Africa Finance Corporation

Compendium of Africa's **Strategic Minerals**

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FOREWORD

Africa stands at a defining juncture in the global economy. As the world undergoes a profound realignment—across energy systems, industrial supply chains, and digital technologies—the strategic importance of mineral resources has never been greater. For Africa, however, this moment is not simply about responding to global demand. It is about agency: the ability to define, on our own terms, how our mineral wealth is developed, transformed, and mobilised to support long-term prosperity.

The continent is endowed with some of the world's most significant reserves of minerals critical to economic security, industrialisation, food systems, the digital economy, defence and the global decarbonisation agenda. Yet Africa's mineral story has too often been framed narrowly—through fragmented data, an upstream-only lens, and priorities set largely outside the continent. This has constrained investment, obscured value-addition opportunities, and limited the development of integrated regional supply chains.

The *Compendium of Africa's Strategic Minerals* is conceived to correct course.

This inaugural edition represents a deliberate effort to reframe Africa's minerals sector through an African lens—one that places infrastructure, beneficiation, and domestic demand at the centre of the analysis. Rather than treating minerals solely as export commodities, the Compendium maps their full value chains, linking reserves and production to processing capacity, transport and energy infrastructure, and regional industrial corridors. In doing so, it advances a simple but powerful proposition: Africa's mineral wealth becomes transformational only when it is developed systemically, across sectors and borders.

Central to this approach is a rethink of what "strategic" truly means for Africa. While global discourse often focuses on a narrow set of energy-transition minerals, Africa's development priorities are broader and more grounded in lived realities. Food security, industrialisation, housing, and infrastructure are as fundamental to the continent's future as batteries and electric vehicles. For this reason, the Compendium deliberately elevates fertiliser minerals such as phosphates and potash, which underpin agricultural productivity, alongside iron ore and steel, which are foundational to construction, manufacturing, and regional trade. These materials are no less strategic to Africa's economic transformation than lithium, cobalt, or rare earths.

Importantly, this Compendium offers a platform for cooperation. Developed in collaboration with governments, regulators, mining companies, and regional institutions, it is designed to strengthen data-sharing, improve market transparency, and establish a common analytical foundation for decision-making. By doing so, it supports better policy choices, more efficient capital allocation, and the emergence of integrated regional value chains.

At the Africa Finance Corporation, our mandate has always been to mobilise capital and expertise to close Africa's infrastructure gap and unlock sustainable growth. This Compendium sits squarely within that mission. It is intended to serve policymakers, domestic and international investors, and industrial players alike—providing the clarity needed to move from endowment to economic transformation.

Above all, this publication is an affirmation of African leadership. It reflects a growing consensus that Africa must define its own minerals priorities in line with its development objectives—anchoring industrialisation, strengthening food and energy security, and deepening regional integration. The scale of the opportunity demands coordination, ambition, and trust. This Compendium is a step toward that shared endeavour.

Samaila Zubairu

President & Chief Executive Officer

Africa Finance Corporation

EXECUTIVE SUMMARY

Africa hosts one of the world's deepest and most diversified mineral endowments, with an estimated US$8.6 trillion in undeveloped mineral assets – x2.5 times its annual GDP. Yet the continent captures only a limited share of the value embedded in this resource base. The binding constraint is not geology but the ability to convert mineral wealth into productive assets: infrastructure, industrial capacity, regional value chains, and competitive manufacturing platforms.

This Compendium argues for a more integrated approach to Africa's mineral development—one that is grounded in commercial realities, aligned with Africa's development priorities, and focused on where coordination can materially improve project economics. It recognises that investment decisions are ultimately driven by risk-adjusted returns, not continental strategies. Capital will flow to the lowest-risk, most competitive opportunities, shaped by jurisdictional risk, ore quality, logistics costs, power pricing, permitting timelines, and offtake certainty. These realities will not always align with pan-African value-chain ambitions.

However, where fundamentals allow, a more joined-up approach can directly improve those same economics. Across Africa, the three anchors of mineral project viability—resource endowment, enabling infrastructure (especially power), and demand—rarely co-locate. This misalignment explains why Africa continues to export raw materials while importing processed products, even in cases where regional integration could lower delivered costs, widen effective market size, and de-risk offtake.

The Compendium therefore reframes the mineral debate away from externally defined "critical minerals" lists and towards African priorities: infrastructure development, industrialisation, energy systems, food security, and manufacturing resilience. Minerals are treated not primarily as export earners, but as inputs into domestic and regional economic systems. From this perspective, iron ore, ferro-alloys, and mineral fertilisers—particularly potash and phosphates—are as strategically important as battery minerals.

The steel value chain illustrates the point. In South Africa, long-steel capacity has been constrained not only by operational challenges and power costs, but also by limited domestic demand, undermining commercial viability at the margin. At the same time, infrastructure pipelines across the continent require precisely those products. Demand exists, but it is fragmented by borders, logistics bottlenecks, procurement practices, and the absence of integrated industrial corridors. The result is under-utilised capacity in some markets, continued imports in others, and lost scale efficiencies across the system.

The consequence extends well beyond steel itself. When Africa imports finished steel, it also imports—implicitly—the embedded value of the ferro-alloys that go into it: chromium, manganese, nickel, cobalt, vanadium, and zinc. As domestic primary steelmaking has weakened, so has Africa's internal demand for these minerals, leaving their value chains tied to external demand cycles, particularly Asian steel production. Today, many of these minerals face subdued outlooks not because Africa lacks long-term demand fundamentals, but because African demand is not being expressed through domestic industrial systems. Getting steel right is therefore not a sectoral objective. It is a system requirement for restoring demand, scale, and viability across multiple mineral value chains that are currently misaligned with Africa's own growth trajectory.

In this context, this inaugural Compendium sets out four core findings.

1 Africa's Mineral Constraint Is Conversion, Not Endowment

Africa's estimated US$8.6 trillion in undeveloped mineral assets places the continent among the world's most resource-rich regions. Yet this wealth remains largely latent for two structural reasons.

First, Africa remains under-explored, with limited geological coverage and an incomplete understanding of its resource base despite strong exploration fundamentals. Africa consistently delivers high discovery rates at lower global cost yet attracts less than 10% of global exploration spending. This imbalance reflects capital allocation failures driven by limited data availability and elevated risk perception.

Correcting this requires treating geoscientific data as strategic infrastructure. Modern mining competitiveness depends on open, harmonised, and machine-readable geological data. Geological surveys, national geoportals, and GIS platforms function as investment de-risking public goods, comparable in strategic importance to roads, ports, or power grids.

Second, this asset value reflects mine-site ore values, not the substantially higher value realised once minerals are processed and transformed. The gap between ore value and industrial value is material. The sale price of a tonne of aluminium is approximately six times that of alumina, which is itself over ten times that of bauxite. Similarly, ferro- and silico-manganese command prices eight to nine times higher than manganese ore. Measured at the point of industrial use, Africa's effective resource base expands materially.

2 Beneficiation Fails Where Demand Is External, and Works Where Demand Is Anchored Regionally

Across Africa, mineral beneficiation remains uneven, under-scaled, or disconnected from downstream demand. Significant processing capacity is idle or has shut down in recent years due to constraints such as feedstock reliability, power affordability, and weak offtake economics, affecting steel mills, ferro-alloy smelters, zinc refineries, and aluminium smelters across the continent. Where beneficiation has succeeded—such as phosphates in Morocco, steel in North Africa, and copper in the Copperbelt—it has done so because processing is anchored to scale, infrastructure, and predictable demand.

The core issue is not resource availability or technical capability, but where demand is located. Much of Africa's processing capacity—particularly in steel and associated ferro-alloys such as chromium, nickel, cobalt, manganese, and vanadium—remains exposed to external demand cycles, most notably Asian steel production, rather than African consumption. As a result, pricing, margins, and investment incentives for these minerals are largely set offshore, increasing volatility and weakening the case for domestic processing.

A more durable approach requires reframing African minerals as anchors for regional industrial demand clusters that reflect the continent's long-term growth fundamentals. These fundamentals are among the strongest globally. Africa has the lowest electricity consumption per capita, the lowest steel use per capita, and the lowest fertiliser application per hectare of any major region. At the same time, it hosts some of the fastest-growing economies in the world, the fastest rate of urbanisation and will account for 42% of the global work-age population growth by 2050.

The implication is clear: Africa represents the world's largest upside in future demand for power, construction materials, food inputs, manufactured goods, and digital infrastructure—all of which are mineral-intensive. This demand directly translates into must-develop clusters:

- **Infrastructure** to expand railways, build ports or factories requires steel and ferro-alloys (iron ore, chromium, nickel, cobalt, manganese, vanadium and zinc) and **construction materials** involving inputs made of aluminium, mineral sands or fluorspar
- **Clean technologies and electrification** (batteries, renewables, and energy-transition materials) to bridge Africa's energy deficit need copper, aluminium, cobalt, rare earths, graphite, silver, or uranium
- **Fertilisers** to grow agriculture yields and achieve food self-sufficiency include a large share of phosphate and potash rocks
- **Portable devices and electronics** to equip the workforce of the future are anchored in tin, tantalum, tungsten, and battery minerals
- **Automotive and machineries** require lead and PGMs for traditional internal combustion engines or lithium, nickel, rare earths, manganese, cobalt or graphite for EV batteries.

These demand drivers are real and growing, but they remain fragmented across borders. Individually, national markets are often too small to sustain processing at scale. Aggregated regionally, they are sufficient to underpin competitive beneficiation platforms.

3 Infrastructure is More Than Just an Enabler

Africa's ambition to localise mineral supply chains only becomes economically meaningful when minerals are embedded in functional infrastructure ecosystems. Power cost and reliability, logistics availability, access to industrial land, and trade capacity ultimately set the ceiling on beneficiation and value capture.

For this reason, the Compendium places infrastructure at the centre of mineral strategy. It introduces a continent-wide minerals and infrastructure map that identifies all operating mines and undeveloped deposits and links them to railways, ports, and major power generation hubs. In doing so, it makes visible where value chains can realistically be built, shared, or scaled across borders.

Building on this, the Compendium proposes targeted infrastructure priorities across rail (including shared mineral corridors in the Guinea Highlands and the Gulf of Guinea), power (with a focus on transmission PPPs and cross-border interconnections), ports (including mineral transshipment hubs and African participation in shipping ownership), and industrial zones designed to host energy- and materials-intensive processing.

Infrastructure also determines whether Africa can compete in a world of green industrialisation. Clean power, efficient logistics, and integrated corridors reduce carbon intensity and directly improve cost competitiveness. This is no longer optional. Low-carbon processing and traceable supply chains are increasingly prerequisites for maintaining access to key markets, particularly the European Union. Africa's potential in this regard is already visible, from emerging decarbonised steel and aluminium value chains in North Africa to lower-carbon transport corridors such as the Lobito Corridor. In each case, competitiveness is driven less by mining techniques than by the infrastructure surrounding them.

4 Trade and Geo-economic Realignment is Elevating the Strategic Relevance of African Minerals

Global mineral supply chains are under increasing strain from trade tensions, export controls, industrial policy shifts, and efforts to reduce concentration risks. In this environment, Africa's scale of mineral endowment and its broadly non-aligned positioning are strategic advantages—but only if they are used to redefine how the continent participates in global value chains. The current environment calls for a shift away from simply identifying new buyers or geopolitical partners, toward embedding Africa as a reliable, value-adding component of emerging supply chains.

This imperative is clearest in minerals where supply chains are both highly concentrated and strategically sensitive. China controls roughly 90% of global manganese refining, around 90% of rare earth separation and refining, and dominates battery-grade graphite processing. In parallel, aerospace and defence industries face similar concentration risks across chromium, graphite, rare earths, and tungsten, all essential for advanced alloys, propulsion systems, and high-performance electronics. Uranium has re-emerged as a strategic mineral as nuclear energy regains momentum, yet fuel conversion, enrichment, and related services remain concentrated in a small number of countries.

Across several of these minerals, Africa is already moving from latent potential to active positioning. The continent's first rare earth refinery is under construction in Angola. Mozambique has emerged as the supplier to the largest natural graphite and anode-material supply chain outside China. Battery-grade manganese sulphate projects are advancing in South Africa and Botswana. Uranium production has restarted at key mines in Namibia (2024) and Malawi (2025).

Africa's participation in strategic mineral supply chains must now shift from isolated, export-oriented projects toward infrastructure-backed, regionally integrated, and policy-aligned platforms. Without this shift, the continent will remain a marginal supplier to strategically critical sectors. With it, Africa can secure durable positions in clean-technology, defence, and nuclear value chains—capturing greater value while contributing to global supply-chain diversification and resilience.

ACKNOWLEDGEMENTS

This publication is the result of a collective effort to strengthen the quality, credibility, and African ownership of data on the continent's mineral endowment and value-chain potential. As such, the Africa Finance Corporation (AFC) wishes to express its sincere gratitude to the many public- and private-sector stakeholders whose collaboration, insights, and expertise made the inaugural *Compendium of Africa's Strategic Minerals* possible.

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List of **Acronyms**

ASM	Artisanal & Small-scale Mining
DRI	Direct Reduced Iron
EANB	East Africa Nickel Belt
EMM	Electrolytic Manganese Metal
EV	Electric Vehicle
GIS	Geographic Information System
GoldBod	Ghana Gold Board
HALEU	High-Assay Low-Enriched Uranium
HC FeMn	High-Carbon Ferromanganese
HP MSM	High-Purity Manganese Sulphate Monohydrate
HSLA	High-Strength Low-Alloy
LFP	Lithium Iron Phosphate
LMFP	Lithium Manganese Iron (Fe) Phosphate
LMNO	Lithium Manganese Nickel Oxide
LMR	Lithium Manganese-Rich
MOZAL	Mozambique Aluminium
mtpa	million tonne per annum
NMC	Nickel Manganese Cobalt
OrCor	Ore Corridor
PEAC	Central African Power Pool
PGEs	Platinum Group Elements
PGMs	Platinum Group Metals
SAPP	Southern African Power Pool
SiMn	Silicomanganese
SMR	Small Nuclear Reactor
TAZARA	Tanzania-Zambia Railway Authority
tpa	tonne per annum
VALCO	Volta Aluminium Company
VR(F)B	Vanadium Redox (Flow) Battery
WAPP	West African Power Pool

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Disclaimer

This Compendium has been prepared by Africa Finance Corporation (AFC) for informational and analytical purposes only. It reflects AFC's best efforts, at the time of publication, to compile, analyse, and present information on Africa's strategic minerals using publicly available sources, stakeholder engagement, and direct inputs from national authorities where possible.

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This Compendium makes several references to artisanal and small-scale mining (ASM) across different commodities and regions. ASM should not be conflated with illegality or smuggling. While significant parts of the ASM sector operate informally and may give rise to governance, environmental, and traceability challenges, ASM also constitutes a legitimate and regulated economic activity in a growing number of African countries, providing livelihoods to millions and contributing meaningfully to domestic mineral production.

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Finally, the Compendium is conceived as a living and evolving reference. As data availability improves, methodologies are refined, and stakeholder engagement deepens, figures and assessments may be restated or adjusted in future editions. Such revisions should be understood as part of an intentional effort to improve accuracy, consistency, and transparency over time.

WHAT **MINERALS ARE STRATEGIC** TO AFRICA?

Africa is endowed with vast mineral resources whose significance extends well beyond their contribution to exports or government revenues. By many estimates, including those of the United Nations, the continent holds approximately 30% of the world's known mineral reserves. These include the world's largest current resources of platinum-group elements (PGE), industrial diamonds, ferroalloy metals such as cobalt and manganese, phosphate rocks, and bauxite, alongside substantial deposits of gold, iron ore, heavy mineral sands, potash and uranium. In several cases, Africa hosts deposits of exceptional scale and quality—such as the world's largest untapped iron ore reserves at Simandou in Guinea, the largest known natural rutile deposit at Kasiya in Malawi, and some of the world's largest and highest-grade flake graphite operations at Balama in Mozambique.

What makes these minerals *strategic* for Africa is not only their global importance, but their ability to reshape domestic production by anchoring industrial value chains and enabling economies move beyond export-led extraction. These resources sit at the foundation of modern industrial systems—supporting steelmaking, energy systems, fertiliser production, construction materials, transport equipment, and emerging manufacturing activities. As such, they offer African economies, a pathway to move beyond enclave-style extraction toward more diversified, resilient, and industrially anchored growth models.

The strategic value of Africa's minerals therefore lies in how they can be leveraged to deepen domestic value addition, support regional integration, and anchor industrial ecosystems, rather than being viewed primarily through the lens of external export demand.

At the same time, the scale of Africa's mineral endowment is likely understated. Commonly cited figures reflect persistent gaps in geological knowledge and exploration coverage across much of the continent.

Limited geological mapping, geophysical surveys, and geochemical sampling have constrained the ability of many countries to fully assess their resource potential.[1] These knowledge gaps are compounded by infrastructure deficits and constrained investment in exploration, further limiting the development of mineral resources that could underpin broader economic transformation.

Against this backdrop, at the Africa Finance Corporation (AFC), we view Africa's mining potential as far more than a source of fiscal and export revenues. In many jurisdictions, reliance on taxes and royalties alone has delivered limited and volatile gains—particularly where governance frameworks are weak or where incentives and transfer pricing erode the tax base. The IMF estimated that African countries were already losing up to US$730 million per year to tax avoidance in the mining sector in 2021[2], a figure likely higher today given the current price cycle.

A more transformative approach is therefore required—one that shifts the focus from narrow fiscal extraction toward integration and beneficiation. Guinea illustrates the scale of the opportunity. In 2023, the country earned an estimated US$700 million in revenues from bauxite[3], despite exporting over 120 million tonnes worth approximately US$4.3 billion. That same volume of ore could theoretically have supported the production of around 25 million tonnes of alumina (worth about US$8.6 billion) or 12 million tonnes of aluminium (worth roughly US$27 billion)[4]. Capturing even a fraction of this downstream value would materially transform fiscal outcomes, industrial depth, and employment—underscoring why beneficiation and value-chain integration are central to maximising the developmental returns from Africa's mineral endowment.

[1] *A desktop assessment of geological capacity by the African Minerals Development Centre (AMDC), an African Union body established to implement the Africa Mining Vision, indicates that most African countries remain either unmapped or poorly mapped. See African Minerals Development Centre, UNECA (2018). Desktop Review of African Geological Survey Organisation Capacities and Gaps*

[2] *International Monetary Fund (November 2021). Countering Tax Avoidance in Sub-Saharan Africa's Mining Sector.*

[3] *See EITI Guinea 2023 Report: https://eiti.org/sites/default/files/Rapport%20ITIE%20Guin%C3%A9e%202023.pdf?hash=1769079600*

[4] *Estimates assume that 5 tonnes of bauxite are required to produce one tonne of alumina and two tonnes of alumina are required to produce one tonne of aluminium. Price assumptions are conservative and assumed $35/t for bauxite, $350/t for alumina and $2,200/t for aluminium.*

Objective and **Scope** of the Compendium

In this context, the *Compendium of Africa's Strategic Minerals* is designed as a system-level reference to support the continent's shift from extraction-led growth toward the development of integrated mineral value chains. It's primary objective is to provide an authoritative, data-driven foundation for decision making by governments, investors, financiers, mining companies, and development institutions—anchored in African-owned data and informed by official national sources.

Rather than serving as a geological inventory or a restatement of subsurface potential, the Compendium focuses on how minerals are developed, produced, processed, and connected to wider economic systems. It examines minerals and enabling infrastructure in tandem, reflecting the reality that value creation in mining is shaped as much by transport, power, logistics, and industrial capacity as by resource endowment itself. In doing so, the Compendium positions infrastructure not as a supporting consideration, but as a central determinant of competitiveness, scale, and regional integration in Africa's mineral economy.

A core objective is to establish a clear and comparable picture of mineral development trends across the African continent. This includes the systematic collation and analysis of annual mineral production data, alongside an assessment of beneficiation and processing capacity and the infrastructure that underpins these activities.

By aggregating data at the continental level and providing detailed country- and region-level breakdowns, the Compendium enables stakeholders to distinguish between geological potential and realised development, track progress over time, and identify patterns of growth, underperformance, and untapped opportunity. The methodology used for the collection, aggregation and validation of the underlying dataset is available in Appendix 4.

Beyond its analytical function, the Compendium is intended to serve as an authoritative African reference for the mining sector. By consolidating inputs from governments, geological surveys, regulators, chambers of mines, and industry participants, it seeks to reduce fragmentation and establish a shared evidence base for policy dialogue, investment planning and regional coordination. This approach supports more informed engagement between public and private stakeholders, grounded in African data, priorities and development objectives.

Published on an annual basis, the Compendium is conceived as a living resource. Its annual cycle allows datasets and analysis to be refined, expanded and restated as new information becomes available, projects advance, and infrastructure networks evolve. Over time, this cumulative process strengthens transparency, comparability and confidence in Africa's mineral and infrastructure landscape for both domestic and global stakeholders.

Finally, the Compendium is oriented towards identifying opportunities for regional supply-chain development and shared infrastructure ecosystems. By analysing mineral resources alongside shared transport, power, and logistics infrastructure (Section 2), it highlights the conditions required to unlock scale, competitiveness and value from both developed and undeveloped mineral deposits. In so doing, it aims to support cross-border coordination, corridor-based development, and the emergence of regionally integrated industrial clusters capable of anchoring Africa's next phase of growth.

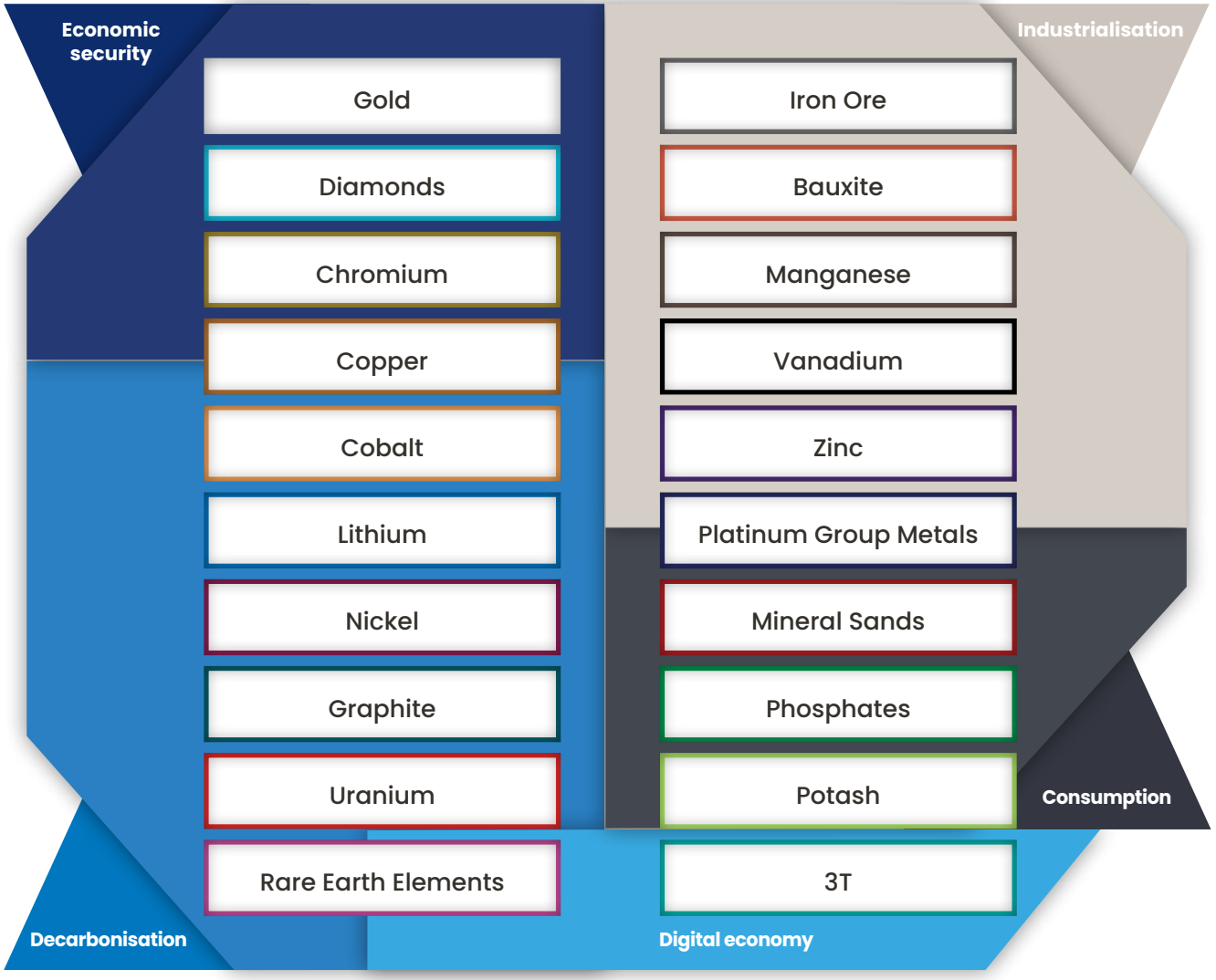
Themes of Africa's Strategic Minerals

In the Compendium, strategic minerals are defined not by externally determined classifications, but by their centrality to Africa's development, resilience, and economic sovereignty. These are minerals that underpin the continent's ability to build and maintain infrastructure, support industrialisation and heavy industry, and participate meaningfully in the global energy and technology transitions. Collectively, they constitute a material backbone for Africa's long-term structural transformation.

