol. 339, no. 339, 10 Mar. 2022, p. 130720, www.sciencedirect.com/science/article/pii/S0959652622003596?via%3Dihub, https://doi.org/10.1016/j.jclepro.2022.130720.

Burundi produced 200 metric tonnes, whereas Madagascar was the sixth-largest producer, with 6,800 metric tonnes (2%) of the world supply.

Although export data for African nations is lacking, 90% of the world's rare earth metals were processed in China as of 2024, indicating that China is the primary buyer of African exports. According to Benchmark Mineral Intelligence, 37% of Africa's future rare earth supply is already committed to Chinese purchasers; the remaining portion is available for other markets. It is anticipated that eight new rare earth mines in Tanzania, Angola, Malawi, and South Africa will begin production by 2029, potentially accounting for 9% of the world supply.

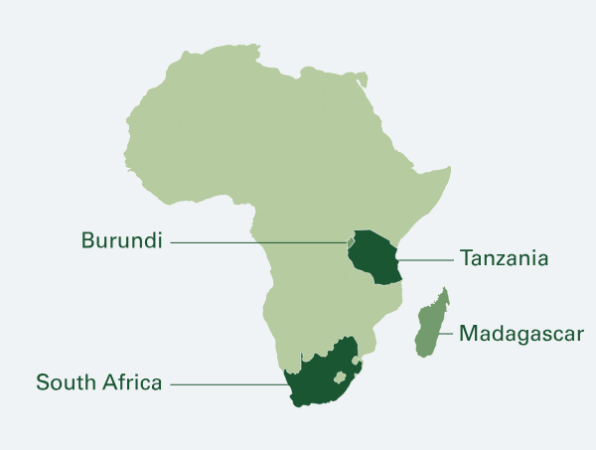

Figure 2: Map of selected African countries with rare earth elements [Source]

With 6,800 metric tonnes (2%) of rare earth minerals in 2021, Madagascar ranked sixth. In the same year, Burundi produced 200 metric tonnes (0.1%) of rare earth minerals, ranking it the eleventh largest producer.

African Countries with Notable REE Reserves:

- **South Africa** holds approximately 790,000 tons of REE reserves, with notable projects like Steenkampskraal, which has the highest-grade rare earth deposit in the world.[1] [2]
- **Madagascar** has around 960 tons of REE reserves, with exploration projects like Kangankunde. This region is known for its monazite deposits rich in thorium, lanthanum, and cerium.
- **Tanzania** possesses around 890,000 tons of REE reserves, with projects like Wigu Hill, a significant light REE deposit.
- **Malawi** has notable REE deposits, including Kangankunde, which are being explored for their potential.

Other African countries, such as Namibia, Zambia, Kenya, and Uganda, also have significant REE deposits and exploration projects. The mining industry in Africa is expanding as a result of these nations drawing interest from investors and mining firms. Africa is probably going to become more and more crucial in supplying the growing demand for REEs.

These REEs are critical for increasing the efficacy and performance of green technologies. Wind turbines, for example, provide significant benefits to permanent magnet generators. These magnets, which are essential components of wind turbine generators, are mostly composed of rare earth elements (REEs) such as neodymium (Nd), dysprosium (Dy), and praseodymium (Pr). Because of its unique properties, mechanical energy captured from the wind can be converted into electrical energy, generating electricity. Neodymium and Dysprosium are critical in producing high-strength, lightweight permanent magnets. Combining REEs such as Nd, Dy, and Pr produces long-lasting, efficient magnets. These magnets are necessary for the turbine's generator to function, which converts wind kinetic energy into electrical power.

REEs significantly improve wind turbine performance, dependability, and design flexibility, advancing sustainable energy technology. These characteristics highlight their importance in facilitating the global transition to renewable energy sources.

13. RAID and AFREWATCH. BENEATH the GREEN in Collaboration With. 2024.
14. Henson, Anna. "Neocolonialism: Cobalt Mining in DRC." Michigan State International Law Review, 12 Oct. 2022, www.msuilr.org/new-blog/2022/10/12/neocolonialism-cobalt-mining-in-democratic-republic-of-the-congo.
15. African Minerals Development Centre. "Rare Earth Minerals - African Green Minerals Observatory." Africangreenminerals.com, 2021, www.africangreenminerals.com/minerals/rare-earth-minerals.
16. Burja, Samo. "China Refines the World's Rare Earth Elements." Bismarckanalysis.com, Bismarck Brief, 24 Aug. 2022, brief.bismarckanalysis.com/p/china-refines-the-worlds-rare-earth.
17. Bloomberg. "Africa's Rare Earths Could Make up 9% of Global Supply by 2029." The Economic Times, Economic Times, 11 July 2024, economictimes.indiatimes.com/small-biz/trade/exports/insights/africas-rare-earths-could-make-up-9-of-global-supply-by-2029/articleshow/111650213.cms.