We adopt an endowment-led approach, grounded in Africa's mineral wealth and what the continent can realistically develop at scale. Rather than beginning with externally defined lists of "critical minerals," the Compendium poses a more fundamental question: which mineral resources does Africa possess—at sufficient scale, quality, and geographic distribution to support its infrastructure build-out, industrial pathways and development objectives? This ensures that strategic priorities are anchored in Africa's development and infrastructure needs as a core proposition, while remaining globally integrated—shifting from a model of exporting high-grade ores and importing essential inputs, such as steel for railways and bridges, toward building domestic and regional value chains capable of supplying both African and international markets.

While rooted in Africa's domestic priorities, many of these minerals are also central to global demand. The Compendium therefore reframes strategic minerals through an African developmental lens—emphasising sustainable growth, competitiveness, self-sufficiency, and long-term resilience, while recognising Africa's expanding role in global value chains, and energy and technology transitions.

Finally, the Compendium adopts a dynamic and forward-looking framework. The thematic classification of strategic minerals is not static: as Africa's industrial base expands, technologies evolve, and new data becomes available, additional minerals may be incorporated in future editions to reflect changing development priorities and market realities.



Thematic Classification of Africa's Strategic Minerals

1 Economic Security

Gold, diamonds, chromium, copper

Certain minerals are strategic because of their contribution to macroeconomic stability and external sustainability across African economies. These commodities account for a significant share of export receipts, public revenues, and foreign exchange inflows, thereby supporting balance-of-payments positions, fiscal capacity, and financial sector stability at both national and regional levels.

They include:

- Minerals that anchor export baskets and public revenues, particularly in resource-dependent economies;
- Strategic mineral reserves that contribute to external resilience, including through their role in reserve accumulation and balance-of-payments support.

2 Industrial Systems & Manufacturing

Iron ore, bauxite (including alumina and aluminium), manganese, vanadium, zinc, platinum-group elements (PGEs)

A second group of strategic minerals is defined by their role as foundational inputs into Africa's industrial and manufacturing base. These minerals underpin heavy industry, metallurgy, construction, machinery, and transport systems, while also supporting higher-value and performance-intensive industrial and technological applications.

They include:

- Ferrous and base metals essential to construction, transport, and industrial equipment;
- Minerals that enable advanced alloys and high-performance manufacturing, including applications in energy, engineering, and specialised technologies.

3 Domestic Demand and Infrastructure Development

Bauxite (incl. alumina and aluminium), iron ore, heavy mineral sands (including ilmenite, rutile and zircon), lead, soda ash, phosphates, potash

Certain minerals are strategic because they directly support Africa's internal demand growth and large-scale infrastructure build-out. As population growth and urbanisation accelerate, these resources are central to meeting rising needs in housing, transport networks, basic industries and food systems.

They include:

- Materials required for core infrastructure, including roads, railways, ports, and housing;
- Inputs for urban and industrial markets such as glass, ceramics, paints, plastics, and construction materials;
- Minerals that underpin agricultural productivity and food security, particularly fertiliser inputs.

4 Climate Transitions and Energy Systems

Copper, cobalt, lithium, nickel, graphite, uranium, rare earth elements

Africa's strategic minerals also include those that enable the global shift towards cleaner energy systems and lower-carbon growth pathways. These resources are essential for renewable power generation, energy storage, electrification, and emerging low-carbon technologies—areas in which Africa holds a growing strategic and competitive position.

They include:

- Minerals critical to solar, wind, battery storage, and transmission and grid infrastructure;
- Inputs for electric vehicles, green hydrogen systems, and carbon management and mitigation technologies.

5 Emerging Technologies and Future Demand

Coltan (including tantalum and niobium), tin, wolframite (incl. tungsten), rare earth elements

Finally, some minerals are strategic because they position Africa to participate in future waves of technological change and long-term demand growth. These resources underpin frontier technologies expected to reshape production systems, energy use, defence capabilities, and digital infrastructure over the coming decades.

They include:

- Minerals enabling advanced technologies, including semiconductors, artificial intelligence, advanced electronics, and robotics;
- Inputs critical to next-generation energy systems, such as advanced battery chemistries, high-density storage, and emerging fusion-related technologies;
- Resources projected to experience structurally rising demand as new technologies mature, scale and diffuse globally.

Analytical Framework and Use

The thematic classification provided above is intended as a guiding analytical framework, rather than a rigid or exhaustive taxonomy. The Compendium recognises that the strategic relevance of minerals is inherently multi-dimensional, and that many resources span multiple categories simultaneously, reflecting their diverse industrial, technological, and geopolitical applications. Minerals such as graphite, aluminium, and chromium, for example, are integral not only to infrastructure, manufacturing, and energy systems, but also to aerospace, defence and advanced security-related industries.

Accordingly, the framework is deliberately pragmatic. Its purpose is not to impose mutually exclusive classifications, but to provide a coherent structure through which stakeholders can assess priorities, identify value-chain and infrastructure opportunities, and think strategically about how Africa's mineral endowment can be translated into sustained development, competitiveness, and economic resilience.

1

AFRICA'S **MINERAL ENDOWMENT**

- An $8.6 Trillion Untapped Mineral Base
- From Endowment to Opportunity: Sorting Africa's Mineral Assets by Investment Readiness

***Africa's mineral endowment represents a significant but under-measured foundation** for industrial development, investment mobilisation, and participation in higher-value global and regional value chains. Yet geological knowledge across much of the continent remains incomplete, uneven, and often decades old, shaped by limited modern mapping and episodic exploration. As a result, widely cited estimates are likely to understate the scale and diversity of Africa's true mineral potential.*

This knowledge gap is not merely technical; it carries material economic consequences. Weak, incomplete, or inaccessible geological data continues to constrain exploration investment, delay the identification of commercially viable deposits, and limit countries' ability to move beyond raw material exports toward domestic processing, beneficiation, and participation in higher-value mineral value chains. To ground this assessment, Appendix 1 provides a comprehensive review of Africa's most recent literature on geological endowments and mineral mapping, synthesising the latest research produced by leading institutions, including the World Bank, the African Development Bank, and the French Development Agency. It synthesises what is currently known, where uncertainty remains most pronounced, and what this implies for investment, exploration spending and technology adoption.

An **$8.6 Trillion Untapped** Mineral Base

Africa hosts an estimated US$8.6 trillion in undeveloped mineral assets[5]—an endowment equivalent to roughly two and a half times the continent's current annual GDP of US$3.4 trillion (2024 est.)—underscoring both the scale of its geological wealth and the magnitude of unrealised development potential. This aggregate mine-site value is calculated using the MinEx Consulting deposits database, whose scope and methodology is explained in Appendix 3. Importantly, this in-ground resource base is concentrated in commodities that are central not only to global markets, but to Africa's own industrialisation, infrastructure expansion, food security, and its energy systems.

The largest contributors to this undeveloped endowment include iron ore (approximately US$2.0 trillion), gold (US$1.1 trillion), potash (US$1.0 trillion), phosphates (US$910.9 billion), platinum-group elements (US$523.7 billion), bauxite (US$516.6 billion), graphite (US$424.7 billion), heavy mineral sands (US$358.7 billion), and copper (US$343.2 billion). Together, these commodities form a material base for the needed domestic steel production, fertiliser supply, construction materials, energy systems, and advanced manufacturing, positioning minerals as a platform for both domestic development and global value-chain participation.

The strategic significance of this endowment lies less in its scale than in Africa's capacity to convert it into productive assets. Despite hosting some of the world's largest iron ore and fertiliser mineral deposits, Africa remains structurally dependent on imports of primary steel, semi-finished metal products, and key fertiliser inputs—particularly potash. This disconnect between resource availability and domestic production capacity highlights that mineral strategy for Africa cannot be framed solely around commodities prioritised by global energy and technology transitions. Minerals underpinning infrastructure, food systems, and basic industry are equally central to the continent's development pathway.

The existence of a further US$8.6 trillion in undeveloped resources should be understood as a starting point rather than a ceiling. First, these figures largely reflect early-stage resource estimates, which are typically refined—and often expanded—as deposits advance through development into production.

Second, they capture only mine-site values of ores and primary metals, excluding the substantial value uplift from beneficiation and downstream processing. In practice, value creation accelerates sharply beyond the pithead: bauxite typically sees its value increase by around tenfold when processed into alumina, and by a further sixfold when converted into aluminium; similarly, ferro- and silicomanganese alloys can command prices eight to nine times higher than raw manganese ore.

This framing reinforces a central message of the Compendium: Africa's mineral constraint is not one of endowment, but of conversion. Translating in-ground resources into durable economic value depends on the pace at which undeveloped deposits can be de-risked, financed, processed, and integrated into regional and continental value chains—an agenda that sits at the intersection of mining, infrastructure, industrial policy, and capital mobilisation.

[5] *For context, Africa's operating mines already account for an estimated US$16.5 trillion in aggregate mine-site value. See Appendix for methodology.*

From Endowment to Opportunity: Sorting Africa's Mineral Assets by Investment Readiness

Africa's undeveloped mineral base is not only large, but differentiated by asset quality and investment readiness, with a meaningful undeveloped deposit that offer scope for scalable, long-life development across multiple commodities and regions. This diversity creates a broad set of investment pathways—ranging from world-class, low-cost assets capable of anchoring regional value chains and shared infrastructure platforms to smaller, commercially viable projects suited to phased or satellite development.

To support this assessment, the MinEx database classifies deposits using an economic Tier Framework based on relative scale, cost structure, and resilience across commodity cycles:

- ***Tier 1 deposits*** are characterised by large resource size, long mine life, and cost profiles that support profitability across price cycles.
- ***Tier 2 deposits*** are smaller in scale but remain economically attractive outside the lower end of the price cycle.
- ***Tier 3 deposits*** are typically lower-grade or smaller and are often viable primarily as satellite or incremental operations linked to larger hubs.

Within this framework, Africa hosts a substantive pipeline of high-quality undeveloped assets across both Tier 1 and Tier 2 categories, reflecting both the depth and geographic breadth of the continent's mineral endowment.

UNDEVELOPED TIER 1

- **Lithium:** Manono–Kitotolo (Democratic Republic of Congo)
- **Mineral sands/Rutile:** Kasiya (Malawi)
- **Copper:** Mingomba (Zambia)
- **Uranium:** Dasa (Niger)
- **Diamonds:** Luaxe (Angola)

UNDEVELOPED TIER 2

(spanning a wider range of minerals and geographies)

- **Gold:** Sudan, Guinea, Côte d'Ivoire, Senegal, Tanzania
- **Platinum-group metals:** South Africa
- **Iron ore:** Republic of Congo, Cameroon, Gabon, Guinea
- **Lithium:** Mali, Zimbabwe
- **Cobalt:** Cameroon
- **Graphite:** Mozambique
- **Mineral sands:** Sierra Leone
- **Rare earth elements:** Angola, Malawi
- **Bauxite:** Guinea
- **Uranium:** Niger
- **Phosphates:** Morocco
- **Nickel:** Côte d'Ivoire, Burundi, Tanzania
- **Potash:** Ethiopia, Eritrea
- **Copper:** Democratic Republic of Congo
- **Zinc:** Zambia

2

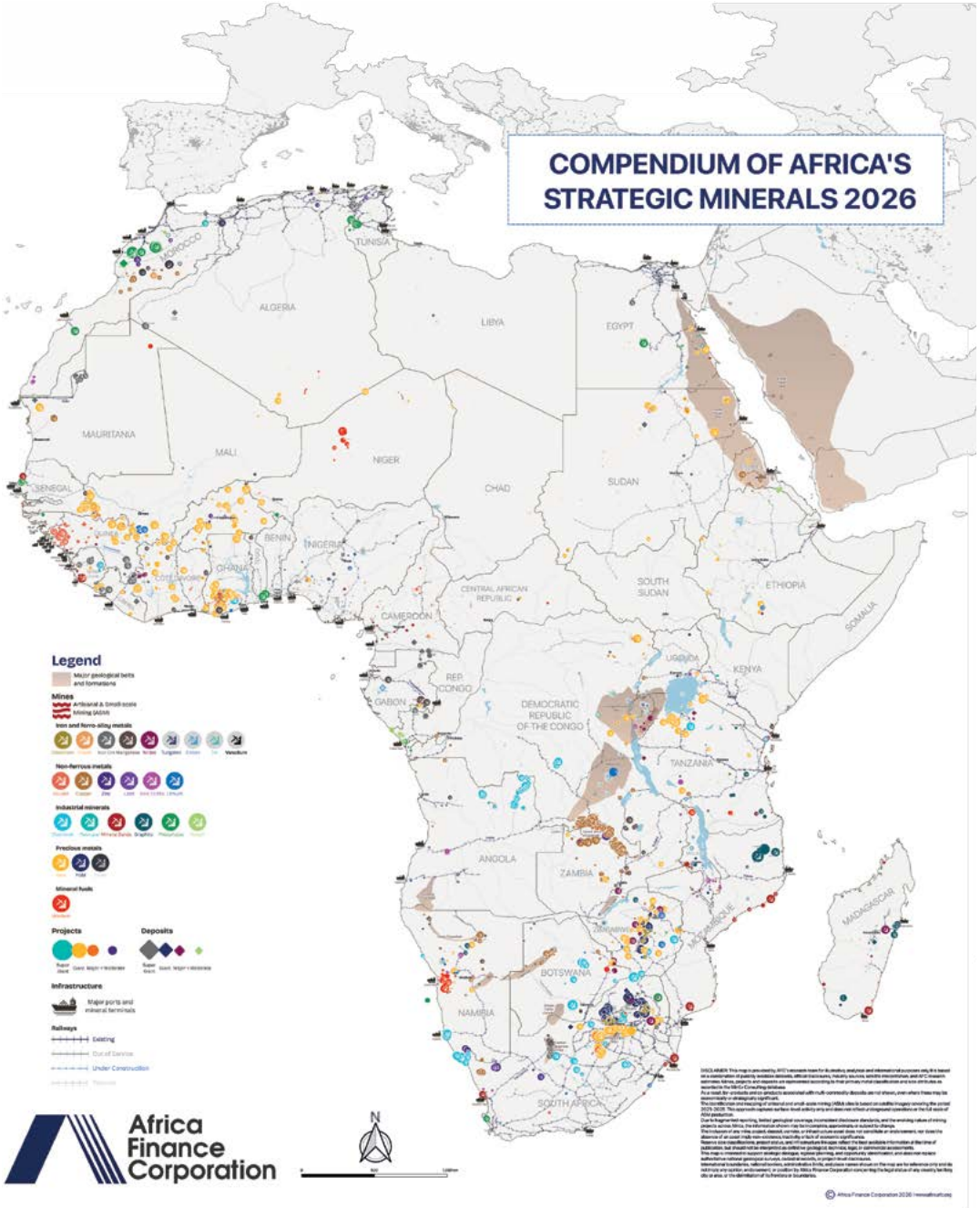
MINERAL VALUE CHAINS IN PRACTICE: THE INFRASTRUCTURE IMPERATIVE

- Railways Must Evolve From Pit-to-Port Assets to Integration Backbones
- Strategic Rail Gaps and Opportunities
- Ports are a Critical Node of New Regional Industrial Ecosystems
- Strategic Ports and Shipping Opportunities
- Industrial zones as Anchors of Localised Mineral Clusters
- Strategic Opportunities for Industrial Clustering
- Energy Remains a Binding Constraint on Africa's Minerals Value-chains
- Strategic Opportunities in Power and Energy
- Africa's Baseload Power Plants

To help visualise both the scale of Africa's current mining activity and the depth of its future potential, the Africa Finance Corporation publishes, alongside this Compendium, a Minerals Map of Africa. The map consolidates all significant operating mines, projects and undeveloped mineral deposits across the continent, classified by size using the classification of MinEx Consulting database (see Appendix 3). It explicitly identifies the major mines, projects and deposits referenced throughout this report, providing a spatial complement to the analysis and illustrating where Africa's next generation of large-scale mining and beneficiation opportunities is most likely to emerge.

Crucially, the map situates these assets within their broader infrastructure ecosystems—including railways, ports, and logistics corridors—highlighting where mineral endowments are already connected to export and processing infrastructure, and where gaps remain. As such, it is intended not only as a descriptive tool, but as an essential instrument for regional planning, supporting the beneficiation, integration, and corridor-based development imperatives advanced throughout this Compendium.

Download Compendium



Railways Must Evolve From Pit-to-Port Assets to Integration Backbones

Railways have historically played a central role in Africa's mining sector, but largely within pit-to-port business models inherited from the colonial era. Designed to evacuate bulk commodities from inland mines to coastal export terminals, many of the continent's rail systems were built as single-purpose assets, tightly aligned with specific mines and ports rather than broader economic integration[6].

In mining today, railways remain critical enablers of market access—but primarily for high-volume, low-value bulk commodities such as coal, iron ore, manganese, bauxite, phosphates or copper. Their importance reflects not only scale requirements, but also the fact that rail offers the lowest unit transport cost and lower carbon footprint for moving large volumes of ore over long distances.

Their relevance to precious metals such as gold, silver or platinum group metals is more limited, given lower transport volumes and higher value-to-weight ratios. As a result, rail investment decisions have historically been driven by bulk extraction economics rather than downstream processing or regional trade considerations.

Across the continent, several major mining rail corridors exemplify this model, including iron ore lines in Mauritania (SNIM) and Liberia (ArcelorMittal), manganese corridors in Gabon (Transgabonese) and South Africa (OrCor), bauxite and iron ore systems in Guinea, and coal corridors linking Malawi and Mozambique (Nacala). While these assets have been successful in enabling large-scale extraction and exports, most have remained narrowly focused on ore evacuation, with limited capacity or incentives to support inland processing, beneficiation, or multi-commodity use.

This paradigm is now beginning to shift. Governments and regulators are increasingly advocating for multi-user and open-access rail systems, seeking to transform mining corridors into broader economic backbones that can serve multiple operators, commodities, and industrial users[7]. Emerging policy and concessioning frameworks—particularly in West Africa (Liberia, Guinea)—reflect a growing recognition that shared rail infrastructure is essential to de-risk mineral development, reduce duplication, and enable regional supply-chain integration.

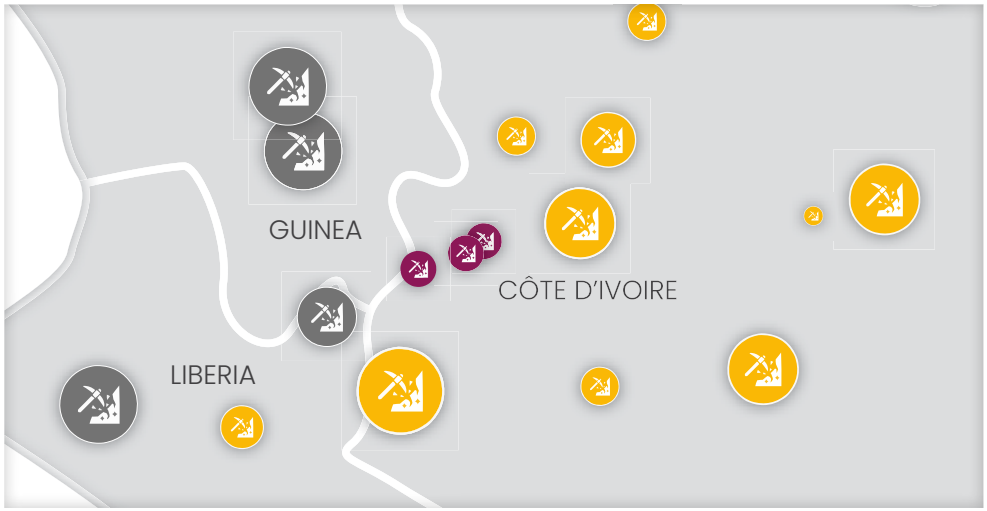
[6] *Africa Finance Corporation (2024). State of Africa's Infrastructure Report: The Infrastructure Imperative: Igniting Africa's Industrial Renaissance*
[7] *Africa Finance Corporation (2025). State of Africa's Infrastructure Report: Mobilizing Domestic Capital*

Strategic Rail Gaps and Opportunities

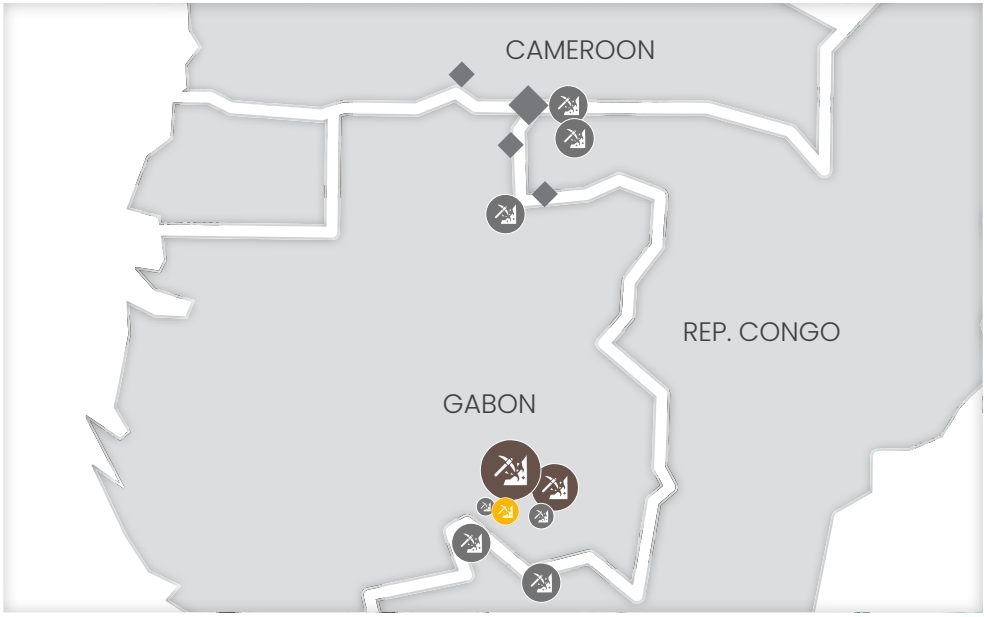
A continental view of Africa's railway ecosystem reveals a small number of high-impact, low-hanging rail interventions that could materially improve mineral development outcomes, de-risk beneficiation, and accelerate regional supply-chain integration:

Trans-Atlantic rail connectivity is essential to de-risk landlocked mineral provinces in Central and Southern Africa. The development of the Lobito Corridor is therefore critical—not only for copper exports, but also for unlocking private investment along the corridor linking the Democratic Republic of Congo, Angola and Zambia. Beyond copper, improved rail logistics support sulphur supply, rare earth development, fuel distribution, and agro-industrial value chains, particularly in sugar and maize. Similar dynamics underpin the strategic importance of the Trans-Kalahari rail link, which would improve trade flows between Botswana and Namibia while supporting future copper and base-metal projects in the region.

Shared rail infrastructure across the Guinea Highlands is increasingly necessary to unlock mineral deposits across Guinea, Liberia and Côte d'Ivoire. Fragmented, mine-specific rail systems risk stranding resources and inflating capital costs. In this context, the future concessioning of Liberia's Buchanan–Yekepa railway is a positive step, with the potential to enable new iron ore developments in southern Guinea and further de-risk nickel prospects across the region.



Integrated rail systems in the Gulf of Guinea are required to unlock significant iron ore resources. Giant – and landlocked – iron ore deposits are concentrated in two main clusters spanning Cameroon, Congo and Gabon (see Regional Overview: Central Africa). Without shared logistics solutions and coordinated corridor development, many of these deposits risk remaining sub-scale despite favourable geology and proximity to each other.



Regional rail connectivity between Burundi and Tanzania is critical to unlocking the East Africa Nickel Belt. Shared rail infrastructure would reduce development costs, improve project economics, and enable the sequencing of multiple deposits across borders. The planned extension of Tanzania's Standard Gauge Railway toward Burundi represents an important enabling step in this direction.

Southward expansion of Algeria's rail network is essential to achieving the country's steel backward-integration strategy. The rail line currently under construction will help unlock the giant Gara Djebilet iron ore deposits, which are producing at limited scale, by providing direct access to the Bethioua Steel Complex and northern ports. This connectivity is critical to anchoring domestic steel production and reducing reliance on imported iron ore.

Finally, upgrading and densifying existing rail corridors is as important as developing new ones. The **Nacala Logistics Corridor** between Malawi and Mozambique, for example, can serve as a regional backbone if extended through links such as Serenje-Chipata (Zambia-Malawi) and Harare–Moatize (Zimbabwe-Mozambique). Similarly, the **North–South Corridor** connecting the Copperbelt to South African ports remains central to SADC integration but requires additional rail links—including Mmamabula–Lephalale (Botswana-South Africa) and Kafue–Lion's Den (Zambia-Zimbabwe)—to reach its full economic and industrial potential.

Ports are a Critical Node of New Regional Industrial Ecosystems

Africa's port infrastructure has expanded materially in line with the growth of bulk ores and commodities. Across the continent, we identify at least 27 dedicated mineral ports and terminals, largely concentrated along West Africa and the Atlantic seaboard[8]. In parallel, dedicated mineral terminals have been added within large commercial ports such as San Pedro, Takoradi, Walvis Bay, Lüderitz, Maputo, Dar es Salaam and Annaba, significantly increasing Africa's bulk-handling capacity.

Yet this expansion has been narrow in scope and weak in value capture. Most mineral ports are designed almost exclusively to export raw ores overseas or import feedstock, with limited integration into domestic industrial systems. While Africa has developed significant trans-shipment capacity and operational expertise over the past 20 years, this capability has been used overwhelmingly to service intercontinental container flows, rather than to support regional mineral supply chains[9].

Ports therefore remain one of Africa's most strategic under-leveraged infrastructure assets. With bulk mineral production accelerating across iron ore, bauxite, manganese and phosphates, ports are natural anchors for wider industrial ecosystems—but only when deliberately connected to rail corridors, power supply and industrial zones.

Where this coordination exists, ports move beyond export gates to become platforms for beneficiation and manufacturing. The industrial hubs at Jorf Lasfar (Morocco) and Ain Sokhna (Egypt) illustrate this model and have anchored large-scale processing, chemicals and—more recently—battery materials manufacturing.

[8] *Guinea alone now counts 11 port terminals dedicated to bauxite and iron ore, reflecting the scale of its production boom*

[9] *Cement is one of the few exceptions: Nigeria's clinker exports, for instance, are shipped almost entirely to Ghana and Cameroon, supported by dedicated terminals developed by Dangote in Apapa (Lagos) and Port Harcourt. Comparable port-led integration has yet to emerge at scale for minerals.*

Strategic Ports and Shipping Opportunities

Port capacity must continue to expand to keep pace with Africa's bulk mineral supply boom. Africa's bulk mineral production is accelerating sharply—across bauxite, iron ore, manganese, phosphates and copper (see Section 4)—and port capacity must grow accordingly.

Two dynamics are now critical. First, existing ports require systematic dredging and upgrading to accommodate larger bulk carriers and improve turnaround times. Second, new dedicated mineral terminals are increasingly required to avoid congestion at mixed-use commercial ports. Recent developments point clearly in this direction with the opening of new mineral terminals at Lobito and Sacomar in Angola in 2024-25, while expansion plans are advancing across African coasts.

Greenfield port capacity will be required in several regions where new large-scale mines are being developed or planned. Proposed and early-stage mineral port projects in Liberia, Cameroon, Gabon, Congo-Brazzaville and Mozambique reflect the reality that existing infrastructure is insufficient to absorb the next wave of bulk mineral supply.

Lastly, shipping offer an immediate opportunity to deepen value capture from Africa's mineral exports. By leveraging the scale and predictability of bulk commodities, producing countries can retain freight revenues through domestic or regional shipping companies, long-term chartering strategies, and closer alignment between miners, port authorities and local investors. For instance, Guinea's move to anchor shipping capacity around bauxite exports shows how mineral scale can support fleet development, maritime services and jobs.

Industrial zones as Anchors of Localised Mineral Clusters

Industrial zones are emerging as one of the most effective instruments to translate Africa's mineral endowment into industrial value. When aligned with mining supply, logistics corridors and energy systems, they reduce execution risk, lower costs, and enable beneficiation and manufacturing at scale.

A growing number of examples in Africa illustrate how coordinated infrastructure can anchor mineral value chains:

- ***Jorf Lasfar*** (Morocco) has evolved from a phosphate hub into a diversified industrial platform, combining mines, rail, deep-water port infrastructure and downstream manufacturing. In 2025, it opened Morocco's first NMC precursor cathode (PCAM) production line.
- ***Bethioua*** (Algeria) has emerged as a steel and metals cluster linked to the Arzew Port, strengthened in 2024 by its connection to the national rail network ahead of future domestic iron ore supply from Gara Djebilet.
- ***Ain Sokhna*** (Egypt) has attracted sustained investment in fertilisers and metals, leveraging port access, energy availability, and proximity to global shipping routes.
- ***Richards Bay*** (South Africa) demonstrates the durability of this model, hosting aluminium, phosphates and mineral sands processing, and recently attracting new investments to process ilmenite into titanium pigments and paints.

These zones share common features: deep-water ports, rail links to the hinterland and mines, reliable utilities, and a targeted supply-chain strategy.

Strategic Opportunities for **Industrial Clustering**

Industrial zones will become increasingly central as African countries seek to localise value chains and restrict raw mineral exports. Export bans and localisation policies can only succeed if investors are offered ready-made industrial ecosystems that materially reduce execution risk. Without reliable power, serviced industrial land, logistics access, and permitting delivered upfront, such policies risk deterring capital rather than catalysing beneficiation.

A first opportunity lies in leveraging existing industrial zones to support mineral value chains. In Ghana, Tema offers a platform to re-anchor aluminium processing around VALCO. In Nigeria, gas-rich zones can support energy-intensive smelting and refining by providing gas at competitive rates. In Zambia, economic zones located along the Copperbelt and connected to regional rail networks offer immediate localisation opportunities.

In parallel, a new generation of zone developers—such as ARISE IIP—has built proven expertise in designing and operating integrated industrial ecosystems that can be leveraged for minerals and metals.

The next step is to move deliberately toward a cluster-based approach, replicating models already used in textiles, agribusiness, automotive and petrochemicals. Rather than dispersing projects, mineral localisation should concentrate around a small number of priority clusters. The most immediate candidates are steel and base metals, clean-technology and battery materials, and electronics and portable devices. These clusters align directly with Africa's resource endowment and its fastest-growing sources of domestic demand, offering the most credible pathway from pit-to-port exports toward regional manufacturing and value capture.

Energy Remains a Binding Constraint on Africa's Minerals Value-chains

Energy is the single most binding constraint across Africa's minerals sector, operating through two distinct but interlinked challenges.

- **The first is power supply for mining itself.** Many large deposits are landlocked or located far from existing urban and industrial centres, with little or no grid access. As a result, mine development increasingly depends on captive, off-grid, or hybrid power solutions, often delivered as hybrid of thermal/diesel and solar plants.
- **The second—and more acute—challenge is energy for processing and beneficiation.** Smelting and refining are among the most energy-intensive industrial activities globally, requiring large volumes of reliable and affordable baseload electricity, as well as heat and steam.

Energy affordability is now the primary reason behind recent industrial closures in Africa, including the upcoming closure of MOZAL's aluminium smelter in Mozambique (2026) and Glencore's ferrochrome smelters in South Africa (2025). High tariffs, unreliable grids, and escalating input costs are also frequently cited as constraints on manganese and iron ore processing across the region.

Strategic Opportunities in Power and Energy

Strategic opportunities exist to turn energy from a binding constraint into a source of industrial advantage. With mining already the largest power consumer in several African economies[10], targeted reforms in power transmission, regional trade, and the use of gas and clean energy can unlock beneficiation, restore competitiveness, and anchor new mineral-based industrial clusters.

1 Enable new power transmission and distribution models

Regulatory frameworks that allow wheeling and third-party access to grids are proving transformative[11]. In Southern Africa, wheeling arrangements within the Southern African Power Pool (SAPP) are already materially improving power access for mines and processors, and should be expanded.

Africa's largest wheeling project, for instance, is the 254 MW Selema Solar Park in South Africa and was commissioned in mid-2024 to supply mines across the country, including Tronox Mineral Sands[12].

2 Deepen integration of African power pools

Stronger interconnection within the West African Power Pool (WAPP) and the Central African Power Pool (PEAC) is a priority for two reasons. First, these are the regions where mining activity is expanding fastest, yet cross-border power trading remains far more limited than in Southern and Eastern Africa. Second, both regions host some of Africa's largest untapped hydropower potential (see Map: Africa's Baseload Power Plants). Improving regional power sharing would materially increase availability, lower system costs, and reduce supply risks for mines and processing facilities.

Where transmission backbones already exist, PPP frameworks can enable private developers to connect nearby mines and industrial users directly to the grid. This opportunity is particularly relevant across West Africa where the recent interconnections of Senegal, The Gambia, Guina Bissau, Sierra Leone Liberia and Côte d'Ivoire provides transmission infrastructure often located less then 20km away from mines[13].

3 Expand transmission to unlock stranded generation

Across Africa, significant pockets of low-cost power remain stranded due to insufficient transmission infrastructure, limiting their ability to support mining, processing, and industrial development. Unlocking these resources requires coordinated investment in transmission that moves in parallel with minerals and industrial projects.

Angola illustrates this opportunity clearly: the country has around 2 GW of stranded hydropower, which could anchor a new energy axis along the Lobito Corridor (westward) and support metals and fertiliser development across the Gulf of Guinea (northward)—provided new transmission lines are built to connect generation to demand centres.

4 Address heat and steam requirements alongside electricity

Processing competitiveness depends on more than power. Cooperation with gas producers can significantly de-risk projects by supplying affordable heat and steam. Countries with domestic gas resources therefore hold a potential structural advantage as industrial anchors (Nigeria, Algeria, Egypt, Mozambique), provided gas can be delivered at scale and on competitive terms.

[10] *Mining already accounts for the largest share of national electricity demand, ahead of residential and commercial consumption—in Zambia, Zimbabwe, and the D.R. Congo for instance.*

[11] *Wheeling refers to the contractual arrangement that allows electricity generated by an independent power producer to be transmitted across a third party's transmission network (in that case, state transmission utilities) to a specific end user, in return for a regulated network access fee.*

[12] *https://solagroup.co.za/utility-and-wheeling-projects/selemela-solar-park/*

[13] *The OMVG Loop and CLSG transmission line have significantly strengthened interconnections between all six countries, creating new opportunities for power sharing and trading that can materially improve the economics of mining and processing projects.*

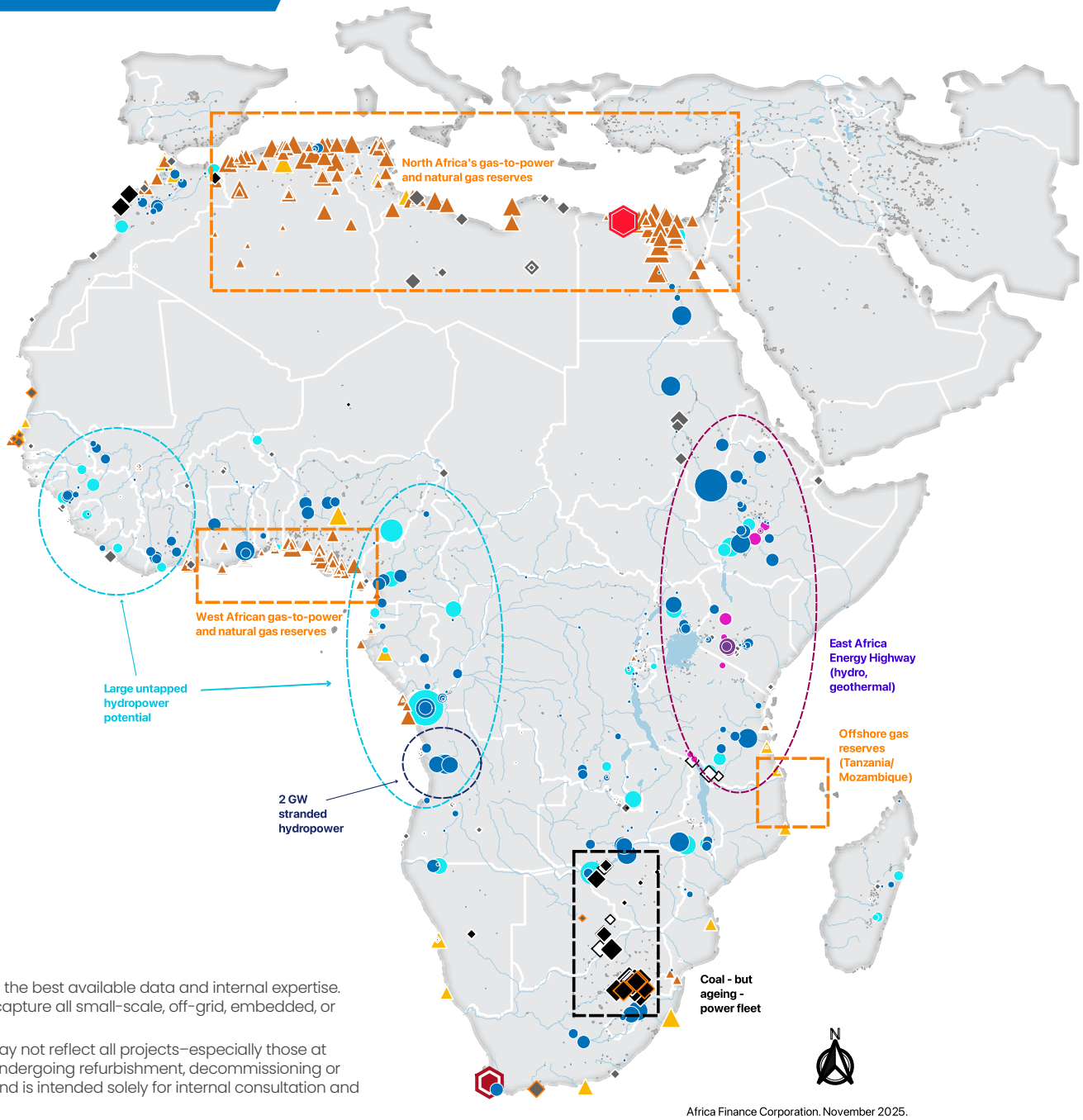
Africa's **Baseload Power Plants**

This map provides a consolidated view of Africa's baseload power generation landscape, covering coal, diesel/HFO, natural gas, hydropower, geothermal and nuclear assets across the continent.

It includes both operational plants and future projects—those under construction or formally planned–offering a single, integrated picture of the infrastructure that underpins Africa's energy security. By bringing together diverse technologies and sources, the map helps understand the distribution of firm generation capacity, identify regional disparities, and appreciate the strategic assets that anchor national and cross-border power systems.

Legend

- Thermal gas/dual-fuel
- Thermal gas (upcoming/planned)
- Thermal diesel/HFO
- Thermal diesel/HFO (possible conversion to gas)
- Coal
- Coal (possible conversion to gas)
- Coal (upcoming/planned)
- Hydropower
- Hydropower (upcoming/planned
- Geothermal
- Geothermal (upcoming/planned)
- Nuclear
- Nuclear (upcoming)



Africa Finance Corporation. November 2025.

Africa Finance Corporation

This map has been developed by AFC's Research and Power Sector teams using the best available data and internal expertise. It focuses primarily on grid-connected baseload plants and therefore does not capture all small-scale, off-grid, embedded, or captive generation assets across the continent.

While every effort was made to ensure accuracy and completeness, the map may not reflect all projects–especially those at early conceptual stages, those lacking publicly verifiable information, or assets undergoing refurbishment, decommissioning or conversion. It should therefore be considered indicative rather than exhaustive and is intended solely for internal consultation and strategic analysis.

3

REGIONAL OVERVIEWS

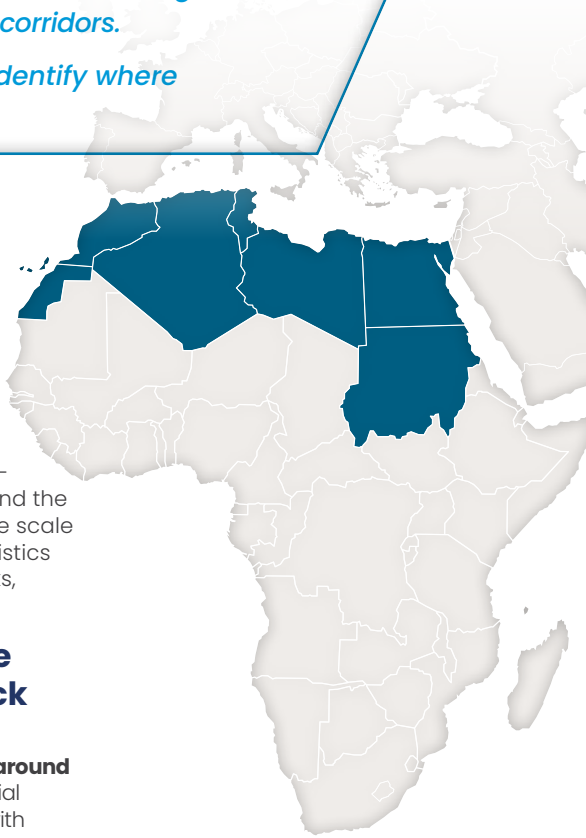
- North Africa
- West Africa
- East Africa
- Central Africa
- Southern Africa

As this Compendium calls for deeper regional supply-chain development across Africa's mining sector, it is essential to examine the broader regional context in which mineral resources are developed.

The following regional overviews aim to contribute to this conversation by offering a big-picture assessment of Africa's major regions, highlighting where structural contradictions persist—between mineral endowment and infrastructure, production and processing, or scale and integration—as well as where clear opportunities emerge to align mining development with transport, power, industrial zones, and trade corridors.

By viewing minerals through the lens of infrastructure ecosystems rather than isolated assets, this section seeks to identify where coordinated regional approaches can unlock scale, resilience, and long-term value creation.

North Africa: Industrial Platforms, Phosphate strength—and a Frontier in Green Industrialisation



North Africa is one of Africa's most industrialised regions, supported by relatively strong national infrastructure ecosystems, even as regional integration remains limited. The region hosts three of the continent's largest economies—Egypt, Algeria, and Morocco—and benefits from comparatively robust power availability and well-developed logistics networks, with ports and rail corridors closely connected to European markets. These structural advantages have enabled the emergence of sizeable industrial bases and metals-processing capacity across multiple countries, particularly in phosphates, steel, and alloy metals such as manganese and zinc.

Yet North Africa functions more as a collection of nationally anchored industrial systems than as an integrated regional bloc. Intra-regional trade remains structurally low, at less than 5% of total trade[14], as industrial and commercial linkages are still overwhelmingly oriented toward Europe and, increasingly, the Gulf. This outward orientation, however, also constitutes a strategic asset. Positioned at a geopolitical and commercial crossroads, North Africa increasingly acts as a bridge between East and West. Morocco illustrates this dual positioning clearly, hosting both major European industrial players—most notably in automotive manufacturing—and a growing footprint of Chinese industrial and battery materials companies.

Two geographic constraints further shape the region's mining and exploration profile: water scarcity and the Sahara. Water stress is becoming a binding constraint for parts of the mining-to-processing agenda, particularly for phosphoric acid production and the development of potash deposits in Morocco. At the same time, the scale and remoteness of Saharan terrains increase exploration and logistics costs and, in some areas, facilitate informal cross-border networks, especially along the southern borders of Algeria and Libya.

An Industrialised Region with Infrastructure Ecosystems — but Constrained by Feedstock

North Africa has built some of Africa's strongest infrastructure ecosystems, underpinned by deliberate and coordinated planning around railways, ports, and industrial zones. Across the region, major industrial platforms share a defining feature: direct rail connectivity combined with immediate access to deep-water ports. This model underpins Egypt's Sokhna Industrial Development Complex within the SCZone (phosphates, urea, steel), anchored by Ain Sokhna port; Algeria's Bethioua and Bellara industrial zones (steel), linked respectively to the ports of Arzew and Djen Djen; and Morocco's Cité Mohammed VI Tanger Tech and Jorf Lasfar Industrial Park (phosphates), connected to Tangiers Med and Jorf Lasfar ports.

[14] *UNCTAD Stats*

The region's central paradox lies in its ability to process and fabricate metals at scale while remaining heavily dependent on imported raw materials. North Africa is Africa's largest steel-producing region, combining primary and secondary steel production, with integrated steel mills operating in Algeria, Libya, and Egypt. Yet iron ore production remains limited, forcing producers to rely on imports—most notably from Brazil and Oman.

Egypt illustrates this dynamic clearly. The country has become Africa's largest steel producer largely on the back of imported iron ore, with imports reaching approximately US$1.66 billion in 2024 as domestic production declined due to a lack of new mine development[15]. A similar feedstock challenge exists in aluminium. Egyptalum, North Africa's only primary aluminium smelter, is expanding smelting capacity while actively exploring the development of an alumina refinery to reduce dependence on imported inputs of alumina.

Algeria presents a partial counterpoint. The country has expanded crude steel production through partnerships with Qatari and Turkish investors, establishing large steel complexes close to ports and rail infrastructure. The Tosyali steel complex in Bethioua—where pelletising and DRI plants were commissioned in 2018—has become one of the largest steel platforms in the Mediterranean. The Algerian Qatari Steel complex in Bellara has also been producing DRI since 2021, using imported feedstock via the Djen Djen port. Algeria is now seeking to anchor the competitiveness of its steel sector in domestic iron ore and gas, with plans to develop large iron ore deposits along its southern border with Mauritania and connect them to new railway infrastructure currently under construction.

A Robust and Expanding Phosphate Industry

Phosphates represent North Africa's most established and globally competitive mining value chain. The region hosts more than 75% of the world's phosphate reserves and includes the first, third, fourth, and sixth largest reserve holders globally—Morocco, Egypt, Tunisia, and Algeria, respectively[16]. While Morocco alone accounts for approximately 67.5% of global reserves, China remains the world's largest producer, with nearly 46% of global production in 2024, compared to Morocco's 12.5%[17].

Importantly, North Africa's phosphate industry—particularly Morocco's—also underpins one of the most significant intra-African industrial trade flows on the continent. Morocco is the principal supplier of phosphorous products to sub-Saharan Africa, serving agricultural markets across West, East, and Southern Africa through exports of phosphoric acid, finished fertilisers, and blended products.

To better leverage their resource base, North African producers are accelerating both phosphate output and downstream transformation. Morocco is leading this shift through a large-scale investment programme to expand fertiliser capacity from 12 to 20 million tonnes, and phosphoric acid capacity with the 3 million tonnes per annum Mzinda Phosphate Hub.

The rest of the region is also advancing strategies to raise phosphate production and revive or expand downstream processing capacity, including Tunisia (Gabes, Skhira, M'dhila), Egypt (Abu Tartour, Ain Sokhna), and Algeria (Bled El Hadba, Djebel Onk).

Water availability remains the main structural constraint on fertiliser diversification, particularly potash. Despite proven potash resources, the region does not yet produce potash, and projects such as Khemisset in Morocco illustrate how water scarcity can delay development. This reinforces the importance of integrated water–energy–infrastructure planning for fertiliser value chains, including desalination infrastructure.

A Green Industrialisation Future

Green industrialisation is increasingly a prerequisite for maintaining and expanding access to European markets, which absorb a large share of the region's industrial and manufactured exports. Proximity to Europe, dense trade links, and deep integration into European supply chains mean that North Africa's metals, fertilisers, and manufactured products are directly exposed to tightening carbon regulations, including carbon border adjustment mechanisms and sustainability requirements across value chains.

Decarbonisation is therefore becoming a competitiveness imperative. Energy-intensive industries such as steel, aluminium, fertilisers, and chemicals will need to progressively shift toward low-carbon power, cleaner production processes, and traceable supply chains to remain viable suppliers to European buyers. North Africa is well positioned to respond. The region's world-class solar and wind resources offer a clear pathway to host low-carbon processing and manufacturing at scale[18].

Morocco is positioning itself as a manufacturing hub for energy and battery materials by leveraging the scale and integration of its phosphate ecosystem at Jorf Lasfar. The commissioning of COBCO's LFP cathode plant in 2025 marks a shift from fertilisers toward higher-value cleantech manufacturing. Looking ahead, the recovery of fluorine from phosphate rocks and its processing into hydrofluoric acid could support coated spherical purified graphite (CSPG) production, reinforcing Jorf Lasfar as an integrated battery materials platform built on existing industrial infrastructure and locally availably inputs.

Conclusion: A Near-Shore, Low-Carbon Industrial Base for a Re-Shaping Global Economy

Taken together, North Africa's industrial platforms, phosphate dominance, and growing clean manufacturing capabilities position the region as a natural near-shore industrial base for Europe as global supply chains realign. The region's challenge is not a lack of infrastructure or industrial capability, but the alignment of feedstock development, water and energy systems, and decarbonisation strategies with its existing industrial footprint.