Opportunities for Africa in the Global Energy Transition

Economic Growth and Job Creation

With the abundance of minerals in Africa, the continent can achieve industrialisation through value-addition to its minerals. By refining and processing minerals locally, African countries can boost the value of their exports, gain more foreign exchange, and improve their trade balances. This, in turn, can lead to increased economic growth as the country invests more in its economy and provides more goods and services to its population. According to the African Development Bank, a 10% increase in mineral value added can result in a 2-3% boost in GDP. Another advantage of industrialisation and value addition through the refining and processing of minerals is the potential for job development.

Many African countries can create new jobs for their citizens by developing resource refinement and processing enterprises. This can be especially useful for young people, who constitute a sizable share of the continent's population. Another benefit of industrialisation and value addition through mineral refining and processing is the potential for job creation. By establishing industries that refine and process minerals, African countries can create new employment opportunities for their citizens.

This can be especially beneficial for young people, who make up a significant proportion of the continent's population. According to the UN Trade and Development (UNCTAD), the mining sector has the potential to create up to 10 times more jobs than primary production, making it a critical strategy for job creation.

Value addition through mineral refining and processing can also yield more results leading to better economic diversification, more competitiveness, and improved innovation in addition to economic growth and job creation. African nations can lessen their reliance on a particular industry or commodity imports and increase their resilience to outside shocks by diversifying their economy. Countries can boost their exports and draw in more foreign investment by becoming more competitive. Countries may increase economic growth and employment creation by fostering innovation and creating new goods and services.

In a unified effort to harness Africa's natural and intellectual resources, a joint coalition among African nations could localise the production of batteries and other essential components for the energy transition. By pooling their diverse mineral wealth, countries can collaborate to manufacture high-demand products such as wind turbine blades, electric vehicle batteries, and solar panels.

This strategy leverages the comparative advantages of each nation, creating a supply chain that spans the continent and produces finished goods tailored to the African market. Beyond meeting regional energy needs, such collaboration would generate significant employment opportunities, foster innovation, and elevate the social and economic standing of participating nations in the global arena.

By combining financial, natural, and intellectual resources, Africa can not only accelerate its energy transition but also position itself as a competitive player in the global green economy, showcasing the power of regional solidarity. These African countries can boost export profits, improve trade balances, and create new job and entrepreneurship opportunities by converting raw materials into higher-value goods.

Strategic Partnerships

While African nations collaborate to pool their mineral resources, financial capital, and intellectual capabilities, strategic partnerships with international companies and governments can further strengthen this initiative. Such partnerships could offer critical benefits, including access to advanced technologies, expertise in manufacturing processes, and funding for large-scale infrastructure projects. For instance, global companies with experience in battery production or renewable energy components could provide technical know-how, while governments of African nations could facilitate favorable trade agreements or co-funding opportunities.

18. Extractive industries and sustainable job creation
19. Reuters. "Chinese Companies to Invest up to $7 Billion in Congo Mining Infrastructure." Reuters, 27 Jan. 2024, www.reuters.com/markets/commodities/chinese-invest-up-7-bln-congo-mining-infrastructure-statement-2024-01-27/.
20. The African Miner. Battling Corruption in Africa's Mining Sector. Ikeoluwa Ogungbangbe, 19 Nov. 2024, miner.africa/2024/11/19/battling-corruption-in-africas-mining-sector/
21. Malcolm, Bella. "The Dark Side of Africa's Mining Industry and the Road to Reform - African Leadership Magazine." African Leadership Magazine, 15 Jan. 2025, www.africanleadershipmagazine.co.uk/the-dark-side-of-africas-mining-industry-and-the-road-to-reform/

On the flip side, these partnerships can also provide African nations with opportunities to integrate their finished products into global supply chains, thereby enhancing market access. By building relationships with international stakeholders, Africa can position itself not only as a regional hub for energy-transition products but also as a significant player in the global green economy.

- **Chinese Investments in the DRC:** China's investments in the DRC provide a prime example of how strategic partnerships can unlock the potential of mineral-rich nations. The DRC, which holds over 60% of the world's cobalt reserves, has benefited from Chinese companies' involvement in mining and infrastructure development. As part of a new deal for the Sicomines copper and cobalt joint venture, Sinohydro Corp and China Railway Group would now invest up to US$7 billion in infrastructure. These partnerships have resulted in the development of mining facilities, improved transportation infrastructure, and increased export capacities, enabling the DRC to play a central role in the global supply chain for electric vehicle batteries.