15 *https://aisusteel.org/en/33005/*
16 *USGS*
17 *Staff calculations based on USGS data estimates for 2024*
18 *In early 2025 for instance, Norwegian renewable energy developer Scatec signed a 25-year, USD-denominated corporate power purchase agreement with Egyptalum to decarbonise aluminium production through a new 1.1 GW solar PV project combined with battery storage. 60% of the smelter's production is currently exported to Europe.*

West Africa: Fragmented Markets, Strong Gold Foundations—and the Case for Regional Industrial Aggregation

West Africa is Africa's most populous region, with a combined population of over 445 million people, giving it the largest potential domestic market on the continent. Yet this scale is fragmented across 16 economies with differing currencies, legal systems, languages, and institutional frameworks. Recent political developments have further accentuated this fragmentation, reinforcing the reality that demand for industrial inputs, construction materials, fertilisers, and manufactured goods remains dispersed and difficult to serve efficiently at a national level.

Infrastructure patterns reflect these dynamics. Transport systems remain overwhelmingly national, with very limited cross-border railway connectivity, the Abidjan–Ouagadougou rail line being the only major exception. In mining, this has translated into a development model dominated by single-user, pit-to-port ventures, particularly for bulk commodities[19].

Despite these constraints, West Africa has emerged as one of Africa's most dynamic mining regions. Ghana and Burkina Faso long ranked among the continent's top mining markets on the back of gold production. More recently, activity has broadened across Côte d'Ivoire, Guinea, Mali, and—more selectively—Nigeria and Senegal, with growth not only in gold but increasingly in bauxite, iron ore, lithium, nickel, manganese, and mineral sands. This shift points to a much broader mineral endowment than current production profiles suggest.

The Gold Foundation

Gold has been the backbone of West Africa's mining economy, in part because it can be developed with relatively limited fixed infrastructure. Prior to recent political instability in parts of the region, strong geological prospectivity combined with comparatively attractive fiscal and regulatory regimes attracted sustained exploration investment, resulting in numerous discoveries and mine developments.

As a result, industrial gold production more than doubled in Mali, Burkina Faso, and Côte d'Ivoire since the early 2010s (see Section 4: Gold). Today, West Africa hosts three of Africa's four largest industrial gold producers—Ghana, Mali, and Burkina Faso—with additional growth in Guinea, Senegal, and Côte d'Ivoire reinforcing the region's central role in Africa's gold supply.

However, artisanal and small-scale mining (ASM) remains significant, and informality and smuggling continue to pose challenges. According to Swissaid, gold smuggling in Africa more than doubled between 2012 and 2022, driven by rising gold prices. Under high-estimate scenarios, nine African countries have undeclared ASM gold production exceeding 20 tonnes annually, more than half of which are in West Africa—notably Burkina Faso, Côte d'Ivoire, Ghana, Guinea, and Mali.

Beyond Gold: Emerging Diversification and Under-explored Geology

West Africa's mineral potential extends well beyond gold into ferroalloy and non-ferrous metals. Recent production trends demonstrate how quickly diversification can materialise once enabling conditions are in place.

Côte d'Ivoire offers a compelling illustration with nickel. Nickel production, which effectively began only in 2017, has now exceeded 2 million tonnes, positioning the country as a meaningful nickel producer in less than a decade. This rapid scale-up underscores how much of the region's geology remains under-explored beyond gold and how targeted infrastructure and investment can unlock new commodities.

[19] *Guinea alone has more than ten ports and terminals dedicated to bauxite and iron ore exports, illustrating how mineral development has historically prioritised extraction and export rather than regional aggregation or downstream transformation.*

Recent exploration success at the Samapleu–Grata deposit, located near the Guinean and Liberian borders, further reinforces this point. Originally known for nickel, renewed exploration has confirmed significant potential for copper and platinum group element (PGE) by-products, highlighting the polymetallic nature of West Africa's geology.

Ghana and Sierra Lone show a similar diversification trajectory in manganese and mineral sands. Between 2014 and 2024, manganese production more than doubled, in Ghana, while Sierra Leone – which hosts world-class rutile reserves – has cemented its global supply position. This success points to strong untapped potential for further mineral sands exploration along the West African coastline, where similar geological settings remain only partially explored.

Taken together, these examples suggest that West Africa's mineral endowment is far broader than current production profiles imply. The historical concentration of exploration on gold means that significant prospectivity remains untapped for base metals, battery minerals, and industrial minerals.

Bulk Minerals and the Case for Value Addition

Bulk minerals highlight both West Africa's scale and its unrealised industrial potential. Over the past three years, Guinea has become the world's largest bauxite producer, exporting around 140 million tonnes in 2024, yet operates only a single alumina refinery producing approximately 350,000 tonnes (see Section 4: Bauxite). Momentum is now building with two alumina refineries currently under development in the country.

These investments are strategically important because alumina refining fundamentally transforms value capture by unlocking additional strategic materials that are entirely lost when bauxite is exported unprocessed. It notably enables control over valuable by-products like gallium – a critical metal valued at over US$400,000 per tonne.

Iron ore follows a similar trajectory. West Africa's iron ore output is projected to rise sharply—from around 30 million tonnes in 2024 to nearly 194 million tonnes by 2030—driven by new mines, revived assets, and improved evacuation routes. This shift is anchored by the commissioning from 2025 onward of Guinea's Simandou iron ore project, which hosts the world's largest untapped reserves of high-grade iron ore and is expected to make Guinea Africa's largest iron ore producer by 2030.

Guinea, Mauritania, Sierra Leone, and Liberia collectively host some of Africa's richest high-grade iron ore deposits and benefit from substantial hydropower potential. Together, these endowments position the region to develop competitive, low-carbon steel production capable of meeting—and potentially exceeding—Africa's growing demand driven by urbanisation and infrastructure development[20].

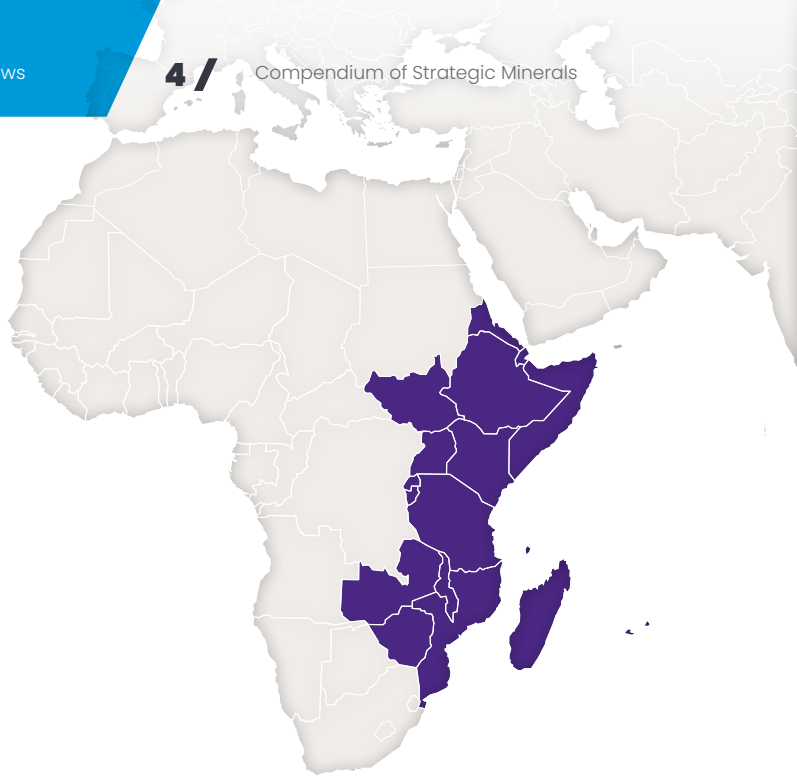
Conclusion: Charting a Path from Gold to Industrial Depth

West Africa has an immediate opportunity to strengthen macroeconomic resilience by formalising gold, following Ghana's example. Beyond gold, the region already has the essential building blocks for industrialisation, but success will depend on sharing infrastructure at scale. This includes mobilising its gas resources for refining, smelting, and chemical processing, and leveraging hydropower for green industrialisation through the forthcoming permanent synchronisation of the West African Power Pool in 2026.

Transport remains the binding constraint. Unlocking regional value chains will require moving beyond enclave, single-user pit-to-port models toward multi-user rail and logistics corridors. Early steps in Guinea and Liberia point to what is possible—and underscore the importance of regional coordination to turn West Africa's mineral endowment into durable industrial growth.

[20] *African Industries Group (AIG) in Nigeria demonstrates what is possible when domestic resources, infrastructure, and investment are aligned: it currently operates West Africa's only fully integrated primary steel value chain, combining iron ore processing with steelmaking to serve domestic demand.*

East Africa: Africa's Strongest Upside?



East Africa is Africa's second most populous region, with a combined population of over 411 million people, and one of its most economically dynamic. The region combines rapid demographic growth with some of the continent's fastest-growing and most integrated economies, including Ethiopia, Uganda, Tanzania, and Rwanda, all of which have posted robust growth for several consecutive years. Intra-regional trade is the highest in Africa, supported by increasingly functional logistics corridors—most notably the Northern and Central Trade Corridors linking the ports of Mombasa and Dar es Salaam to inland markets through a growing network of highways, railways, pipelines (Kenya), and cross-border transmission lines.

The region's industrial and mineral outlook is reinforced by steadily improving infrastructure and energy integration. The East African Power Pool is enabling deeper regional electricity trade, while East Africa's diversified energy mix—hydropower, geothermal, solar, and wind—positions the region particularly well for low-carbon mineral processing and beneficiation. Rail infrastructure is also expanding. Tanzania's Standard Gauge Railway can become a central anchor in this respect, with planned extensions toward Burundi that could directly support the development of nickel-rich deposits and strengthen cross-border mineral supply chains.

Geologically, East Africa is also one of the continent's most diverse mining regions, spanning multiple world-class provinces. These include the gold-rich Arabian–Nubian Shield in Sudan and parts of the Horn of Africa; Tanzania's graphite-bearing terrains within the Mozambican Belt; the East African Nickel Belt shared between Burundi and Tanzania; and the critical mineral systems of the Great Lakes and eastern Democratic Republic of Congo[21], notably coltan and cassiterite, which produce niobium, tantalum, and tin.

Despite these advantages, East Africa remains the least developed mining region on the continent. According to MinEx data, it accounts for just 2.5% of the mine-site value of resources from currently operating mines and around 7% of undeveloped resources, making it Africa's smallest mineral producing region today. At this stage of its exploration history, East Africa is therefore the least endowed—but not necessarily the least prospective.

On the contrary, exploration in East Africa is the most cost-efficient globally, with an average discovery cost of approximately US$55 million per discovery, compared with US$199 million elsewhere. Recent exploration success—including new gold discoveries announced in Kenya in 2025[22]—confirms that the region remains significantly under-explored and under-exploited and arguably offers the strongest upside potential among Africa's major regions.

A Growing Industrial Base: Smaller but Strategic Beneficiation Gains

East Africa is undergoing a meaningful transformation in mineral beneficiation, often overlooked because projects are smaller in scale than in North or Southern Africa, but strategically significant nonetheless.

Historically a producer of secondary and recycled steel, the region has now begun developing primary and integrated steel production based on iron ore processing. This transition is being led by the Devki Group, with integrated steel investments in Kenya and, more recently, Uganda[23]—marking a shift toward domestic feedstock processing and industrial deepening.

East Africa has also emerged as a regional processing hub for selected metals and minerals. Rwanda hosts both a tantalum smelter and a tin refinery; Uganda operates a tin refinery; and gold refineries are active in Uganda, Rwanda, and Tanzania. These facilities play a critical role in efforts to formalise supply chains, improve traceability, and anchor value addition closer to the source.

Tanzania has been particularly proactive in this regard. In its push to increase local content and value capture, the country has commissioned new small-scale copper, graphite, and nickel processing units in 2025, supported by policy measures restricting the export of selected raw ores. Tanzania now counts eight gold refineries and nine small-scale base-metal value-addition plants[24], and has increased mining's contribution to GDP from 6.8% in 2020 to over 10% in 2024.

[21] *While eastern D.R. Congo is often classified as part of Central Africa, this analysis considers it structurally part of East Africa. The D.R. Congo is a member of the East African Community, and its eastern provinces are far more integrated with East African economies—particularly Rwanda and Uganda—than with the rest of Central Africa. The D.R.C. also represents the largest volume of transit traffic at the Port of Dar es Salaam in Tanzania, growing from 1.7m tonnes in 2014 to 3.7m tonnes in 2023, including a significant amount of copper.*

[22] *https://nation.africa/kenya/business/british-firm-reveals-sh683bn-gold-deposits-in-kakamega-5261690*

[23] *https://www.theeastafrican.co.ke/tea/partner-content/devki-s-500m-tororo-steel-plant-poised-to-transform-ea-5291900*

[24] *See Ministry of Minerals' Investment Guide (2024): https://www.madini.go.tz/media/United_Republic_of_Tanzania_Investor_Guide.pdf*

Newcomers in Gold: Geographic Expansion and Formalisation

Gold remains a central pillar of East Africa's mining sector, underpinned by the well-known Lake Victoria Goldfields in Tanzania. Tanzania has long been the region's undisputed leader and currently ranks among Africa's top ten gold producers. Its position is set to strengthen further, with new large-scale commercial projects coming on stream—notably the Nyanzaga Gold Mine, currently under construction and expected to enter production by 2027.

Tanzania's gold sector is also benefiting from more systematic ASM formalisation efforts, centred on centralised – and increasingly mercury-free – processing plants. These small-scale facilities aggregate production, improve recovery rates, and promote formalisation, while also serving as hubs for safety and regulatory oversight[25]. They act as "pinch points" providing the government with greater visibility over the sector and an ability to counter illicit networks more efficiently.

Gold production is now feeding into Tanzania's macroeconomic strategy. The Bank of Tanzania launched a gold purchasing programme in 2023 and has already increased official gold holdings to over 15 tonnes[26], with significant contributions from the Mwanza Precious Metals Refinery.

Beyond Tanzania, new gold provinces are emerging across the region. Ethiopia has re-entered the gold landscape following the commissioning of the Segele Gold Mine in late 2024—the country's first new gold mine in over 30 years. Further projects are expected, including Kurmuk (targeted for 2026) and Tulu Kapi (expected in 2027), signalling a renewed gold cycle.

[25] *World Gold Council (May 2025). The Role of Gold Processing Plants in Artisanal and Small-Scale Mining.*

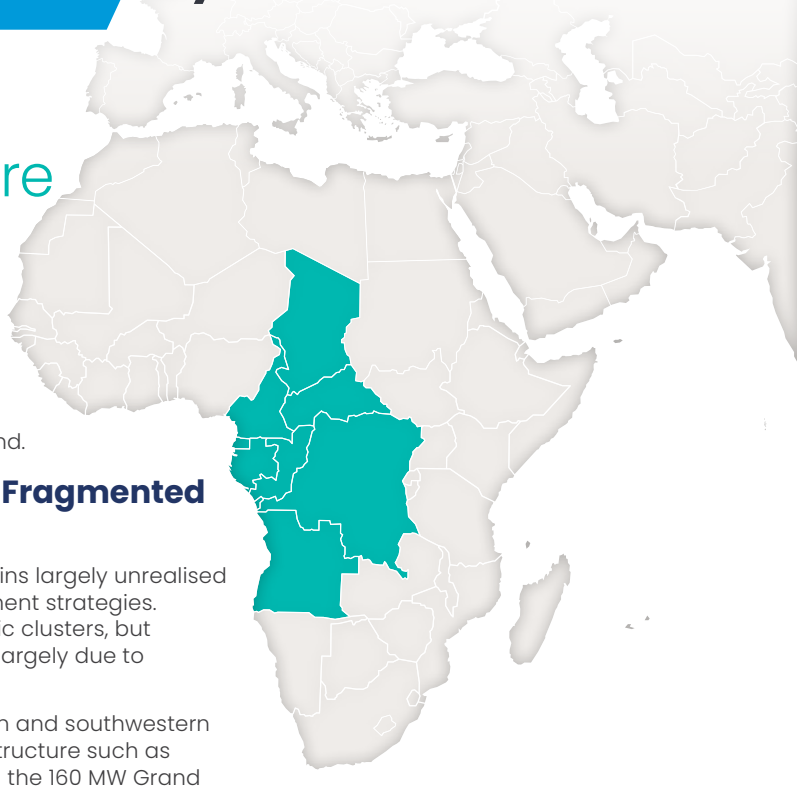
[26] *See speech by Bank of Tanzania Governor Emmanuel Tutuba: https://www.youtube.com/watch?v=Ln-vUhZDooQ*

Conclusion: Why East Africa Should Not be Overlooked

The coming years are likely to confirm that East Africa represents one of the most compelling mineral frontiers on the continent. Taken together, the region combines demographic scale, rapid economic integration, improving infrastructure, and exceptional geological upside. As exploration deepens and infrastructure continues to expand, East Africa could emerge as one of the continent's most strategically important mining and beneficiation regions over the next decade.

Importantly, the East African Nickel Belt (EANB) is approaching a critical inflection point, with final investment decision expected on Tanzania's Kabanga Nickel Project in 2026, one of the world's largest high-grade undeveloped nickel sulphide deposits, which includes plans for a downstream nickel refinery.

Central Africa: Giant Endowments, Minimal Integration – and the Case for Shared Infrastructure



Central Africa is the continent's most fragmented region, characterised by the absence of cross-border railway connectivity and the lack of a fully integrated regional power pool[27]. Yet this fragmentation stands in sharp contrast to the region's extraordinary natural advantages. Central Africa hosts Africa's largest hydropower potential, estimated at over 100 GW in the Democratic Republic of Congo alone[28], providing a structural foundation for energy-intensive mineral processing and low-carbon industrialisation.

Industrial development to date has remained limited and highly selective. One example is SOREMI in the Republic of Congo, which produces copper cathodes and zinc ingots at small scale and has recently invested in lead processing[29]. In Gabon, Eramet has demonstrated the feasibility of downstream beneficiation through its long-standing operations at Moanda, where manganese enrichment has been ongoing since 2000 and ore smelting since 2014—albeit on a relatively limited scale. These cases show that beneficiation is possible but remains far from systemic across the region.

Gold and diamonds are present across Central Africa, but production is largely dominated by informal artisanal and small-scale mining (ASM). This is particularly evident in Chad, the Central African Republic, and along the Cameroon–CAR border, where large informal networks operate for both gold and diamonds, generating limited domestic value capture and reinforcing governance and security challenges.

Despite limited development, the region remains highly prospective.

- Cameroon hosts Africa's largest resources of primary cobalt at the Nkamouna deposit, a polymetallic system that also contains nickel and manganese.
- Gabon hosts the Mabounié polymetallic deposit, which includes niobium, tantalum, phosphates, uranium, and rare earth elements.
- The coastline of Gabon and the Republic of Congo contains giant undeveloped potash deposits, a strategic asset given that Africa is entirely dependent on imported potash despite rapidly growing fertiliser demand.

Iron Ore: Large Clusters and the Cost of Fragmented Planning

Central Africa's iron ore endowment is substantial but remains largely unrealised due to infrastructure constraints and fragmented development strategies. Giant deposits are effectively split into two major geographic clusters, but their development has been delayed for years or decades, largely due to infrastructure gaps and policy uncertainty.

The southern cluster comprises deposits in southern Gabon and southwestern Republic of Congo, located relatively close to existing infrastructure such as the Transgabonese Railway, the Congo–Ocean Railway and the 160 MW Grand Pouraba hydropower plant in Southern Gabon. This cluster includes the Baniaka, Mayoko, and Zanaga iron ore deposits.

- Genmin's Baniaka project in Gabon could become the country's first large-scale iron ore mine by 2026, targeting 5 Mtpa initially and ramping up to 10 Mtpa. The project benefits from proximity to both the Transgabonese Railway and the 160 MW Grand Poubara hydropower dam, and could ultimately produce lump, fines, and pellet feed.
- In the Republic of Congo, Zanaga Iron Ore plans to produce premium DRI pellet feed aligned with global demand for green steel. The project could reach 30 Mtpa, but requires substantial infrastructure development, including a 366 km buried concentrate pipeline to Pointe-Indienne, with potential co-location with the future ARISE IIP industrial zone outside Pointe-Noire.

[27] *For analytical clarity, the Copperbelt is excluded from this regional section and addressed within the Southern Africa analysis, reflecting its integration into SADC trade and logistics networks via the Lobito, Walvis Bay, North–South, and Tanzania corridors.*

[28] *Africa Finance Corporation (2025). State of Africa's Infrastructure Report: Mobilizing Domestic Capital*

[29] *See USGS Congo-Brazzaville Report (2022).*

The northern cluster spans southern Cameroon, northern Gabon, and parts of Congo, but remains largely stranded and landlocked, with no railway connectivity. It includes Mbalam, Nadeba, Avima, Babondo, and Belinga.

- At Belinga in Gabon, Ivinro Iron (Fortescue) exported a pilot cargo in mid-2023 and demonstrated the project's technical viability. Commercial production is now expected around 2030, anchored by an integrated mine-rail-port development and a new deep-water port on the Gabonese coast.
- Cameroon Mining Company (CMC) is advancing the Mbalam project, part of the cross-border Mbalam–Nadeba system (Cameroon/Rep. Congo), with initial production potentially starting as early as 2026, initially relying on trucking to the Port of Kribi ahead of a future railway.

Taken together, these developments reveal a common challenge: large, high-quality assets advancing in isolation, without a regional vision for shared rail, power, port, and industrial infrastructure. Given the relatively small size of domestic markets in Cameroon, Gabon, and Congo, regional aggregation and export-oriented strategies under African Continental Free Trade Area (AfCFTA) will be essential.

The Fertiliser Opportunity

Beyond iron ore, Central Africa hosts some of Africa's most strategically important undeveloped potash and phosphate resources. Critically, many of these potash occurrences are clustered along the Gulf of Guinea, close to deepwater ports—particularly around Pointe-Noire—and existing power infrastructure. This coastal setting offers a rare combination of scale, logistics access, and industrial optionality that few other African potash provinces can match.

By contrast, alternative pathways are constrained. Potash projects in North Africa, including Morocco, face binding water constraints, while developments in the Horn of Africa are hampered by persistent political and security instability. As a result, Gulf of Guinea potash deposits represent Africa's most credible—and possibly only—route to building a domestic potassium supply chain and reducing long-term exposure to imported fertilisers.

With coordinated investment in shared infrastructure, the sub-region could emerge as a new regional fertiliser hub, capable of supplying both coastal markets and inland agricultural economies.

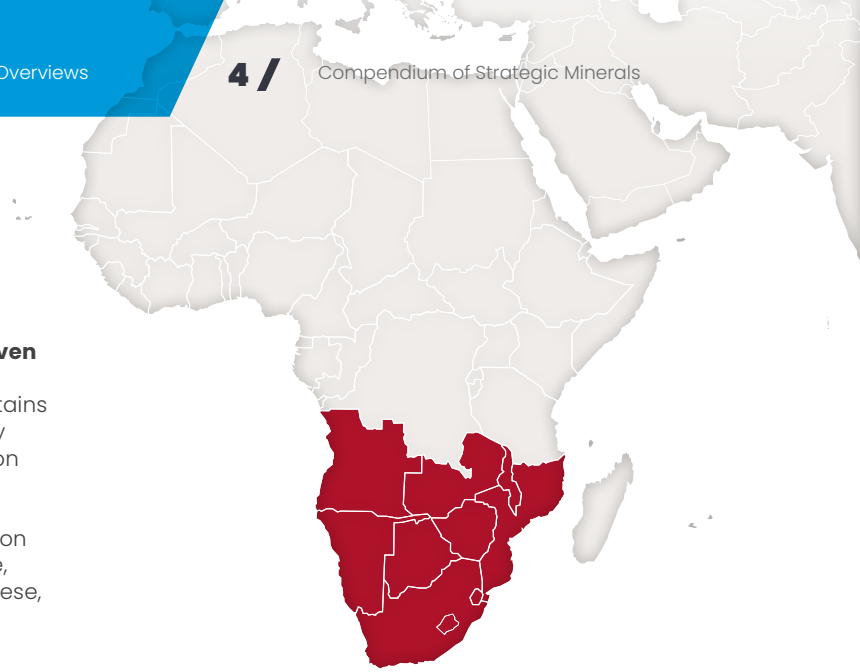
Momentum is beginning to build: in 2025, Millennial Potash secured support from the U.S. International Development Finance Corporation to advance a feasibility study on Gabon's Banio potash deposit, while Kore Potash signed the EPC contract for its Kola project in the Republic of Congo at the end of 2024. Kola ranks among the highest-grade and shallowest undeveloped Muriate of Potash (MoP) projects globally, reinforcing the Gulf of Guinea's strategic relevance in Africa's fertiliser security agenda.