  However, the partnership also highlights critical lessons. While the investments have spurred economic growth, concerns about equitable resource sharing, environmental impacts, and local job creation underscore the importance of establishing fair and transparent terms of engagement. For Africa's proposed coalition, these lessons can guide how partnerships are structured to ensure mutual benefit and long-term sustainability.

- **South Korea and Vietnam in Electronics Manufacturing:** Another relevant example is the partnership between South Korea and Vietnam in electronics manufacturing. Through collaborative investments and knowledge transfer, Vietnam has become a significant hub for electronics assembly and production.

African nations could adopt similar strategies by collaborating with global leaders in renewable energy technologies to develop local manufacturing hubs for solar panels, wind turbines, and battery systems.

However, these partnerships must be approached with care to ensure that Africa retains control over key resources, safeguards local jobs, and avoids exploitative practices that undermine the coalition's objectives. Clear frameworks and equitable terms of engagement will be essential to maximise the value of international collaboration while ensuring the coalition's long-term success. For Africa's joint coalition, such partnerships could involve technology transfer agreements, training programs for local talent, and infrastructure investments, ensuring that the region moves beyond raw material exportation to become a global leader in energy transition products. By learning from past successes and challenges, African nations can create a framework for partnerships that deliver sustainable economic and social benefits.

Challenges in Unlocking Africa's Mineral Potential

Africa is endowed with vast mineral resources, including copper, cobalt, and lithium. The extraction and processing of these minerals have the potential to drive economic growth, create jobs, and improve living standards across the continent. However, despite this potential, Africa's mineral sector faces numerous challenges that hinder its development.

- **Governance and Regulatory Issues:** Weak policies, corruption, and a lack of regulatory enforcement are important governance and regulatory concerns affecting Africa's mineral sector. Many African countries' mining regulatory frameworks are weak, resulting in a lack of openness and accountability in the sector. Corruption is also a major issue, with officials frequently taking bribes in exchange for mining licenses or permits. This corruption may result in the issuing of licenses to companies that are neither competent or equipped to operate safely and sustainably.

  Also, the lack of implementation of existing legislation allows corporations to operate with impunity, disregarding safety and environmental norms. This can have major environmental and social consequences, including deforestation, water contamination, and community dislocation. African nations must address these concerns.

22. Resource nationalism refers to the tendency of governments to assert control over natural resources, often through the nationalization of mining companies or the imposition of stringent regulations.
23. Partners, Tomorrow. Conflict Minerals and the Democratic Republic of Congo Responsible Action in Supply Chains, Government Engagement and Capacity Building. 2010.

- **Environmental and Social Concerns:** The extraction of minerals in Africa has significant environmental and social impacts. Under the surface of the multibillion dollar mining sector lies a brutal reality: environmental degradation, human rights violations, systematic corruption, and rising inequality continue to plague communities dependent on mining. In addition, the use of child labour in cobalt extraction raises major ethical concerns. Cobalt is an important mineral used in the manufacture of electric vehicle batteries, and its extraction has been related to child labour and other human rights violations.

To address these concerns, mining companies must adopt sustainable and responsible mining practices. This includes conducting environmental impact assessments, implementing measures to mitigate negative environmental impacts, and engaging with local communities to ensure that their rights and interests are respected. Governments must also play a role by enforcing environmental and social regulations, and ensuring that mining companies are held accountable for their actions.

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- **Infrastructure Deficits:** Inadequate transport networks, electricity supplies, and mining facilities are major infrastructure bottlenecks blocking Africa's mineral sector development. Many African countries lack the transport infrastructure needed to transport minerals from mines to ports, making exporting minerals difficult and expensive. Byond this, the lack of a consistent electricity supply forces many miners to rely on diesel generators, which are costly and environmentally unsustainable. African governments and private firms must thus invest in infrastructure development. This would include the construction of roads, railways, and ports, as well as the establishment of dependable energy supply networks. The development of mining facilities, including processing plants and smelters, is also critical to unlocking the continent's mineral potential.

- **Geopolitical Risks:** Resource nationalism and regional conflicts are significant geopolitical risks that affect Africa's mineral sector. Regional conflicts, such as the Democratic Republic of Congo's conflicts over minerals , can also disrupt mining operations and impact the global supply of minerals.