Conclusion: Where Infrastructure exists, Beneficiation Follows

Central Africa's opportunity lies in scaling and integrating what already works. The region has a limited but critical infrastructure base to build on. In Gabon, the Transgabonese Railway has anchored decades of manganese production and materially de-risked future iron ore developments. In Cameroon, the CAMRAIL corridor provides a ready-made logistics backbone that strengthens the investment case for large-scale bauxite projects.

True scale will depend on extending rail systems to unlock cross-border iron ore deposits, and on mobilising Central Africa's vast but underutilised hydropower potential through a more integrated power pool to support processing and beneficiation. With abundant low-carbon power and rail-connected access to ports, the region is uniquely positioned to anchor processing at scale—particularly in potash, iron ore, manganese, and bauxite.

Southern Africa: Rebuilding Industrial Depth Around New Mineral Economies



Southern Africa is Africa's most significant minerals region, accounting for over half of the continent's aggregate mine-site value from operating mines and almost one-third of the continent's aggregate value from undeveloped mineral deposits. The region's strength is rooted in an exceptionally rich and diverse geological endowment. It includes some of the world's most mature and productive mining provinces: the Central African Copperbelt shared between Zambia and the D.R.C.; South Africa's Bushveld Igneous Complex (BIC) that holds the world's largest reserves of platinum group metals (PGMs) and chromite; Zimbabwe's Great Dyke, home to the world's second-largest PGM reserves; the Kalahari Manganese Field in South Africa, which holds the largest manganese reserves globally and underpins South Africa's position as the world's leading manganese and iron ore producer; and the Witwatersrand Basin south of Johannesburg, which for decades sustained South Africa's status as the world's largest gold producer.

Southern Africa's geology is not only mature—it is still expanding. New and under-explored provinces are emerging as exploration progresses, although significant work remains to fully delineate their potential. These include the Kalahari Copperbelt spanning Botswana and Namibia; the Molopo Farms Complex (nickel and PGMs) between Botswana and South Africa; the Choma Tin Belt in southern Zambia; the Kaoko Copperbelt in northern Namibia; and the largely under-explored Kunene Complex (nickel, copper, PGMs) straddling Angola and Namibia. Together, these belts signal that Southern Africa's mineral story is far from complete.

Much of the region's historical success has been driven by South Africa, which remains Africa's largest and most diversified mining economy. The country maintains commercial-scale production across an exceptionally wide range of commodities, including copper, gold, iron ore, manganese, nickel, PGMs, phosphates, zinc, lead, chrome, vanadium, diamonds, heavy mineral sands, and silver – to name just a few. Crucially, this production base is supported by deep downstream infrastructure, including refineries and smelters for chrome, manganese, steel, platinum, nickel, cobalt, aluminium, copper, and phosphates.

Southern Africa's leadership is further reinforced by other globally significant mining jurisdictions across the region. Mozambique hosts the world's largest graphite operation at Balama; Namibia is Africa's largest uranium producer; Botswana and Angola are home to world-class diamond industries; and Malawi hosts Kasiya, the world's largest known natural rutile deposit and the second-largest known flake graphite deposit globally. These assets broaden the region's commodity mix and reinforce its strategic relevance across energy transition, construction, and industrial value chains.

Finally, Southern Africa's long mining history has translated into deep institutional capacity, technical expertise, and investor familiarity, making it one of Africa's most competitive destinations for mining capital. This is reflected in global benchmarks: in 2024, Botswana, Zambia, and Namibia ranked among the top jurisdictions on the continent in the Fraser Institute's investment attractiveness index, behind only Morocco[30].

De-industrialisation Pressures, But the Foundations For Re-industrialisation Remain

Southern Africa's industrial dynamics remain heavily shaped by South Africa, whose recent de-industrialisation has weighed on the entire region. As Africa's largest and most diversified mining and industrial economy, South Africa has historically anchored demand for regional minerals and provided the core infrastructure—ports, railways, smelters, and refineries—through which much of Southern Africa's production was processed or exported. Today, a combination of rail under-investment, unreliable and costly electricity, subdued industrial demand, and exposure to global steel cycles has left several processing assets closed or on care and maintenance, including steel[31], ferrochrome[32], and zinc smelters and refineries.

Across the region, industrial capacity has also been eroding. In Zimbabwe, both nickel smelters and refineries are currently idle, removing an important source of regional beneficiation. Namibia's Skorpion zinc refinery has been on care and maintenance since 2020, while in Mozambique the MOZAL aluminium smelter—one of Africa's largest—will be placed on care and maintenance from 2026 following the inability to secure competitive power tariffs[33].

30 *https://www.fraserinstitute.org/studies/annual-survey-mining-companies-2024*

31 *https://www.reuters.com/sustainability/boards-policy-regulation/arcelormittal-south-africa-says-course-close-long-steel-plants-september-2025-07-31/*

32 *In 2025, the Glencore–Merafe Chrome Venture placed its Wonderkop and Boshoek smelters on care and maintenance and reduced activity at the Lion ferrochrome smelter, citing power availability and cost challenges. https://www.glencore.com/south-africa/news/glencore-merafe-statement-regarding-the-status-of-its-ferrochrome-smelter-operations-and-s189-process-in-south-africa*

33 *https://www.south32.net/news-media/latest-news/mozal-aluminium-update*

Southern Africa as a Platform for New Value Chains

The picture is not one of irreversible decline. Southern Africa retains many of the structural assets required for re-industrialisation—provided existing infrastructure is rehabilitated, better maintained, and more efficiently utilised. In South Africa, rail and port performance has begun to stabilise[34], while Eskom has shown early signs of operational and financial recovery[35], easing one of the most binding constraints on energy-intensive industries. At the regional level, Southern Africa also benefits from Africa's most integrated power pool, where emerging private participation frameworks like wheeling are already enabling greater power access for mining and industrial users.

Crucially, the region still hosts industrial ecosystems that can support a new generation of mineral-based industries. South Africa alone counts multiple established, port-linked industrial zones that can be repurposed for beneficiation and manufacturing. Immediate opportunities exist in automotive and electric-vehicle value chains, where South Africa remains the largest manufacturing hub in sub-Saharan Africa, hosting global OEMs such as Toyota, Ford, Isuzu, Volkswagen, and Mercedes-Benz. The next challenge is to attract EV, battery, and energy-materials manufacturing by leveraging this industrial base and access to critical minerals—mirroring strategies successfully deployed in Morocco.

Zimbabwe, however, has moved fastest in translating policy into industrial outcomes. The country has pursued a deliberate mineral-based industrialisation strategy anchored in chromite, iron ore, and lithium, supported by pragmatic export restrictions. High-carbon ferrochrome production rose from less than 250,000 tonnes in 2014 to over 1.7 million tonnes in 2024 (see Section 4: Chromium), while the commissioning of the Mvuma steel plant in 2024 has begun to reshape the regional steel landscape. In lithium, investment has accelerated into concentration plants and is now extending into lithium sulphate production ahead of a proposed ban on concentrate exports from 2027—illustrating how targeted, credible policy can materially accelerate domestic value addition.

Trade Corridors as Enablers of Mining and Industrial Revival

Revitalising and upgrading regional trade corridors will be essential to support both South Africa's recovery and broader SADC industrial ambitions. Several corridors are particularly strategic to the mining sector,

- ***The North–South Corridor***, linking the D.R.C.'s Copperbelt to South Africa via Zambia and Zimbabwe, is being repositioned by SADC from a transit route into a "smart economic corridor"[36]. This will require rail rehabilitation and new cross-border links, notably Mmamabula–Lephalale (Botswana–South Africa) and Kafue–Lion's Den (Zambia–Zimbabwe).
- ***The Central Corridor***, via the Port of Dar es Salaam, has become increasingly important for landlocked countries such as the D.R.C., Zambia, and Malawi. Upgrades include the concessioning of the TAZARA railway and construction of the Kasomeno–Kasenga–Chalwe–Mwenda toll road, which will shorten the Lubumbashi–Dar es Salaam route by 500 km.
- ***The Nacala Corridor***, while currently dominated by Mozambican coal exports, is well positioned to support undeveloped deposits in Zambia and Malawi, should the Chipata-Serenje rail link between both countries be developed.

Beyond these, SADC is also advancing new corridors that will be critical to supporting the integration and expansion of its mining industries:

- ***The Lobito Corridor*** has seen a sharp ramp-up since rail operations resumed in January 2024, reaching 20,000 tonnes per month and targeting 50,000 tonnes per month by end-2025, mostly exporting copper and importing sulphur. The corridor will be further strengthened by the Lobito II greenfield railway, led by AFC, linking Zambia directly to Angola.
- ***The Walvis Bay Corridor*** remains a key export route for Namibia's uranium and increasingly for Copperbelt copper, especially concentrates and refined copper trucked in the absence of rail connection.
- ***The Trans-Kalahari Corridor***, already functional by road, is being considered for rail integration between Namibia and Botswana, creating a second trans-Atlantic rail outlet after Lobito and significantly de-risking mining projects in Botswana.

Conclusion: Emerging Frontiers in a Mature Province

Southern Africa is exceptionally well positioned to play a leading role in global industrial, digital and energy transitions. This is driven by exploration success across nickel, lithium, rare earth elements, graphite, and uranium, alongside established mining depth.

Malawi stands out as a country to watch. Its mineral significance lies first and foremost in the scale and quality of its geological endowment. Recent exploration has confirmed the presence of world-class reserves of rutile, graphite, niobium, and rare earth elements, positioning the country as one of Southern Africa's most prospective but still under-explored mineral provinces.

What has historically constrained investment is not resource quality, but frontier-market risk—particularly around logistics and power access. This risk profile is now changing. Established rail connectivity to the Mozambican ports of Nacala and Beira, together with the commissioning of the 400 kV Mozambique–Malawi interconnector in 2025, is materially de-risking mining and processing investments by lowering transport costs and integrating Malawi into the Southern African Power Pool.

[34] *Transnet Freight Rail recorded increase in exports of both coal and iron ore between FY2022 and FY2024 while Transnet Port Terminals recorded an increase in traffic from both in Richards Bay and Saldanha Bay ports in FY2024, following five years of consecutive decline. Richards Bay serves as the major ports for coal exports, while Saldanha Bay is the major port used for iron ore exports.*

[35] *https://www.eskom.co.za/generation-recovery-plan-yields-sustained-grid-stability-and-on-going-efficiencies-year-on-year-unplanned-outages-drop-by-1-201mw/*

[36] *https://www.sadc.int/latest-news/sadc-endorses-north-south-economic-corridor-concept*

COMPENDIUM OF STRATEGIC MINERALS

This Compendium calls for deeper African supply-chain development in mining, while recognising that investment decisions are ultimately governed by project economics rather than continental strategy. Capital will flow to the lowest-risk, most competitive opportunities, shaped by jurisdictional risk, ore quality, logistics costs, power pricing, permitting timelines, and offtake certainty. These commercial realities will not always align with a pan-African value-chain vision.

That said, where fundamentals allow, a more joined-up approach can materially improve those same economics.

Across the continent, the three anchors of viability—**resource endowment, enabling infrastructure (especially reliable and affordable power), and demand**—rarely co-locate neatly. This misalignment often leaves Africa exporting raw materials while importing processed products, even where regional integration could lower delivered costs, widen effective market size, and de-risk offtake.

Against this backdrop, this section steps away from regional narratives and follows individual minerals and metals through their value chains—from where raw materials occur, to where processing and fabrication capacity is located (and what feedstock it relies on), to where demand for outputs is concentrated.

Viewed this way, a consistent pattern emerges: even where Africa hosts world-class deposits, processing is often located elsewhere on the continent or offshore, dependent on imported inputs, or oriented primarily toward non-African demand.

By tracing these chains—steel, aluminium, phosphates and fertilisers, potash, gold, nickel, manganese and ferroalloys, traceability minerals, and battery and industrial materials—this section highlights where Africa's value chains remain thin and discontinuous, and where coordinated investment can begin to convert mineral endowment into more durable and regionally anchored economic value. A detailed description of the data collection methodology is available in Appendix 4.

Key Take-Aways: Our **Value-Chain Disconnection Matrix**

Africa's Minerals Value-Chain Disconnection Matrix

Where Raw Materials, Processing Capacity and Demand Rarely Co-Locate

Chromium

PRODUCERS

Major Producers: South Africa (Bushveld Complex), Zimbabwe (Great Dyke)
Others: Ethiopia, Madagascar, Sudan

PROCESSING

Smelting: South Africa *(incl. units on care & maintenance)*, Zimbabwe

DRIVERS

Sectors: Steelmaking represents 95% of chromium demand; remaining 5% consumed as chrome metal (aerospace, defence, petchem, nuclear)
Geography: steel and ferroalloy producers (China, India, East Asia, Russia); limited African demand in the absence of a manufacturing base

CONSTRAINTS AND OPPORTUNITIES: Africa holds over 60% of global chromite reserves and produces ~50% of world supply, yet value capture remains constrained. Ferrochrome capacity exists (South Africa, Zimbabwe) but is undermined by power cost, reliability and policy divergence. Demand and pricing remain externally driven, largely tied to Chinese steel and alloy markets.

Cobalt

PRODUCERS

Major Producers: D.R.C.
Others: South Africa, Morocco, Zambia, Zimbabwe, Madagascar

PROCESSING

Refining (by-product copper and nickel): D.R.C. (hydroxide), Zambia, Morocco, Madagascar, South Africa, Zimbabwe

DRIVERS

Sectors: Lithium-ion batteries (46%), portable electronics (30%), superalloys and hard metal (12%)
Geography: China, USA, Japan

CONSTRAINTS AND OPPORTUNITIES: Africa controls the majority of global cobalt supply, but demand and offtake are concentrated abroad. This leaves producers exposed to external demand cycles, in an oversupplied market. Building regional offtake anchored in Africa's fast-growing demand for digital infrastructure and electronics (low-cost devices manufacturing) is now critical to rebalance the value chain.

Iron Ore

PRODUCERS

Major Producers: South Africa, Seirra Leone, Mauritania, Liberia, Algeria
Emerging Producer: Guinea (Simandou)
Others: Morocco, Namibia, Nigeria, Uganda

PROCESSING

Primary: Egypt, Algeria, Libya, South Africa *(incl. units on care & maintenance)*, Nigeria *(idle)*
Emerging: Zimbabwe, Kenya

DRIVERS

Sectors: Steelmaking
Geography: steel and ferroalloy producers (China, India, East Asia, Russia)
Africa: Egypt, Algeria, Libya, South Africa

CONSTRAINTS AND OPPORTUNITIES: African steelmakers are under pressure from Chinese overcapacity and dumping, contributing to smelter closures in South Africa and weak investment across the continent. Despite this, Africa has the largest upside in global steel demand, combining the world's lowest per-capita steel consumption with the fastest urbanisation rate. Only regional demand aggregation and integrated supply-chain planning can restore viability to Africa's steel industry.

Manganese

PRODUCERS

Major Producers: South Africa, Gabon, Ghana,
Mid-tier Producers: Côte d'Ivoire
Others: Morocco, Zambia, Senegal, Kenya, Egypt, Nigeria

PROCESSING

Smelting: Egypt, Gabon, South Africa *(incl. units on care & maintenance)*, Zambia
Refining: South Africa

DRIVERS

Sectors: Steelmaking (96%)
Geography: steel and ferroalloy producers (China, India, East Asia, Russia)

CONSTRAINTS AND OPPORTUNITIES: Sector highly exposed to Chinese and Asian steel demand despite rapid production growth across Southern and West Africa. Strategic opportunity lies in anchoring manganese processing to new African steelmaking capacity and building refining facilities for electrolytic manganese metal (EMM) and manganese sulphate (HP-MSM) to serve emerging batteries and energy-storage supply chains.

Nickel

PRODUCERS

Major Producers: Madagascar, South Africa, Côte d'Ivoire, Zambia
Others: Zimbabwe, Morocco

PROCESSING

Smelting: Zimbabwe *(closed)*
Refining *(by-product PGM and copper)*: South Africa, Morocco

DRIVERS

Sectors: Steelmaking (65%), lithium-ion batteries/EV (20%)
Geography: steel and ferroalloy producers (China, India, East Asia, Russia)

CONSTRAINTS AND OPPORTUNITIES: Nickel supply exposed to global oversupply and price volatility, with demand largely dictated by overseas steelmaking—mirroring dynamics seen in other ferro-alloys. Strategic upside lies in anchoring nickel into Africa's own stainless steel value chains and developing refining capacity to serve EV and battery demand.

3Ts

PRODUCERS

Tin
Major Producers: D.R.C., Namibia | **Others:** Rwanda, Nigeria, Tanzania, Burundi, Uganda

Tungsten
Major Producers: Rwanda | **Others:** Burundi, D.R.C., Nigeria, Uganda

Tantalum
Major Producers: D.R.C., Burundi, Rwanda | **Others:** Uganda, Ethiopia, Nigeria, Mozambique

PROCESSING

Smelting: Rwanda
Refining: Uganda, Rwanda

DRIVERS

Sectors: Portable electronics (solder, semiconductors, capacitors), aerospace and defence industries, hard metals and carbide tools, renewable energy technologies and high-performance industrial applications.
Geography: China, SE Asia, East Asia

CONSTRAINTS AND OPPORTUNITIES: Value capture constrained by artisanal and small-scale mining (ASM), informality, and persistent illicit trade flows. Immediate priority is formalising ASM and expanding regional processing hubs in East Africa to improve traceability and retain value. Over time, refined 3Ts could support local electronics and digital manufacturing, aligned with Africa's fast-growing consumer and technology markets.

Vanadium

PRODUCERS

Major Producers: South Africa

PROCESSING

Smelting: South Africa *(incl. units on care & maintenance)*

DRIVERS

Sectors: Steelmaking (90%), energy storage (2%)
Geography: steel and ferroalloy producers (China, India, East Asia, Russia)

CONSTRAINTS AND OPPORTUNITIES: Ferroalloy metal whose demand is tied to global—especially Chinese—steel cycles. African processing capacity is entirely concentrated in South Africa, where power shortages and high electricity costs have forced most ferrovanadium facilities to shut down. Longer-term opportunity lies in reviving regional steelmaking and selectively positioning vanadium into energy-storage niches.

Bauxite

PRODUCERS

Major Producers: Guinea
Medium Producers: Ghana, Sierra Leone,
Others: Côte d'Ivoire, Tanzania, Mozambique

PROCESSING

Refining: Guinea
Smelting: South Africa, Egypt, Cameroon, Ghana *(under-capacity)*, Mozambique *(under care & maintenance)*

DRIVERS

Sectors: Aluminium used in construction and manufacturing, transport, power transmission and renewable energy infrastructure, lightweighting
Geography: alumina demand from major aluminium producers (China, Europe/Russia, Middle East) incl. African smelters in Egypt, South Africa and Mozambique

CONSTRAINTS AND OPPORTUNITIES: Aluminium demand and prices are structurally resilient, unlike most bulk metals. Africa's opportunity lies in expanding alumina refining to capture value and by-products (e.g. gallium), before reviving idle or under-utilised smelters (Mozambique, Cameroon) constrained by power and integration gaps.

Copper

PRODUCERS

Major Producers: D.R.C., Zambia
Others: Eritrea, Morocco, Mauritania, South Africa, Tanzania, Zimbabwe

PROCESSING

Smelting: Zambia, D.R.C., Namibia
Refining: D.R.C., Zambia, Namibia, Congo-Brazzaville

DRIVERS

Sectors: Electrical applications & wiring (65%), construction & pipes (25%), transport (7%)
Geography: China, East Asia, EU

CONSTRAINTS AND OPPORTUNITIES: Africa's mining, smelting and refining capacity is scaling rapidly, with output increasingly upgraded to cathodes and anodes. However, downstream transformation remains. The opportunity is to anchor copper into Africa's own long-term demand—power grids and transmission, construction and urban infrastructure, electrical equipment and cables, renewables, EVs and industrial machinery.

Lead

PRODUCERS

Major Producers: Morocco, Nigeria, South Africa, Namibia

PROCESSING

Smelting: Morocco *(liquidation)*
Refining *(secondary recycling)*: Egypt, Algeria, Nigeria, Ghana, Senegal, Mozambique, South Africa

DRIVERS

Sectors: Lead-acid batteries for internal combustion engines (60%), construction, radiation-shielding glass, aerospace, storage technologies
Geography: China, East Asia, EU

CONSTRAINTS AND OPPORTUNITIES: Africa's strategic opportunity lies in scaling lead recycling, which already accounts for most global supply, while strengthening domestic automotive and energy-storage value chains.

Lithium

PRODUCERS
Major Producers: Zimbabwe, Mali
Others: Nigeria, South Africa, Namibia

PROCESSING
Refining: Zimbabwe *(under-construction)*

DRIVERS
Sectors: EV (90%), energy storage (9%)
Geography: China, East Asia, EU, USA

CONSTRAINTS AND OPPORTUNITIES: Africa's lithium opportunity is coalescing around two emerging clusters: Southern Africa (Zimbabwe, South Africa, Namibia) and West Africa (Nigeria, Mali, Ghana). The strategic challenge is to move beyond ore exports by building independent refining and chemical conversion capacity, reducing reliance on external processors and anchoring battery-related value chains on the continent.

Diamonds

PRODUCERS
Major Producers: Angola, Botswana, DRC, Namibia, South Africa
Others: Lesotho, Sierra Leone, Tanzania, Ghana, Guinea, Liberia

PROCESSING
Cutting and polishing: Botswana, South Africa, Angola

DRIVERS
Sectors: Jewellery fabrication, industrial diamonds (cutting, drilling, abrasives)
Geography: India, USA, UAE, EU

CONSTRAINTS AND OPPORTUNITIES: Market conditions have become structurally more challenging as lab-grown diamonds compress prices and margins. The priority is therefore to retain as much remaining value as possible by expanding local cutting, polishing, and trading capacity. Strengthening downstream capabilities can help formalise not only diamonds but the wider gemstones industry, preserving employment, skills, and fiscal revenues.

Rare Earths

PRODUCERS
Major Producers: Mozambique, Madagascar, Nigeria
Others: Burundi *(care and maintenance)*

PROCESSING
Refining: Angola *(under-construction)*

DRIVERS
Sectors: Permanent magnets (NdFeB) for clean technologies (20%) incl. EV traction motors, wind turbines, industrial motors, but also defence and aerospace systems, electronics and advanced manufacturing.
Geography: China, East Asia, SE Asia, USA

CONSTRAINTS AND OPPORTUNITIES: Geopolitical and geoeconomic realignment is creating an opening for Africa to emerge as an alternative rare earth supplier. Most African rare earths are currently under-valued—often produced as by-products of mineral sands with no local beneficiation—making selective, cluster-based refining strategies critical, notably around an Atlantic cluster (Logonjo) and a Western Indian Ocean cluster.

Fluorspar

PRODUCERS
Major Producers: Morocco, South Africa

PROCESSING
Minimal acid manufacturing in South Africa

DRIVERS
External: Fluorochemicals (hydrofluoric acid, aluminium fluoride), for aluminium smelting, glass manufacturing, fine chemicals and semiconductors, lithium-ion battery materials
Geography: USA, EU

CONSTRAINTS AND OPPORTUNITIES: Key constraint around absence of hydrofluoric acid capacity, which is essential to retain value and anchor fluorine-based industries. Building HF capacity could integrate fluorspar into aluminium value chains and selective manufacturing, including glass and EV battery materials—particularly in phosphate-based industrial hubs such as Morocco.

Zinc

PRODUCERS
Major Producers: South Africa, Eritrea
Others: Zambia, Morocco, Namibia, Nigeria

PROCESSING
Smelting: Algeria *(care & maintenance)*
Refining: Congo-Brazzaville, South Africa *(care & maintenance)*, Namibia *(care & maintenance)*

DRIVERS
Sectors: Steelmaking (galvanising 50%) for construction, automotive and infrastructure; consumer products
Geography: steel and ferroalloy producers (China, India, East Asia, Russia); EU

CONSTRAINTS AND OPPORTUNITIES: Africa's zinc processing capacity is currently largely on care and maintenance, despite stable upstream production. Reviving refining and galvanising capacity presents a strategic opportunity along the South Africa–Namibia axis and in Algeria, anchored to regional steel and manufacturing demand.

Mineral Sands

PRODUCERS
Major Producers: South Africa, Mozambique, Madagascar, Senegal, Sierra Leone

PROCESSING
Smelting: South Africa

DRIVERS
Sectors: pigments (paints, coatings, plastics and paper), ceramic tiles, foundry, refractory materials and continuous steel casting
Geography: China, EU, USA, India

CONSTRAINTS AND OPPORTUNITIES: Immediate opportunities lie in deepening forward integration in existing South African hubs by expanding into titanium dioxide pigments and downstream paint value chains. In parallel, a second regional processing hub could be developed in West Africa—anchored around Senegal and Sierra Leone—to support beneficiation closer to production and regional demand.

Graphite

PRODUCERS
Major Producers: Madagascar, Mozambique
Others: Tanzania

PROCESSING
No anode material manufacturing

DRIVERS
External: Battery applications, high-performance uses (aerospace, semiconductors), defence technologies
Geography: China, East Asia, USA, Japan, EU

CONSTRAINTS AND OPPORTUNITIES: Africa's opportunity is to build a globally competitive graphite supply chain centred on the Mozambique–Tanzania corridor. The Balama mine has already anchored the largest natural graphite and anode-material supply chain outside China. The next step is to scale downstream processing—particularly along logistics corridors such as Nacala—to capture more value and strengthen supply-chain resilience.

Phosphates

PRODUCERS
Major Producer: Morocco
Mid-tier Producers: Algeria, Egypt, Tunisia, Senegal, South Africa, Togo
Others: Tanzania

PROCESSING
Refining: Morocco, Egypt, Senegal, South Africa, Tunisia

DRIVERS
Sectors: Fertilisers (agriculture), lithium iron phosphate (LFP) batteries
Geography: India, EU, East Asia

CONSTRAINTS AND OPPORTUNITIES: Africa holds the world's largest phosphate reserves (80%) but produces a much smaller share of global supply (20%), leaving the continent exposed to external price and supply shocks. With the lowest fertiliser use per hectare globally, Africa also has the strongest long-term demand upside—making expanded phosphate mining and processing a strategic priority.

Gold

PRODUCERS
Major Producers: Ghana, South Africa, Mali, Burkina Faso
Mid-tier Producers: Côte d'Ivoire, Guinea, Senegal, Mauritania, Namibia, Niger, Democratic Republic of the Congo, Tanzania, Zimbabwe, Sudan
Others: Liberia, Ethiopia, Rwanda, Zambia, Togo, Egypt, Eritrea, Mozambique, Nigeria, Gabon, Botswana

PROCESSING
Refining: South Africa, Ghana, Tanzania, Kenya, Uganda, Rwanda, Egypt, Nigeria, Zimbabwe, Senegal, Mali, Guinea, Gabon, Burkina Faso, Sudan

DRIVERS
Sectors: jewellery fabrication, reserves and holdings
Geography: USA, EU, Russia, China and the IMF have the world's largest gold reserve holdings

CONSTRAINTS AND OPPORTUNITIES: Africa's key opportunity lies in formalising artisanal and small-scale mining through expanded processing centres and traceable supply chains. Scaling up licensed gold refineries is critical to retain value locally, support domestic and regional central-bank purchasing programmes, and reduce smuggling and fiscal leakage.

PGMs

PRODUCERS
Major Producers: South Africa (Bushveld Complex), Zimbabwe (Great Dyke)

PROCESSING
Smelting: South Africa, Zimbabwe
Refining: South Africa

DRIVERS
External: Automotive catalytic converters (60-65%), jewellery, chemical processing, petroleum refining, electronics
Geography: USA, China, EU

CONSTRAINTS AND OPPORTUNITIES: Tight global supply and a supportive price outlook make PGMs structurally attractive. Africa controls over 75% of global resources, but refining is concentrated in South Africa, creating a single-country bottleneck. The key opportunity is to diversify and secure regional processing capacity to reduce vulnerability to power, cost, and operational constraints.

Silver

PRODUCERS
Major Producers: Morocco, Eritrea, Botswana, South Africa
Others: Burkina Faso, DRC, Ghana, Namibia, Tanzania, Zambia

PROCESSING
Refining: Morocco, South Africa
Smelting (co-product): Namibia

DRIVERS
Sectors: Industrial applications (60% – solar photovoltaics, electronics and semiconductors), electrification, jewellery, silverware, reserves & holdings
Geography: USA, China, East Asia, EU

CONSTRAINTS AND OPPORTUNITIES: Silver is regaining strategic importance as prices strengthen and industrial demand expands. Africa's silver output is concentrated around major gold and copper districts, positioning it well for regional processing clusters in West and Southern Africa. Capturing value will require recognising silver as a standalone metal and integrating it into refining, industrial, and reserve-management strategies.

Uranium

PRODUCERS
Major Producers: Namibia, Niger, Malawi
Others: South Africa (by-product of gold)

PROCESSING
No enrichment facilities

DRIVERS
External: Nuclear energy
Geography: Russia, China, EU (incl. France), USA, South Korea

CONSTRAINTS AND OPPORTUNITIES: Global nuclear demand is rising, requiring a sustained increase in uranium supply and the restoration of African capacity, notably in Niger. Africa remains the only continent without uranium enrichment capacity, leaving the highest value segment offshore. As nuclear power expands—already operational in South Africa and under construction in Egypt—there is a strategic case for a shared African enrichment capability.

Source(s): USGS, BGS, WMD, World Bank, IEA, The Observatory of Economic Complexity, World Integrated Trade Solution (WITS)

IRON AND FERRO-ALLOY METALS

Chromium: Southern Africa's Strategic Alloy Metal

Chromium is a strategic alloy metal whose demand is anchored in industrialisation and manufacturing depth. The metal is primarily consumed as ferrochrome, an alloy containing between 50 and 70% chromium, where it is mixed with iron. Stainless steel accounts for around 80% of global ferrochrome demand[37], making it the dominant driver of chromium markets. A further 15% is used in special steels, where chromium enhances resistance to corrosion, wear, shock, and extreme temperatures. The remaining 5% is consumed as chrome metal—nearly pure chromium (≈99%)—required for highly demanding applications in aerospace, defence, petrochemicals, gas, and nuclear industries[38]. As such, chromium demand is closely tied to industrial sophistication rather than purely to construction volumes.

Africa sits at the core of the global chromium market, hosting most of the world's chromite endowment. More than 60% of global chromite reserves are located on the continent, overwhelmingly concentrated in Southern Africa. The world's largest reserves are found in South Africa's Bushveld Complex, while Zimbabwe's Great Dyke hosts another globally significant concentration. Zimbabwe is uniquely endowed with both stratiform and podiform chromite deposits, making its ore body particularly versatile for ferrochrome production[39]. South Africa's chromite deposits are predominantly stratiform and generally lower grade, but extremely abundant. This geological positioning makes both countries structurally indispensable to global chromium supply.

Africa dominates global chromium production. South Africa remains the world's largest producer of chromium and reached a new production peak of over 22m tonnes of chrome ores in 2024, despite lower average grades. Zimbabwe is the second major African producer and tripled output over 2014-24. Across the rest of the continent, Madagascar contributes smaller but notable volumes through the Bemanevika Mine in Madagascar, with intermittent production occasionally reported in Ethiopia and Sudan.

CHROME ORE

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**14 780**	**16 064**	**14 819**	**17 063**	**19 743**	**19 302**	**14 491**	**19 646**	**20 281**	**20 990**	**22 500**
South Africa	14 038	15 656	14 708	16 671	17 850	17 661	13 197	18 381	19 105	19 689	20 500
Zimbabwe	628	304	59	297	1 756,1	1 550	1 272	1 244	1 154	1 205	2 001
Others (Ethiopia, Madagascar, Sudan)	114	104	52	96	136	90	22	21	22	96	nd

(e) estimate; nd = no data available at the time of publication
Source(s): DMRE, ZIMSTAT, BGS

[37] *International Chromium Development Association*
[38] *idem*
[39] *The Southern African Institute of Mining and Metallurgy*

Upstream growth has not translated uniformly into downstream processing and beneficiation outcomes are diverging sharply. South Africa's ferrochrome production has been on a sustained downward trend for many years, with chromium alloy output falling below the 3 million tonnes per annum threshold in recent years (see data table). By contrast, Zimbabwe has experienced a rapid resurgence in ferrochrome production since 2021 on the back of a partial export ban, marking one of the most striking beneficiation shifts on the continent.

Energy availability and policy choices have proven decisive in shaping chromium value chains. Ferrochrome production is an electricity-intensive metallurgical processes, making power access, pricing, and reliability critical. South Africa's declining ferrochrome output reflects chronic power shortages, high electricity tariffs, and grid instability, which have progressively undermined the competitiveness of local smelters. These pressures culminated in a series of high-profile closures and curtailments, including Glencore's decision in 2025 to place several of its South African ferrochrome and vanadium operations into care and maintenance[40].

Zimbabwe adopted a different approach. A partial ban on raw chrome exports introduced in 2021, combined with concessionary electricity tariffs, triggered a new investment cycle focused on reactivating idle furnaces and building new smelting capacity. As a result, the country produced over 1.7 million tonnes of ferrochrome in 2024, compared with average annual output of just 100–200 thousand tonnes over the previous decade.

CR_2O_3 CONTENT

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**6 252,6**	**6 834,1**	**6 438,5**	**7 500,7**	**8 001,8**	**8 148,1**	**6 062,5**	**8 237,6**	**8 374,1**	**8 475,6**	
South Africa	5 977,6	6 660,5	6 254,6	7 073,4	7 524,7	7 384,0	5 479,4	7 583,2	7 862,0	7 968,4	
Zimbabwe	184,8	93,8	128,2	310,0	402,6	720,3	572,5	644,4	499,4	484,8	
Others (Ethiopia, Madagascar, Sudan)	90,20	79,89	55,65	117,36	74,46	43,75	10,60	10,00	12,65	22,49	

(e) estimate
Source: World Mining Data, EITI

Zimbabwe's experience demonstrates both the potential and the pressures of rapid beneficiation. The ferrochrome sector has grown so quickly that it has become the country's single largest electricity consumer[41], forcing producers to seek alternative energy solutions and invest in captive power generation. While this underscores the effectiveness of targeted policy in driving value-chain deepening, it also highlights the infrastructure challenges that accompany energy-intensive beneficiation at scale.

FERROCHROME

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
South Africa -chromium alloys	**3 719,0**	**3 684,6**	**3 524,0**	**3 483,6**	**3 515,9**	**3 247,6**	**2 404,1**	**3 110,0**	**3 157,6**	**2 897,4**	**nd**
Zimbabwe -high carbon ferrochrome (HCFC)	248,7	176,1	30,8	108,4	287,1	324,4	161,7	310,8	277,1	361,1	1 747,55

nd = no data available at the time of publication
Source(s): DMRE, ZIMSTAT

[40] *https://www.glencore.com/south-africa/news/glencore-statement--regarding-the-status-of-its-Ferrochrome-and-Vanadium-operations-and-S189-process-in-South-Africa-*
[41] *https://www.bloomberg.com/news/articles/2024-06-13/zimbabwe-s-ferrochrome-miners-agree-to-build-power-plants*

Cobalt: Managing Value Creation in a Structurally Oversupplied Market

Cobalt is a strategic metal anchored in batteries, advanced alloys, and defence. Its demand profile reflects its role in high-performance and high-reliability applications rather than bulk industrial uses. Lithium-ion batteries account for over 46% of global cobalt demand, driven by electric vehicles and energy storage systems[42]. A further 30% is used in portable electronics, including mobile phones and laptops[43]. Superalloys and hard metals account for about 12%, with aerospace applications representing cobalt's largest non-battery use[44]. This demand structure gives cobalt long-term strategic relevance, even as battery chemistries evolve.

Africa controls more than half of the world's cobalt resources, but these are overwhelmingly by-product in nature. Most cobalt mineralisation on the continent occurs alongside copper, and to a lesser extent nickel or manganese, with very few deposits qualifying as primary cobalt in the strict sense[45, 46]. These include the producing Boss and Pumpi mines in the Democratic Republic of the Congo and Bou-Azzer in Morocco (see data table).

Beyond these assets, Africa hosts several undeveloped primary cobalt deposits of varying scale, most notably the Nkamouna nickel-cobalt deposit in Cameroon, which represents Africa's largest resource of primary cobalt, as well as additional occurrences in Zambia, Namibia, South Africa, and the D.R.C.

This geological reality means that Africa's cobalt endowment is structurally tied to the performance and investment cycles of other mineral value chains, rather than to cobalt demand alone.

The cobalt market has been in prolonged surplus, constraining prices and triggering administrative intervention. Global oversupply has weighed on cobalt prices for several years, with the surplus peaking at 36,000 tonnes in 2024[47]. In response to a nine-year low in prices, the D.R.C. – which accounts for some 75% of global supply – imposed an export ban in February 2025, followed by a transition to a quota system[48, 49]. According to the Cobalt Institute, the market is not expected to return to deficit before 2030[50], reinforcing expectations of continued price pressure.

Africa captures limited downstream value from cobalt processing, despite its resource dominance. The continent has no dedicated cobalt-only refining facilities. Cobalt is refined and processed only as a by-product in a small number of countries, including Morocco, Madagascar, South Africa, and Zimbabwe, typically alongside nickel. Outside these limited operations, most of African cobalt is exported as oxides and hydroxides, primarily to China, where it is further refined and converted into battery-grade materials.

The by-product nature of cobalt production complicates supply management and reinforces the case for local processing. Because cobalt output is tied to copper and nickel production, miners have limited ability to reduce cobalt supply independently to comply with quotas or respond to weak prices. Storing cobalt in intermediate forms also poses logistical challenges, particularly in the African Copperbelt, unless material is further processed into solid or refined products[51]. In this context, downstream processing is not only a value-addition opportunity, but increasingly a practical requirement to manage supply, storage, and market volatility more effectively.

Taken together, the cobalt data points to a clear strategic reality for Africa. The continent dominates global resources and production, yet remains structurally upstream in the value chain, exposed to surplus cycles, policy shocks, and external refiners. Moving toward integrated copper-nickel-cobalt ecosystems—and eventually EV manufacturing—will be central to Africa's ability to convert its cobalt endowment into durable industrial and strategic value.

COBALT (METAL CONTENT)

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**80 362**	**88 493**	**73 542**	**89 799**	**118 114**	**85 054**	**91 980**	**97 858**	**121 202**	**158 653**	**205 433**
Botswana	196	316	281	–	–	–	–	–	–	–	–
Congo, D.R.*	75 560,2	83 529,1	68 822,0	82 461,4	111 358,2	77 963,7	86 590,7	93 010,5	115 371,3	152 798,9	198 844,1
Madagascar	nd	nd	nd	3 053	2 852	2 897	833	2 111	3 428	3 387	2 535
Morocco (a)*	1 391	1 722	2 081	1 924	1 806	2 397	2 416	1 796	1 690	1 506	1 690
South Africa (a)	1 332	1 362	1 101	1 065	1 007	1 027	897	355	250	378	611
Zambia	1 525,3	1 154,6	812	892,4	689,2	367,3	287,2	240,4	251	207	1 409
Zimbabwe (a)	358	409	445	403	402	402	956	345	212	376	344,14

(e) estimate; (a) metal and/or refined by-product

* *Supply growth in the D.R.C. was primarily underpinned by higher copper output from CMOC's Kisanfu operation, where production rose by around 50% in 2024. In Morocco, cobalt cathode is produced from the polymetallic mining complex in Guemassa, with most cobalt sourced from the Bou-Azzer Mine*

Source(s): Statistics Botswana, CTCPM, Ambatovy, Haut Commissariat au Plan (HCP), DMRE, Ministry of Mines and Mineral Development Zambia, Ministry of Finance Zambia, ZIMSTAT, BGS, USGS, WMD

42 *The Cobalt Institute*
43 *idem*
44 *Idem. For the same reason, cobalt is increasingly recognised as a national security material, given its role in advanced military and defence systems.*
45 *Primary cobalt refers to deposits where cobalt is the most economically significant co-product, even if not mined in isolation.*
46 *Cobalt is largely a by-product globally with only 0.5% of global output coming from primary cobalt mines. Worldwide, it is primarily extracted as a by-product of industrial copper and nickel mining, with 78% of production coming from copper operations and 22% from nickel. See African Development Bank Group Factsheet – Cobalt: https://www.afdb.org/sites/default/files/documents/publications/cobalt_factsheet_1.pdf*
47 *https://www.reuters.com/world/china/global-cobalt-market-seen-swinging-deficit-surplus-early-2030s-2025-05-14/*
48 *https://www.spglobal.com/market-intelligence/en/news-insights/research/2025/10/drc-cobalt-export-quotas-to-support-cobalt-prices-though-challenges-loom*
49 *From October 16, 2025, exports will be capped, with 2026 and 2027 annual quotas set at 96,600 tonnes, roughly half of 2024 export volumes*
50 *https://www.reuters.com/world/china/global-cobalt-market-seen-swinging-deficit-surplus-early-2030s-2025-05-14/*
51 *https://www.spglobal.com/market-intelligence/en/news-insights/research/2025/10/drc-cobalt-export-quotas-to-support-cobalt-prices-though-challenges-loom*

Iron Ore: Scale Is Returning – But Steel Integration Remains the Missing Link

Global iron ore markets are entering a weaker price environment as demand softens and supply expands. China—the world's largest producer and consumer of steel—continues to weigh on iron ore demand amid prolonged weakness in its property sector and subdued construction activity elsewhere[52]. At the same time, rising output from Australia and Brazil, combined with the imminent arrival of new low-cost, high-grade supply from Guinea, is reinforcing oversupply conditions[53]. Iron ore prices declined by around 10% year-on-year in 2025 (see price chart) and are expected to ease by a further 4% annually in 2026 and 2027[54], increasingly favouring large, high-grade deposits and low-cost producers.

Iron ore prices (2014-2025), cfr spot $/dmtu

Source: World Bank

Against this bearish backdrop, Africa's iron ore supply has recovered and is entering a phase of structural expansion. After a volatile decade, African iron ore production reached a new ten-year high in 2024 (~98m tonnes) and is estimated to have surpassed 100 million tonnes in 2025. This recovery has been driven by the rebound of Sierra Leone's production, alongside steady growth in Algeria and Uganda (see data table).

IRON ORE

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**121 496,6**	**92 851,7**	**88 516,9**	**96 639,4**	**92 053,8**	**93 184,9**	**76 902,6**	**95 954,1**	**91 620**	**95 400**	**98 000**
Algeria	335	396	439	497	2 182,9	1 978,8	1 881,8	1 744,5	1 634,3	1 742,6	2 000
Congo, Rep.	–	–	–	–	40	50	70	70,0	70,0	nd	nd
Egypt (e)	1 697	1 500	509	565	500	80,5	3,5	10,0	40,5	75,0	nd
Guinea	–	–	–	–	–	–	1 148	1 755,1	304,4	–	171,9
Kenya	–	–	–	–	167,1	161	79	156,0	52,0	nd	nd
Liberia	5 744	4 530	1 405	1 934	3 934	4 823,2	4 788	4 093,5	6 853	5 050	5 205
Malawi	–	–	3,3	4,4	–	1,7	2,4	–	5,0	1,0	1,0
Mauritania	13 306	11 607	13 268	11 714,0	10 710,3	12 196,5	12 515,5	12 617,8	12 722,0	14 007,0	14 307,5
Morocco	22,9	18	21	100,3	51,4	19,9	39,2	24,6	13,4	14,5	46,3
Namibia	–	4	8,5	2,5	13,0	12,5	40,5	75,7	–	7,9	nd
Nigeria*	1,9	5,9	1,5	1,6	1,6	0,2	0,1	3,1	0,3	8,9	200,0
Sierra Leone	19 308,0	1 691,3	6 176	6 521	–	722,3	–	1 583,8	5 339,8	10 136,5	11 757,3
South Africa	80 759,3	72 805,5	66 455,9	75 090,7	74 273,0	72 406,8	55 635,4	72 980,5	63 714,3	63 187,8	65 300
Tanzania	–	–	16,6	8,6	–	25,1	28,4	78,2	51,1	67,6	66,5
Togo	88,6	–	–	–	–	–	–	–	–	–	–
Tunisia	192	285	211	198	176	186,5	172,9	266,4	260	260	nd
Uganda	42	9	2,2	2,3	4,5	–	20,2	101,3	102,5	361,2	436,7

(e) estimate; nd = no data available at the time of publication; (e) = estimates
Note: data excludes small production from Angola, Malawi and Gabon.
** In Nigeria, industry sources point to a significant under-reporting of iron ore production*
Source(s): ONS, USGS, Ministère des Mines et de la Géologie de Guinée, EITI, Central Bank of Liberia, ANSADE, Haut Commissariat au Plan (HCP), Chamber of Mines of Namibia, National Minerals Agency (NMA-SL), Department of Mineral Resources, INSEED, Uganda Bureau of Statistics (UBOS), Ministry of Energy and Mineral Development (MEMD).

[52] *World Bank (October 2025). Commodity Markets Outlook.*
[53] *idem*
[54] *idem*

The next phase of supply growth will be transformative. The commissioning of the Simandou project in Guinea at the end of 2025 marks the arrival of large-scale, high-grade iron ore to global markets, with production expected to reach 60 million tonnes by 2028 and exceed 120 million tonnes after 2030[55]. Guinea's neighbours are also scaling up: in Mauritania, SNIM reached a record 15 million tonnes in 2025 and plans to triple output by 2031[56], while Liberia is expanding supply following the recent commissioning of ArcelorMittal's expansion project at Yekepa[57], at the border with Guinea.

Steel production in Africa has expanded in parallel—but largely without domestic iron ore integration. African crude steel output has roughly doubled over the past decade, driven primarily by North Africa and the growth of scrap-based and secondary steel production across sub-Saharan Africa (see data table).

CRUDE STEEL

'000 tonnes (including secondary)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**14 885**	**13 701**	**13 099**	**14 818**	**17 610**	**17 175**	**18 482,7**	**22 546,2**	**22 841,9**	**25 770,9**	**26 557,7**
Algeria	415	650	650	415	2 300	2 400	3 000	3 491,3	4 300	4 421	4 520
Angola	nd	nd	nd	nd	nd	nd	250	275	270	190	285
Egypt	6 485	5 506	5 036	6 870	7 807	7 257	8 228,7	10 293,5	9 818,5	10 353,6	10 730,9
Ghana	25	25	25	25	25	25	400	400	400	220	245
Kenya	20	20	20	20	20	20	385	485	450	1 365	1 750
Libya	712	352	492	422	396	606	494,9	651,7	687,8	902,2	871,9
Morocco	501	516	520	550	520	500	1 000	1 050	1 550	1 397	1 415
Nigeria	100	100	100	100	100	100	650	650	650	1 190	1 200
South Africa	6 412	6 417	6 141	6 301	6 327	6 152	3 876,5	5 019,5	4 495,6	4 953,1	4 716,9
Tanzania	nd	nd	nd	nd	nd	nd	120	145	140	695	750
Tunisia	150	50	50	50	50	50	77,6	85,1	80	84	73

(e) estimate
Note(s): data includes secondary steel produced from scrap and does not cover smaller markets like D.R. Congo, Mauritania or Uganda.
Source: World Steel Association

Egypt has been Africa's largest steel producer since 2017, while Algeria has invested heavily in pig iron and direct reduced iron (DRI) capacity. However, both countries face acute feedstock constraints. Egypt's iron ore production has declined as reserves at the Bahariya Oasis deplete, forcing reliance on imports; the country spent approximately US$1.7 billion importing iron ore in 2024[58], sourcing feedstock from suppliers such as Brazil and Oman (see Infographic: Iron Ore & Steel Value-Chains). Algeria is only now beginning to integrate domestic supply through the development of the Gara Djebilet deposit and a new railway connection, which could enable local feedstock substitution from 2026[59], including for Tosyali's steel complex in Oran.

With very few exceptions, Africa's iron ore mining and steelmaking remain structurally disconnected. South Africa was for many years the only country that combined meaningful iron ore production with significant steel output but has had to gradually close its primary steel mills[60]. Other major crude steel producers—including Algeria (4.4 million tonnes) and Morocco (1.4 million tonnes) produce little to no iron ore and rely heavily on imported feedstock or scrap. This disconnect between mining and refining capacity highlights a broader continental challenge: iron ore is increasingly abundant in Africa, but its industrial transformation remains geographically and institutionally constrained.

This structural gap has left Africa increasingly exposed to global steel oversupply and trade distortions. As demand weakened in China, steel exports were redirected toward emerging markets, with Africa absorbing a growing share. In the first half of 2025 alone, Chinese exports to Africa increased by over 25%, contributing to total exports exceeding US$200 billion for the first time, and widening Africa's trade deficit with China to more than US$60 billion[61]. Much of this surge was concentrated in steel-intensive products: vehicle exports rose by 115%, motorcycles by 84%, construction machinery by 63%, and structural steel by 43%[62]. These dynamics have directly challenged domestic steel industries and sector jobs across the continent.

Africa's most compelling iron ore opportunity therefore lies in building integrated, low-carbon steel value chains. High-grade deposits such as Simandou—where iron content averages around 65.8%[63]—are well aligned with global decarbonisation trends, as steelmakers increasingly seek higher-grade feedstock to reduce emissions intensity. When combined with Africa's vast clean energy resources, particularly hydropower in West and Central Africa, the continent is structurally well positioned to host green steel and DRI production at scale. Yet outside of North Africa and a handful of isolated initiatives, a cohesive regional or continental roadmap linking iron ore, power, transport, and steelmaking remains absent.