To mitigate these risks, mining companies must engage with governments and local communities to ensure that their interests and concerns are addressed. Governments must also work to create a stable and predictable regulatory environment, one that encourages investment and innovation in the mineral sector. Regional organisations, such as the African Union, can also play a role in promoting regional stability and cooperation.

Policy Recommendations and Strategies

Harnessing Africa's mineral potential necessitates an integrated strategy that considers economic growth, environmental sustainability, and social equality. To unlock Africa's critical mineral potential and promote sustainable development, the following policies and measures are proposed:

1. **Strengthen Governance and Regulation:** Good governance and strong regulatory frameworks are essential for ensuring equitable and sustainable mining of Africa's resources. To achieve this, there is a great need for transparency in managing mining revenues. This would be essential to ensure accountability and fairness in the entire value-chain of the mineral management process. To support this transparency process, governments should establish mechanisms for public disclosure of mining revenues and expenditures, enabling citizens to monitor and hold authorities accountable. This could mean a public dashboard that gives an overview of mineral activities, with stakeholder offices responsible for managing each process of the mineral refining. This platform would be an accessible online platform where mining revenues, expenditures, royalties, and taxes are regularly updated. Another step in this direction could be publishing contracts and agreements related to mining to ensure citizens have visibility into terms and revenue-sharing arrangements.

   Another regulatory development could be to establish ethical sourcing certifications for African minerals that can ensure compliance with international environmental and social standards. Such certifications would not only enhance the reputation of African minerals on the global market but also ensure the protection of local communities and ecosystems.

   Strengthening regulatory frameworks is critical to preventing corruption and ensuring environmental sustainability. Governments must adopt stringent environmental regulations and anti-corruption measures to safeguard natural resources and promote responsible mining practices.

2. **Promote Regional Cooperation:** Collaboration among African nations is vital to maximising the benefits of critical minerals while minimising regional disparities. An innovative mechanism to drive this collaboration would be developing regional frameworks for resource management and value chain integration, such as leveraging the African Continental Free Trade Area (AfCFTA). This move has the capacity to create synergies and foster collective prosperity. Ripple effects of such a coalition would be the creation of finished products, with minerals now having greater value, that can serve the global market and the burgeoning African clean energy market. These could include finished products like batteries, solar panels and wind turbines that are African-made.

   Investing in local processing capabilities within Africa ensures that minerals are refined and processed locally, creating jobs and retaining more value on the continent. This approach not only strengthens the mining sector but also fosters economic independence by reducing reliance on exporting raw materials. Encouraging companies to procure local goods and services further boosts economic growth by supporting local industries, driving innovation, and promoting sustainable development. Additionally, developing skills and tailored training programs for the mining sector enhances local capacity and ensures community participation. By empowering the workforce, communities can directly benefit from mining activities, leading to long-term socio-economic development.

   Another key benefit of such a coalition is that it encourages collaboration among African countries and allows the sharing of best practices, expertise, and resources, which can help address common challenges in the mining sector. It could also be an opportunity to jointly seek large capital investments for the development of the continent's minerals and infrastructure. Investing in regional infrastructure, including transportation networks and energy systems, is key to facilitating trade and economic growth. Improved connectivity ensures that mineral-rich regions can access markets and enhance their global competitiveness.