55 *https://www.spglobal.com/market-intelligence/en/news-insights/research/2025/09/simandou-iron-ore-project-a-game-changer-for-global-supply*
56 *https://www.snim.com/en/snim-participates-and-officially-sponsors-mauritanides-exhibition-and-forum*
57 *https://liberia.arcelormittal.com/Phase_II_Expansion_Projects*
58 *https://aisusteel.org/en/33005/*
59 *https://al24news.dz/en/president-tebboune-orders-launch-of-gara-djebilet-iron-ore-exploitation-from-early-2026/*
60 *ArcelorMittal, the country's last integrated ore-to-steel producer, cited weak domestic demand, competition from local scrap metal recycling and a deteriorating infrastructure ecosystem as primary reasons for closing its long steel business in 2025. See for instance https://www.reuters.com/markets/commodities/arcelormittal-south-africa-cease-long-steel-production-by-april-2025-02-28/*
61 *https://www.bloomberg.com/news/articles/2025-08-26/china-is-pouring-exports-into-africa-faster-than-anywhere-else*
62 *idem*
63 *https://www.spglobal.com/market-intelligence/en/news-insights/research/2025/09/simandou-iron-ore-project-a-game-changer-for-global-supply*

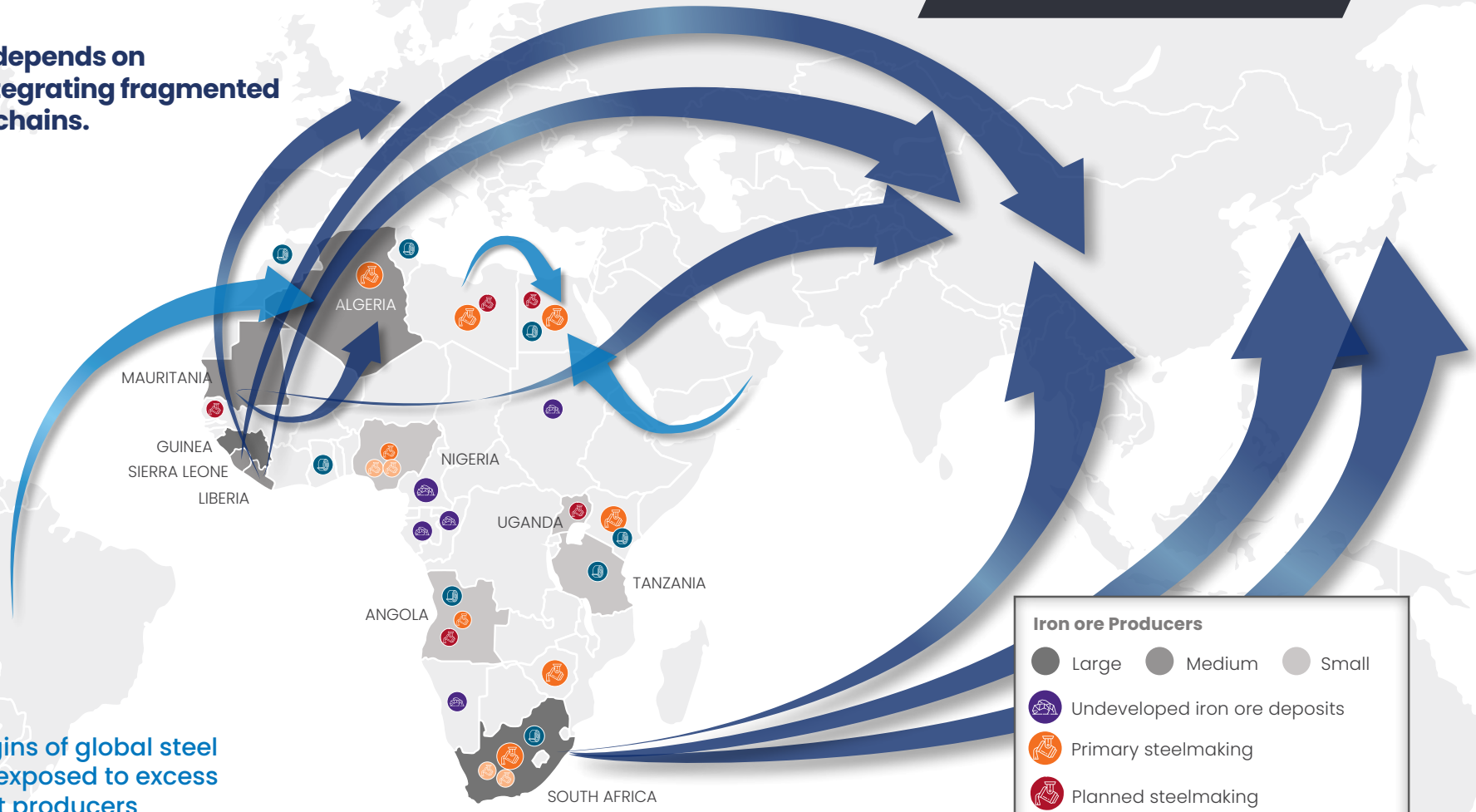
Africa's steel future depends on regionalising and integrating fragmented ore-to-steel supply chains.

Trade-flow exports

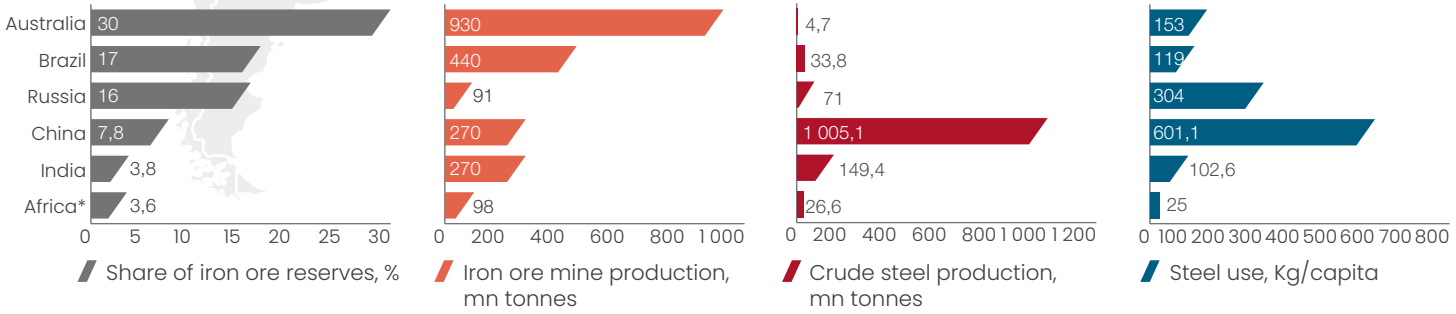
- South Africa → China, Japan, South Korea
- Liberia → Europe, China
- Sierra Leone → China
- Mauritania → China, Algeria

Trade-flow imports

- Oman → Egypt
- Brazil → Algeria
- Libya → Egypt



Africa sits at the margins of global steel value chains, heavily exposed to excess supply from dominant producers



- China is the world's undisputed steel production leader and controls most of the demand across the supply-chain, including for a wide range of ferroalloys (iron ore, chromium, manganese, nickel).
- Africa's exceptionally low steel consumption per capita signals unmatched long-term demand growth as urbanisation and industrialisation accelerate.

* *includes Egypt (10.7), South Africa (4.7), Algeria (4.5), Kenya (1.6), Morocco (1.4) and others. Beyond Egypt and Algeria, most Africa's crude steel production comes from electric arc furnaces processing scrap metal.*

Source(s): USGS, World Steel Association, AFC Research

Manganese: Navigating Steel Cycles While Positioning for Battery Demand

Manganese remains fundamentally an alloy metal, anchoring its demand profile to global steel market dynamics. Around 96% of all manganese produced is consumed in steelmaking, where it is primarily used as silicomanganese (SiMn) and high-carbon ferromanganese (HC FeMn) to improve strength, hardness, and resistance to wear[64]. As a ferro-alloy, manganese economics are therefore tightly linked to steel cycles, making Chinese steel demand a key determinant of global market conditions.

The current slowdown in China's property sector and more subdued construction activity have already translated into steel oversupply, which in turn pushed the manganese market into surplus in 2024. The impact has been tangible in Africa: Eramet temporarily suspended manganese ore production in Gabon for several weeks in 2024 in response to weak demand and pricing[65]. Producers continue to signal subdued near-term prospects for manganese ores and alloys, which could slow the continent's recent production growth cycle[66].

Africa's strategic relevance in manganese is underpinned by its exceptional resource base and production scale. The continent holds over one-third of global manganese resources and accounts for approximately two-thirds of global manganese ore production[67].

African output doubled between 2014 and 2024, driven by sustained growth in three core producers: Gabon, Ghana and South Africa (see data table). In these markets, large-scale manganese production is tied to functioning rail and port evacuation infrastructure[68]: the Owendo Terminal in Gabon is connected to the Transgabonese Railway; a refurbished railway line connects the Nsuta manganese mine in Ghana to the Port of Takoradi; while Transnet' rail network in South Africa connects manganese mines to both Saldanha Bay and Namibia's Port of Lüderitz.

MANGANESE ORE

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**18 305,1**	**17 299,3**	**17 010,4**	**23 614,5**	**26 358,8**	**30 596,1**	**28 545,6**	**33 295,7**	**33 766,9**	**33 465**	**36 130**
Burkina Faso	–	–	–	–	9,1	9,1	30,0	21,2	4,9	–	–
Congo, D.R.	–	–	–	–	14,9	4,9	–	–	14,9	–	–
Côte d'Ivoire	362	263,2	207	510,1	797,9	1 181,8	1 325,5	961,3	929,7	1 175,3	1 292,8
Egypt	50	34	110	36	40	36	15	25	16	nd	nd
Gabon	4 081	4 184,0	3 586,2	5 109,5	5 366,5	6 749,1	8 443,1	9 521,6	10 221,6	9 968,0	9 442,8
Ghana	1 531,4	1 562,8	2 034,6	3 021,6	4 965,0	5 401,1	2 359,5	3 418,2	3 103,4	2 990,7	4 745,3
Kenya	–	–	–	2,7	7	16,6	13,6	28,5	61,2	44,1	nd
Morocco	91,3	72,6	70,1	99,0	79,5	71,2	84,1	82,5	89,3	83,7	83,3
Namibia	32	10,1	5,1	9,8	8,8	14,7	11,9	10,3	10,6	13,8	nd
Nigeria	0,1	0,5	20,3	13,6	22,9	1	5,9	22,4	21,9	16,3	nd
Senegal	–	–	–	–	–	20,0	12,0	9,4	31,1	30,0	nd
South Africa	12 026,8	11 033,7	10 805,8	14 652,2	14 918,2	17 001,8	16 198,5	19 063,2	19 103,7	19 055,1	20 300
Sudan	20	31,4	33,8	42	41	40	–	–	–	–	–
Zambia	110,5	107	137,5	118	88	48,8	46,5	132,2	158,7	66,7	134,9

(e) estimate; nd = no data available at the time of publication
Source(s): CTCPM Mines RDC, DPPSE-CI, International Manganese Institute, INSTAD, DGEPF Gabon, Ghana Minerals Commission, World Mining Data, USGS, Haut Commissariat au Plan (HCP), BGS, Department of Minerals South Africa, Ministry of Mines and Minerals Development Zambia.

Reducing exposure to volatile external steel demand cycles will require a more integrated and strategic approach. One of the most effective levers available to African producers is the integration of manganese, iron ore and steel value chains, which can lower logistics and input costs, strengthen competitiveness, and anchor more resilient industrial ecosystems at the regional level.

The economic rationale for deeper beneficiation is compelling. Ferro- and silicomanganese products typically command prices eight to nine times higher than raw manganese ore, underscoring the scale of value currently foregone through the export of unprocessed material.

Despite the continent's dominance in ore supply, manganese processing, smelting and refining remain highly constrained across the continent. South Africa hosts Africa's most advanced manganese processing ecosystem, with smelting capacity to produce ferro- and silicomanganese as well as refining capacity to produce electrolytic manganese metal (EMM). However, the operating environment has become increasingly challenging: high electricity costs have severely eroded competitiveness, and by the end of 2025 the last remaining manganese smelter reported having been loss-making for three consecutive years, with power accounting for around 40% of operating costs[69].

[64] *International Manganese Institute (IMnI)*
[65] *https://www.eramet.com/en/news/eramet-revises-its-2024-targets-for-manganese-activitie-in-gabon-and-nickel-activities-in-indonesia/*
[66] *https://www.eramet.com/wp-content/uploads/2025/06/2025-04-25-Eramet-Rapport-Integre-2024-FR.pdf*
[67] *Staff calculations based on USGS data estimates for 2024*
[68] *Côte d'Ivoire also produces manganese at scale, though evacuation relies primarily on road transport.*
[69] *https://www.reuters.com/sustainability/boards-policy-regulation/south-africas-last-manganese-smelter-brink-high-power-costs-weigh-ceo-says-2025-12-30/*

MANGANESE OXIDE

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Gabon	nd	nd	nd	nd	nd	nd	nd	nd	5,7	4,7	4,5

Source(s): DGEPF Gabon

FERROMANGANESE

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Egypt	12	12	12	12	13	12	6	9	6	nd	nd
South Africa (alloys incl. FeMn and SiMn)	970	615	371	459	432	411	227	257	247	205	nd

nd = no data available at the time of publication
Nb: no data is available on Zambia, which has become a notable producer of ferromanganese over the past few years around Serenje.
Source(s): USGS, Department of Minerals South Africa

SILICOMANGANESE

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Egypt	–	–	–	–	–	–	–	–	–	–	nd
Gabon	nd	14,5	14,9	21,3	42,9	43	35,4	41	42,3	34,4	24,5

nd = no data available at the time of publication
Nb: South African silicomanganese production is included in ferromanganese; no data is available on Zambia where several silicomanganese plants operate
Source(s): USGS, DGEPF Gabon

Across the rest of the continent, processing capacity is also limited. In Gabon, Eramet runs two processing facilities, although on a small scale[70]; Egypt produces small volumes of ferromanganese, while Sinai Manganese Company (SMC) resumed silicomanganese production in 2024; while Zambia has seen the emergence of a fast-growing cluster of small-scale ferromanganese smelters around Serenje[71].

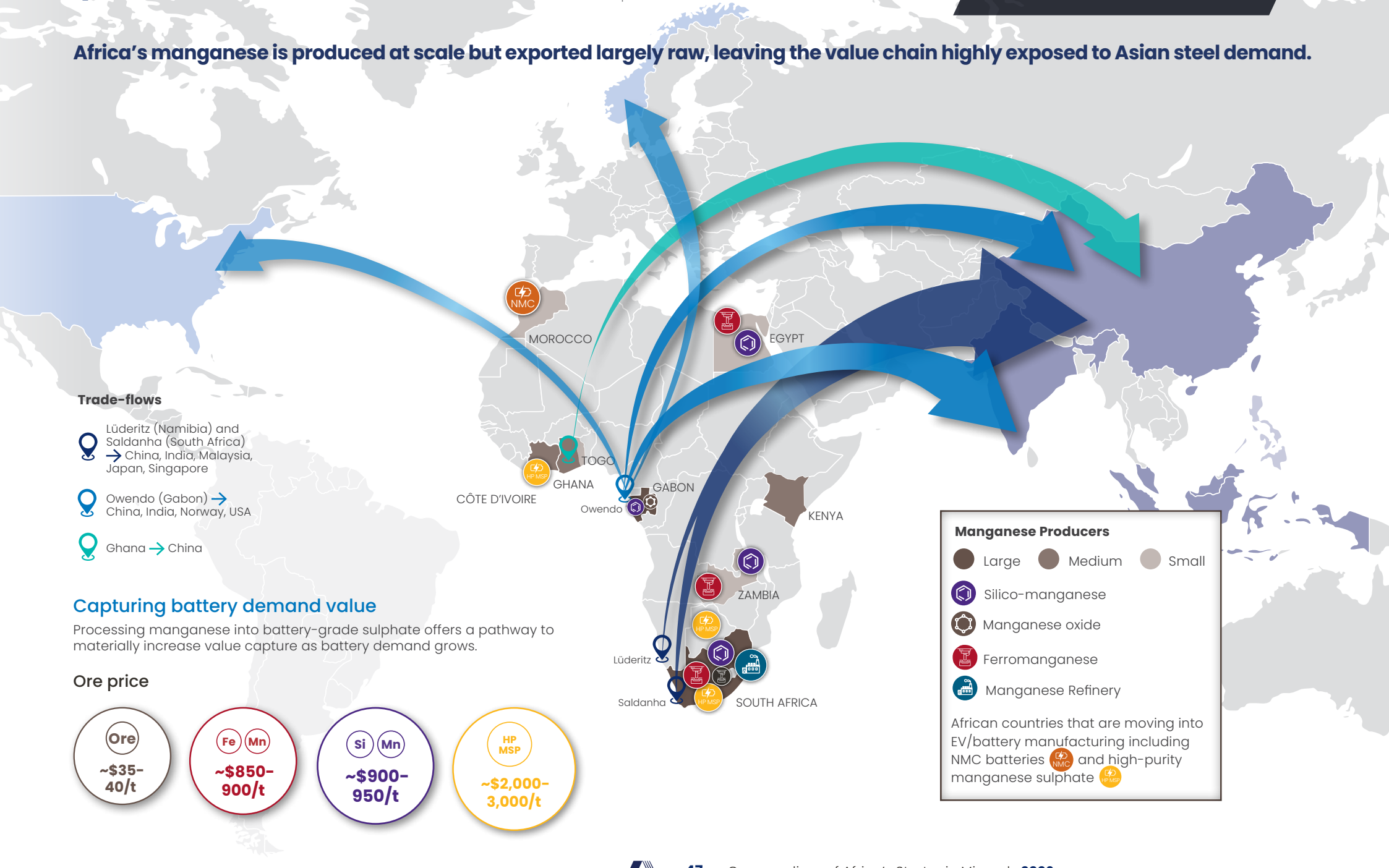
Against challenging market conditions, battery-related manganese applications are emerging as the most important structural diversification opportunity. While batteries currently account for only around 3% of global manganese consumption, demand for high-purity manganese sulphate monohydrate (HPMSM—a critical precursor for lithium-ion batteries—is set to expand rapidly[72]. This surge reflects the increasing incorporation of manganese into battery chemistries such as NMC, LMNO, LMR and LMFP[73], where manganese is used to reduce costs, improve thermal stability, and partially substitute for cobalt.

Africa has begun to position itself along this emerging value chain. Gyani Metals Corp. successfully produced HPMSM from a pilot plant in late 2025 as part of the future K. Hill project in Botswana[74], expected to become one of Africa's first low-carbon producers of battery-grade manganese. In South Africa, Manganese Metal Company (MMC)—one of the few producers of high-grade Electrolytic Manganese Metal (EMM) outside China[75]—is constructing a 6,000 tpa Metal-to-Crystal (MTX) plant, due to come online in 2026, with potential future expansions under consideration[76].

Policy signals will be decisive in unlocking this transition. Gabon's planned ban on raw manganese ore exports from 2029 illustrates how targeted, well-sequenced interventions—if supported by coordinated infrastructure and power planning—can catalyse investment into beneficiation. Combined with selective diversification into battery-grade manganese products, such strategies can reposition Africa's manganese sector to capture more value while reducing its structural dependence on external steel market cycles.

[70] *Eramet's infrastructure includes the Moanda Industrial Complex (CIM) that produce manganese concentrates with a capacity of 650,000 tpa, and the Moanda Metallurgical Complex (CMM) that produces silicomanganese (65,000 tpa capacity) and manganese oxide (46,000 tpa capacity).*
[71] *Industry sources estimate that up to 20 units may now be operating, although comprehensive production data remain unavailable.*
[72] *According to the International Manganese Institute (IMnI), global HPMSM production stood at approximately 230,000 tonnes in 2024, while cathode active material forecasts point to demand rising to around 1.4m tonnes by 2030.*
[73] *NMC = Nickel Manganese Cobalt; LMNO = Lithium Manganese Nickel Oxide; LMR = Lithium Manganese-Rich; and LMFP = Lithium Manganese Iron (Fe) Phosphate.*
[74] *https://giyanimetals.com/news*
[75] *Other manganese refineries producing manganese sulphate monohydrate outside of China only include a small one owned by Nippon Denko Co. Ltd. in Japan and another owned by Vibrantz Technologies Inc. in Belgium.*
[76] *https://www.mmc.co.za/what-we-do/hpmsm-project*

Africa's manganese is produced at scale but exported largely raw, leaving the value chain highly exposed to Asian steel demand.



Nickel: Building Strategic Supply and Value Capture in a Rebalancing Market

Like most ferroalloys, global nickel markets remain oversupplied. Recent supply growth is dominated by Indonesia, which now accounts for around 60% of global output, while Russia remains the world's lowest-cost producer, producing roughly 15% of global supply and benefiting from significant palladium by-products[77]. Despite recent policy efforts by Indonesia to tighten production oversight through shorter quota cycles, the global surplus is expected to narrow only gradually. After declining by an estimated 9% in 2025 (see prices chart), nickel prices are projected to recover modestly, rising by around 1% in 2026 and 3% in 2027, as demand from clean energy technologies slowly absorbs excess supply[78].

This global backdrop sets the context in which African nickel producers—operating at much smaller scale—must focus less on volume competition and more on product quality, processing depth, and integration into battery-related value chains.

On the demand side, nickel remains anchored in traditional alloy applications, even as its end-use profile evolves. Stainless steel continues to account for roughly two-thirds of global nickel demand, providing the primary base of consumption, but offering only modest near-term support amid subdued global industrial activity. Historically, nickel demand was even more concentrated: stainless steel and other non-ferrous alloy applications represented around 75% of total demand as recently as 2020[79].

Nickel prices (2014-2025), $/mt

Source: World Bank

Recent years, however, have marked a structural shift in demand composition toward energy technologies. Nickel is a critical input for nickel-rich lithium-ion batteries, particularly in electric vehicles and also plays a role in renewable energy applications such as wind and geothermal power. In 2024, energy technologies accounted for almost 20% of global nickel demand, a share that continues to rise[80]. Across all scenarios assessed by the International Energy Agency (IEA), future demand growth is driven by clean energy technologies, with the current nickel surplus expected to dissipate by around 2030[81].

NICKEL (METAL CONTENT OR REFINED)

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**123,8**	**137,1**	**125,9**	**106,1**	**106,9**	**104**	**83,4**	**105,6**	**109**	**130**	**134**
Botswana	15,0	16,8	16,9	–	–	–	–	–	–	–	–
Côte d'Ivoire*	–	–	–	5,3	12,5	9,2	18,9	24,7	25,8	39,8	38,2
Madagascar	37,1	47,3	42,1	35,5	33,2	33,7	9,9	29,3	35,7	36,1	27,7
Morocco (a)	0,2	0,2	0,2	0,2	0,1	0,1	0,1	0,1	0,2	nd	nd
South Africa	55	56,7	49,0	48,5	43,2	43,5	34,9	31,8	29	29,8	32
Zambia	–	–	–	–	–	1,1	3,2	3,8	4,1	8	21
Zimbabwe	16,6	16,1	17,7	16,6	17,9	16,3	16,3	15,8	14,3	16,3	15,1

(e) estimate; (a) hydroxide; nd = no data available at the time of publication

** Côte d'Ivoire only discloses its raw ore production, so a standard nickel content grade of 1.4% is applied here to national nickel ore production.*

Source(s): EITI, Statistics Botswana, Direction Général des Mines et de la Géologie, Ambatovy, USGS, Department of Minerals South Africa, Ministry of Mines and Minerals Development of Zambia, Zambia Development Agency, ZIMSTAT, USGS

Against this global backdrop, Africa remains a marginal nickel producer, but its position has strengthened in recent years through both recovery and new developments. Continental output has rebounded since 2020, led by the resumption of operations at Ambatovy in Madagascar following COVID-19 disruptions, and by incremental new supply from Zambia (see data table). Ambatovy remains Africa's largest nickel operation, producing around 30,367 tonnes in 2021, and exports unwrought Class 1 nickel with purity of approximately 99%, making it suitable for battery supply chains.

A step-change occurred with the commissioning of First Quantum Minerals' Enterprise nickel mine at Kalumbila in Zambia, where production started over 2023–24. Enterprise is expected to produce approximately 30,000 tonnes of nickel annually, placing it on par with Ambatovy.

Elsewhere on the continent, Zimbabwe primarily exports nickel matte, a higher-value intermediate product, while Côte d'Ivoire exports mainly ores and concentrates, which command lower prices on international markets.