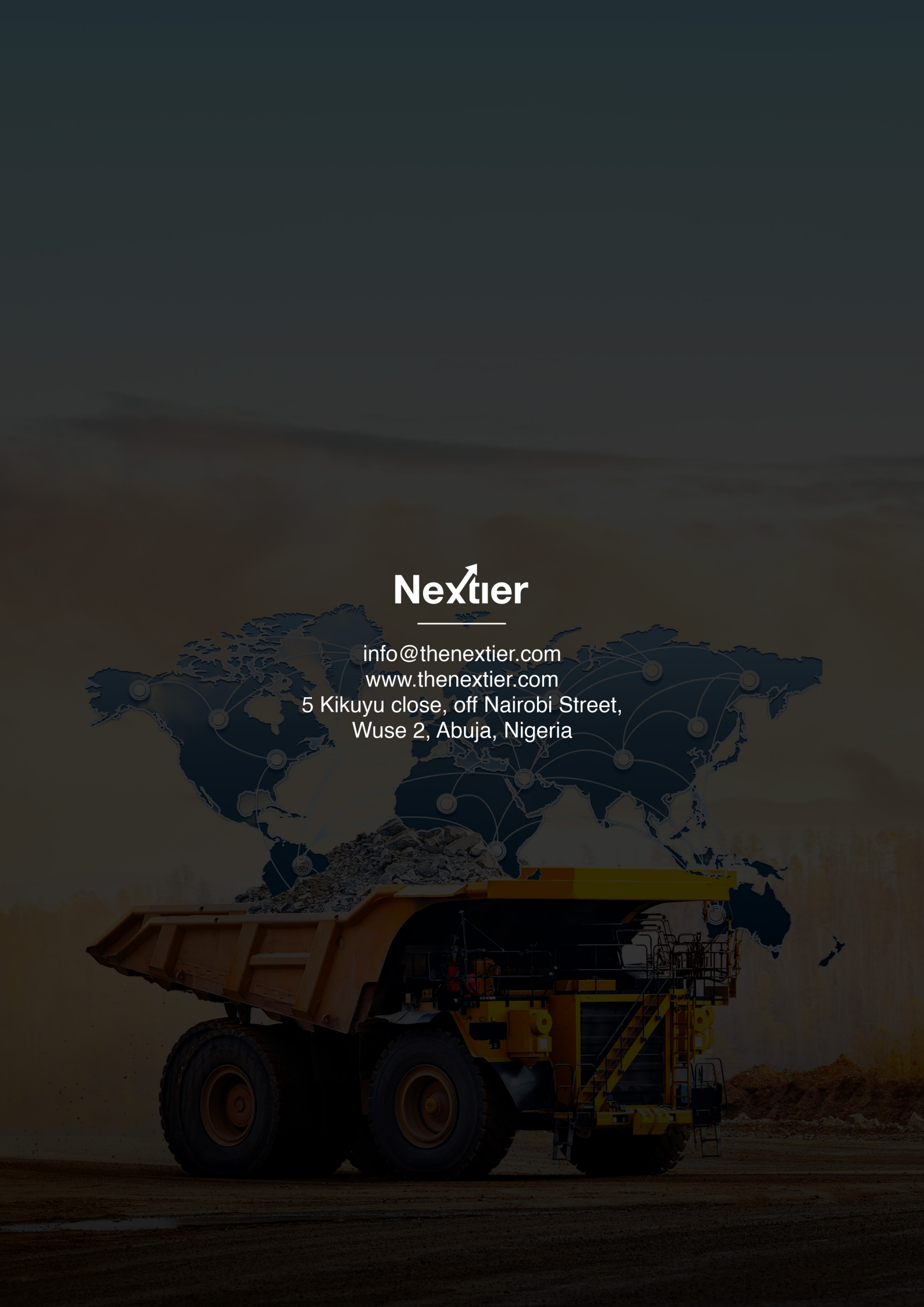
3. **Focus on Sustainable Mining Practices:** Sustainability must underpin all mining activities to preserve Africa's natural environment for future generations. stakeholders should actively promote the adoption of eco-friendly technologies and practices in mining operations to reduce environmental impacts while improving operational efficiency. By integrating green technologies, such as water recycling systems, renewable energy solutions, and waste management techniques, mining companies can minimise their ecological footprint and align with global sustainability goals. These innovations not only preserve natural resources but also enhance cost-effectiveness in the long term.

   Equally important is the rehabilitation of mining sites after operations to prevent environmental degradation. Restoring mined lands through reforestation, soil stabilisation, and other ecological interventions supports sustainable land use and helps rebuild ecosystems. This practice is vital for maintaining biodiversity, combating land erosion, and ensuring a long-term ecological balance that benefits both nature and communities. To ensure that this is done properly, it is imperative to engage local communities in decision-making processes. By involving local populations in discussions about mining projects, governments and companies can ensure a double win-win situation that allows community rights and interests to be respected, while gleaning from their knowledge of their natural habitat. Such participatory approaches often foster trust, reduce conflicts, and promote cooperation, creating a harmonious relationship between mining operations and local stakeholders.

Conclusion

The mining industry plays a crucial role in encouraging sustainable development and decreasing environmental damage. Mining firms can reduce their environmental impact, increase operational efficiency, and align with global sustainability goals by implementing eco-friendly technology and practices. The incorporation of green technologies, such as water recycling systems and renewable energy solutions, is critical for conserving natural resources and increasing cost-efficiency.

Furthermore, rehabilitation of mining sites following operations is critical for reducing environmental deterioration and supporting sustainable land use. Engaging local communities in decision-making processes is also critical for ensuring that community rights and interests are upheld. Participatory tactics build trust, minimise conflict, and encourage collaboration, resulting in a healthy connection between mining operations and local stakeholders.



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