Despite this production base, Africa currently has no dedicated operating nickel refinery: nickel is only refined on the continent as a by-product, notably in South Africa and Morocco, while Zimbabwe's two historical standalone facilities—the Empress Nickel Refinery and the Bindura Smelter & Refinery—are both currently idle, limiting downstream value capture.

Africa's strategic opportunity in nickel lies in capturing value through selective supply growth, product quality, and integration. While current production remains modest, the continent hosts several world-class undeveloped assets that could materially diversify African nickel supply over the next decade.

Most notably, the East African Nickel Belt (EANB), stretching across Burundi and northern Tanzania, is emerging as a new growth frontier. The giant Kabanga nickel deposit in Tanzania, one of the world's largest high-grade undeveloped nickel sulphide resources, is advancing through early-stage development and includes plans for a domestic nickel refinery. In West Africa, Côte d'Ivoire's Sipilou deposit represents another giant undeveloped nickel asset with scale potential. These projects underline Africa's ability to grow nickel supply in a note but strategic manner—focused on higher-value products and integration into clean-energy and battery-related markets rather than bulk volume competition.

77 *World Bank (October 2025). Commodity Markets Outlook.*
78 *idem*
79 *International Energy Agency (June 2025). Global Critical Minerals Outlook 2025*
80 *idem*
81 *idem*

Tin, Tantalum and Tungsten (3Ts): Strategically Essential Minerals from a High-Risk, High-Control Region

The 3Ts—tin, tantalum and tungsten—occupy a unique position in Africa's minerals landscape. They are strategically indispensable for electronics, aerospace, defence, and energy-transition technologies, yet their production profiles are shaped by supply concentration and high levels of artisanal and small-scale mining (ASM) and informality.

Reliable data on production volumes and metal content remains limited, as a substantial share of African 3Ts output originates from ASM—particularly in eastern D.R.C. and Burundi—and is often processed outside the continent. In the D.R.C. for instance, up to 90% of cotan production comes from ASM[82].

This combination of geographic concentration, 'artisanality', and cross-border trade has led to 3Ts being classified as "conflict minerals"[83], subject to some of the world's most demanding due-diligence and supply-chain compliance frameworks.

Most African 3Ts activity is anchored in East Africa, notably eastern D.R.C., Rwanda, Burundi, southwestern Uganda and western Tanzania. The Karagwe–Ankolean Belt (KAB) underpins much of this activity, stretching across parts of all five countries. This belt hosts multiple tin, tungsten, tantalum, cobalt and copper formations and overlaps with the East African Nickel Belt in Burundi and northwestern Tanzania. Additional 3Ts occurrences are found in the Kibara Belt, which extends across eastern D.R.C. and complements the KAB as a second major metallogenic province.

Beyond the Great Lakes, Africa hosts a broader but more dispersed 3Ts footprint. These include mining operations in Namibia (Uis Tin Mine including tantalum and lihium by-rpdocuts), Sierra Leone (Bombali, Tonkolili and Kono districts), Mozambique (Marropino Mine including both tantalum and niobium), and Nigeria (tin-bearing regions around the Jos Plateau).

New supply clusters are also under study and development. Morocco's Achmmach Tin Project seeks to redevelop the El Hammam fluorspar mine, while Zimbabwe's Kamativi Mine, once a major tin producer, remains geologically significant for future lithium developments.

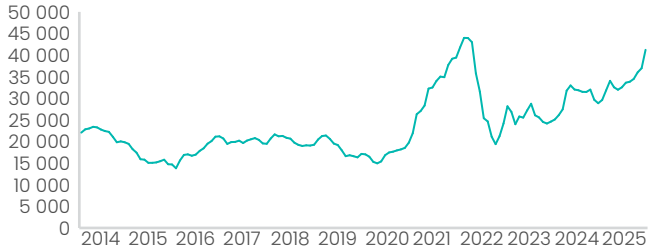
Tin: Africa's expanding upstream role to meet electronics-driven demand

Tin is essential to modern electronics manufacturing due to its superior soldering properties. Solder remains the dominant end use, accounting for approximately 51% of global tin consumption in 2023[84], underpinning demand from smartphones, semiconductors, circuit boards and photovoltaic systems.

Globally, tin supply is expected to strengthen modestly over the near term, driven by higher exports from Indonesia and the anticipated restart of major mines in Myanmar that have been idle since 2023[85]. Despite these additions, the tin market remains structurally tight, reflecting a limited pipeline of new projects and persistent exposure to geopolitical and operational disruptions.

Against a resilient demand outlook[86], tin prices reached an all-time high in 2025 (see price chart) and the World Bank forecasts them to increase by 3% in 2026 and a further 2% in 2027, reaching new record annual highs.

Tin prices (2014–2025), $/mt



Source: World Bank

Africa plays a meaningful role in this supply landscape. The Democratic Republic of the Congo ranks as the world's fifth-largest cassiterite producer, accounting for roughly 6% of global supply[87]. Additional production hubs operate across Rwanda, Burundi, Tanzania and Uganda, alongside long-established activity in Nigeria's Jos Plateau and Namibia's Uis mine (see data table).

CASSITERITE ORE

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Burundi*	11,7	31,8	22,2	161,5	159,2	187,8	138,3	132	100,1	107,1	130,8
Congo, D.R.	7 198,8	7 470,5	11 824,3	12 536,5	13 354,7	19 983,5	29 028,3	26 761,6	32 854,6	33 558,7	42 953
Namibia* (a)	–	–	–	–	–	7,0	473,0	748,0	855	1 474	1 507
Nigeria	3 700	3 500	3 443	12 324	11 721	2 437	1 703	23 871	1 705	4 642,8	nd
Rwanda (b)	5 953,8	3 845,7	3 549,9	4 759,6	4 779,9	3 860,5	2 820,2	3 136,5	4 452,0	4 588,5	4 861,5
Tanzania	nd	179,0	138,2	91,4	8	24,3	47,5	211,3	538,2	420,8	338

(a) = concentrate; (b) = exports; nd = no data available at the time of publication; no data available on Ugandan ore production
** Namibian data is for financial year from March to February.*
Source(s): INSBU, CTCPM Mines RDC, Andrara Mining, USGS, EITI, National Bank of Rwanda, Tanzania Economic Survey Book

82 *Agence Française de. Développement (August 2024). Le potentiel minier de l'Afrique: Panorama, enjeux et défis*
83 *idem*
84 *International Tin Association*
85 *World Bank (October 2025). Commodity Markets Outlook*
86 *On the demand side, growth is projected to remain resilient, supported by expanding semiconductor manufacturing, solar PV deployment and broader energy-transition technologies. see World Bank (October 2025). Commodity Markets Outlook*
87 *Agence Française de. Développement (August 2024). Le potentiel minier de l'Afrique: Panorama, enjeux et défis*

TIN (METAL CONTENT)

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**10 879**	**9 970,8**	**12 708,2**	**21 681,7**	**20 391,1**	**20 841,7**	**23 116,3**	**25 872,4**	**32 934,6**	**30 624,3**	**34 000**
Burundi*	8	21,8	15,2	110,7	109,1	128,7	94,7	90,4	68,6	73,3	89,6
Congo, D.R.	4 012	4 567	6 503	9 725	8 950	10 991	14 673	15 963	20 420	18 460	25 000
Namibia**	–	–	–	–	–	4	310	508	587	885	921
Nigeria	2 485	2 298	3 443	8 260	7 850	6 900	5 970	6 890	8 340	7 680	nd
Rwanda	4 270	2 770	2 560	3 430	3 405	2 780	2 030	2 260	3 115	3 210	nd
Tanzania	59	134	104	68	6	18	35	158	404	316	nd
Uganda	45	180	83	88	71	20	3,6	3	–	–	112

(e) estimate; (a) concentrate; nd = no data available at the time of publication
Note: Discrepancy of the data for Nigeria between cassiterite ores and tin metal comes from different sources applying different data methodology and scope, with USGS and EITI disclosing ore production while World Mining Data estimates metal content contained.
** The tin (Sn) content of Budunri's cassiterite is between 65-72%.*
*** Namibian data is for financial year from March to February.*
Source(s): staff estimates and calculations, World Mining Data, Chamber of Mines of Namibia, Andrara Mining, Ministry of Energy and Mineral Development of Uganda

TIN SMELTED

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Rwanda	–	–	–	–	–	92	547	395	643	nd	nd

nd = no data available at the time of publication
Source(s): USGS

Downstream capacity, while limited, is strategically important. Rwanda hosts the LuNa Tin Smelter (2018)[88], producing high-grade tin ingots averaging 99.96% Sn, alongside by-products such as tin dross and tantalum-bearing slags. The facility is currently executing an expansion project to increase its processing capacity from 150 tons to 200 tons of tin metal per month. Further north, Uganda opened the Woodcross Tin Refinery in 2024, reinforcing the region's potential as Africa's core tin processing hub.

[88] *The LuNa Smelter is currently executing an expansion project to increase its processing capacity from 150 tons to 200 tons of tin metal per month.*

Tantalum: by-product dominance and Africa's central role in global supply

Tantalum is prized for its exceptional resistance to heat and corrosion, making it indispensable for electronic capacitors, aerospace components, and high-performance industrial applications. Electronics alone account for an estimated 60–80% of global tantalum demand[89].

Structurally, tantalum is almost always produced in association with niobium in coltan ores and frequently co-occurring with tin (Namibia, Egypt, Zimbabwe) and lithium (D.R.C., Ethiopia, South Africa). This by-product nature complicates resource definition, grade estimation and production transparency—particularly where upstream mining is dominated by ASM and downstream processing occurs offshore.

Africa is the global centre of gravity for tantalum supply. The Democratic Republic of the Congo is the world's largest producer, accounting for up to 43% of global output, followed by Rwanda, which supplies approximately 17–22% and ranks as the world's third-largest producer[90]. Nigeria, Uganda, Burundi and Mozambique also contribute meaningful volumes, with varying degrees of ASM production (see data table).

Africa's downstream footprint remains narrow but strategically significant. Rwanda hosts the POWER-X Tantalum Refinery, currently the only tantalum and niobium refinery on the continent. This facility anchors Rwanda's position as a compliant processing hub and illustrates how targeted industrial infrastructure can unlock value in a highly regulated market.

[89] *idem*
[90] *Idem*

COLTAN ORE

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**4 556**	**4 012**	**5 084**	**4 297**	**5 909**	**3 738**	**4 874**	**4 403**	**10 049**	**6 529**	**7 500**
Burundi	81,672	44,480	31,687	74,481	21,913	21,566	16,332	41,952	13,192	5,705	4,748
Congo, D.R.	1 158,91	1 292,71	2 414	1 358,51	2 190	1 256,3	2 466,55	1 802,29	2 220,6	1 918,50	2 848,84
Ethiopia*	141	180	191	118,876	76,302	161,582	76,08	66,77	161,5	nd	nd
Mozambique	111,767	62,607	91,661	114,325	146,435	131,557	209,041	178,449	210,547	204,805	138,995
Nigeria	760	776	1 073	923	1 306	587	509	510	5 903	1 871,85	nd
Rwanda (a)	2 302,52	1 651,71	1 269,94	1 697,04	1 643,53	1 353,85	1 028,42	1 046,16	1 304,70	2 070,37	2 383,91
Sierra Leone	–	–	–	–	517,32	219,4	395,75	353,25	235	307,5	217,8
Uganda (30% purity)	nd	4,589	12,64	11,187	6,83	6,62	172,654	404	–	–	–

* *data on Ethiopia includes significant discrepancy between sources*
(e) estimate; (a) exports; nd = no data available at the time of publication
Source(s): INSBU, CTCPM Mines RDC, USGS, Ministry of Finance of Mozambique, EITI, National Bank of Rwanda, National Minerals Agency (NMA-SL), Uganda Bureau of Statistics (UBOS)

TANTALUM CONTENT

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**1 183**	**998**	**1 254**	**1 574**	**1 556**	**1 183**	**1 549**	**1 518**	**1 682**	**1 859**	**1 795**
Burundi	24,502	13,344	9,506	22,344	6,574	6,470	4,900	12,586	3,957	1,711	1,424
Congo, D.R.* (a)	365	400	710	490	685	580	980	800	980	925	1 270
Ethiopia	90	75	101	90	104	50	41	64	90	120	nd
Mozambique	50	28	41	57	66	59	94	75	84	82	nd
Namibia (b)	–	–	–	–	–	–	–	–	–	6,5	50,6
Nigeria	75	72	66	480	230	120	80	160	150	190	nd
Rwanda (a)	578,29	408,99	322,86	431,62	421,25	348,69	274,54	277,31	355,25	508,95	579,58
Sierra Leone	–	–	–	–	41	18	32	28	19	25	17
Uganda**	nd	1,15	3	2,80	1,7	2	43,2	101	–	–	–

(e) estimate; (a) Nb content from both coltan and cassiterite ores; (b) = concentrate by-product; nd = no data available at the time of publication
* *Tantalum content for the D.R.C. is estimated by applying an average 1.5% grade in cassiterite ores and 22% grade in coltan ores **Uganda's tantalum grades average 20-30%.*
Source(s): staff calculations and estimates, World Mining Data, Andrara Mining (financial year March to February)

NIOBIUM CONTENT

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**707**	**609**	**879**	**794**	**1 056**	**853**	**1 041**	**970**	**1 144**	**1 244**	**1 192**
Burundi	25	13	8	18	5	5	4	10	3	1	nd
Congo, D.R.* (a)	275	300	540	363	520	420	720	583	717	670	930
Ethiopia	25	20	28	25	28	14	11	18	25	35	nd
Mozambique	9	5	7	10	12	11	17	14	17	16	nd
Nigeria	30	29	104	122	181	170	80	140	145	185	nd
Rwanda (a)	343,12	242,12	192,01	255,83	250,08	207,58	163,58	164,82	210,39	301,87	344,37
Sierra Leone	-	-	-	-	59	25	46	41	27	35	25
Uganda**		0,28	0,76	0,67	0,4	0,4	10,36	24	-	-	-

(e) estimate; (a) Nb content from both coltan and cassiterite ores; nd = no data available at the time of publication

** Niobium content for the D.R.C. is estimated by applying an average 1% grade in cassiterite ores and 17.5% grade in coltan ores **Uganda's tantalum grades average 5-7%.*

Source(s): World Mining Data, staff calculations and estimates

WOLFRAMITE

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**2 980,6**	**2 066**	**2 099,7**	**1 865,3**	**2 447,5**	**3 496,9**	**3 461,4**	**3 349,3**	**3 590,8**	**3 523,9**	**3 225**
Burundi	66	77,8	162,5	259,8	194,4	270,8	261,9	216,6	170,3	123,5	90,5
Congo, D.R.	17,5	106,4	153,9	251,69	310,34	504,4	226,3	220,5	297,3	812,1	337,1
Nigeria	603	52	15	4	50	1 160	1 150	46,0	100	50,4	nd
Rwanda -*exports*	2 214,5	1 784,4	1 716	1 523,7	1 966	1 883,9	1 808,8	2 825,2	2 943,4	2 502,4	2 741,3
Uganda	79,6	45,4	52,3	77,9	237,1	182,2	14,4	41	79,8	35,6	4,3

(e) estimate; nd = no data available at the time of publication

Source(s): INSBU, CTCPM Minea RDC, National Bank of Rwanda, Uganda Bureau of Statistics (UBOS), Ministry of Energy and Mineral Development of Uganda, USGS

TUNGSTEN (METAL CONTENT)

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**1 106,1**	**978,2**	**1 003,7**	**1 028,1**	**1 281,3**	**1 874,1**	**1 658,9**	**1 615,4**	**1 704,5**	**1 709,9**	**1 519**
Burundi	41,2	48,7	101,6	162,4	121,5	169,2	163,7	135,4	106,4	77,2	56,6
Congo, D.R.	13	55	79	130	160	260	116	114	148	418	225
Nigeria	-	27	8	12	66	550	520	24	52	26	nd
Rwanda	1 051,9	847,6	815,1	723,7	933,9	894,8	859,2	1 342,0	1 398,1	1 188,7	1 302,1
Uganda*											

(e) estimate; nd = no data available at the time of publication

** In Uganda, wolframite ores contain average tungsten (W) grades of 0.1 – 0.5%*

Source(s): staff calculations and estimates, World Mining Data

Tungsten: concentrated production, limited beneficiation

Tungsten is a critical input for hard metals, cutting tools, and defence and aerospace applications. African production is highly concentrated, with Rwanda emerging as the continent's largest producer and ranking fourth globally. Smaller volumes are produced in D.R.C. (Maniema Province), Burundi, Nigeria and Uganda (see data table).

Despite this strong upstream position, beneficiation remains minimal. Concentrates from Rwanda's Nyakabingo Mine for instance are exported to the United States for conversion into high-value tungsten and tungsten-carbide powders, underscoring Africa's limited capture of downstream value.

The clearest opportunities for 3Ts value-chains lie in targeted, compliant processing hubs, anchored in jurisdictions with relatively strong institutions and infrastructure. As global buyers continue to prioritise traceability, ESG compliance and supply security, Africa's ability to move selectively downstream—rather than pursue volume expansion alone—will determine whether its 3Ts endowment translates into durable industrial and economic value.

Vanadium is Constrained by Steel Cyclicality but Energy Storage Offers a Strategic Repositioning Opportunity

Vanadium remains, first and foremost, a steel alloy metal. In 2024, an estimated 90% of global vanadium consumption was still tied to the steel sector[91], particularly in high-strength low-alloy (HSLA) steels, tool steels, and stainless steels. This share anchors vanadium demand firmly to construction, infrastructure, and industrial activity. As with other ferro-alloys, vanadium market fundamentals are therefore closely linked to global steel cycles—and in particular to the trajectory of steel demand from China and the rest of developing economies, which remains the dominant price-setting factor.

Beyond steel, energy storage is emerging as vanadium's most strategically important growth market, albeit from a low base. Energy storage applications currently account for only around 2% of global vanadium demand, but this share could rise to approximately 10% by 2030[92]. This growth is driven by the increasing deployment of vanadium redox flow batteries (VRFBs)[93], which are particularly well suited for grid-scale, long-duration energy storage. As power systems integrate more solar and wind, VRFBs are increasingly positioned as a complementary technology for medium- and long-duration storage.

From a geological perspective, vanadium occurs in a wide range of mineral and fossil fuel deposits—across phosphate rock, titaniferous magnetite, uraniferous sandstones, bauxite, coal, crude oil, oil shale, and tar sands[94]. Despite its broad geological occurrence, economically proven reserves are rare, and in Africa they are concentrated in Southern Africa (South Africa, Mozambique, Namibia, Zambia).

South Africa holds around 4% of global vanadium reserves and accounts for approximately 9% of global supply[95], despite production decreasing for a decade (see data table). The country ranks as the world's third-largest vanadium producer, and was the only African country with verified commercial production of vanadium ore products in 2024.

VANADIUM

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
South Africa	21 582	17 455	15 877	14 222	14 904	14 858	14 446	15 414	14 976	14 003	14 000

Nb: ferrovanadium production is estimated at 6-7,000 tonnes per year on average in South Africa
Source(s): Department of Minerals South Africa

While Africa does host meaningful vanadium processing capacity, the industry is currently constrained by two structural challenges. First, vanadium is a ferro-alloy metal, and its economics remain tightly coupled to global steel demand. Periods of weak steel demand translate rapidly into pressure on vanadium prices, narrowing margins across the value chain and reducing the viability of higher-cost operations.

Second, Africa's vanadium processing infrastructure is entirely concentrated in South Africa, where operators face persistent operational constraints, most notably around power availability, reliability, and affordability. These challenges are especially acute in a low-price environment, where electricity costs can account for a disproportionate share of total operating expenses. As a result, even downstream-oriented assets have struggled to remain competitive. In 2025, Glencore announced the suspensions of the vanadium operations at the Rhovan mine for instance – the country's biggest vanadium operation by capacity[96].

Despite recent setbacks, the foundations for recovery, beneficiation, and new demand-driven growth remain in place. The recent acquisition by Southern Point Resources (SPR) of Bushveld Minerals' Vanchem operations and the Mokopane project in South Africa opens the door to renewed investment and operational restructuring. Downstream, East London now hosts the BELCO vanadium electrolyte facility, providing a critical link to the VRFB value chain and enabling domestic production of battery-grade electrolyte. At the resource level, several significant deposits remain undeveloped in South Africa. These notably include the giant Steelpoortdrift deposit, whose development could support the production of vanadium pentoxide flake and powder for both alloy and energy-storage markets.

Reducing exposure to volatile external steel demand cycles will require a more integrated and strategic approach. While steel will remain the anchor market for vanadium, the emergence of VRFBs offers a structurally different demand profile—less cyclical, more policy-driven, and closely aligned with grid expansion and renewable integration. South Africa's existing processing base, combined with targeted investment in battery-linked downstream capacity, positions the country —and Africa more broadly—to capture greater value from vanadium beyond traditional alloy markets, provided power reform, policy clarity, and capital mobilisation move in tandem.

[91] *African Development Bank (November 2025). Critical Minerals Insight – Vanadium (based on Grand View Research).*
[92] *Idem (based on World Bank and PS Market Research)*
[93] *VRFB is a type of rechargeable battery that stores energy in liquid electrolytes held in external tanks, rather than within solid electrodes as in lithium-ion batteries.*
[94] *USGS*
[95] *Staff calculations based on USGS data estimates for 2024*
[96] *https://www.glencore.com/south-africa/news/glencore-statement--regarding-the-status-of-its-Ferrochrome-and-Vanadium-operations-and-S189-process-in-South-Africa-*

NON-FERROUS METALS

Bauxite: Expanding and Closing the Value Chain in a Resilient Aluminium Market

Aluminium demand continues to grow globally, supported by its central role in construction and manufacturing and its expanding use across energy-transition technologies. Solar photovoltaic systems, electric vehicles, grid transmission infrastructure, and lightweighting across transport and industry are structurally increasing aluminium intensity[97]. Against this backdrop, aluminium's long-term demand outlook remains more resilient than that of steel. This demand resilience has translated into comparatively strong and sustained aluminium prices, which closed 2025 at around US$2,800 per tonne (see price chart).

Aluminium prices (2014-2025), $/mt

Source: World Bank

Africa occupies a dominant position at the very upstream end of this value chain. Guinea alone holds approximately 25% of global bauxite reserves[98] and has emerged as the world's largest producer since 2022, accounting for more than one-third of global supply. The scale and pace of growth have been historic: Guinea's bauxite output rose from around 22.3 million tonnes in 2014 to over 140 million tonnes in 2024 (see data table), while preliminary data indicate exports exceeding 180 million tonnes of in 2025.

[97] *International Energy Agency (June 2025). Global Critical Minerals Outlook 2025*
[98] *Staff calculations based on USGS data estimates for 2024*

BAUXITE ORE

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**22 293,6**	**23 605**	**35 206,3**	**55 017,4**	**62 736,4**	**73 315,3**	**90 685**	**89 767,7**	**105 382,6**	**125 476,9**	**144 000**
Côte d'Ivoire	–	–	–	–	100,0	–	272,3	–	55,0	105,0	nd
Ghana	798,1	1 014,6	1 278,6	1 477	1 011,3	1 116,3	1 162,1	839,5	773,2	959,6	1 694,2
Guinea	20 288	20 904,7	32 423,9	51 701,6	59 573,7	70 173,3	87 776,2	87 438,6	103 525,5	122 991,8	141 708,9
Mozambique	3,3	5,0	1,5	3,2	9,9	8,0	6,5	7,9	14,6	5,5	4,5
Sierra Leone	1 178,6	1 475,8	1 429,6	1 823,6	2 034,4	2 017,6	1 442	1 443,7	973,4	1 353,7	317,2
Tanzania	25,6	205	72,8	12,1	7,1	–	26	38,1	40,9	61,4	79,1

(e) estimate; nd = no data available at the time of publication
Source(s): Ministère des Mines, du Pétrole et de l'Énergie, World Mining Data, Ghana Minerals Commission, INS Guinea, National Minerals Agency (NMA-SL), Tanzania Economic Survey Book

Smaller volumes are also produced in Ghana, Sierra Leone, Côte d'Ivoire, Tanzania, and Mozambique. However, this supply boom remains overwhelmingly extractive. The bulk of Africa's bauxite is exported as raw ore—primarily to China, with Europe remaining Sierra Leone's main market—capturing only a fraction of the potential value embedded in the resource.

This imbalance is most evident downstream. Despite the surge in bauxite production, alumina and aluminium output have failed to keep pace. Alumina refining resumed at Africa's only operating refinery in Guinea in 2018, yet production has remained limited, averaging just 350,000–400,000 tonnes per year. Aluminium smelting has stagnated at approximately 1.7 million tonnes annually for more than a decade (see data table).

ALUMINA

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Guinea	–	–	–	–	169	317,7	438,7	409,9	336,1	251,9	351,3

Source(s): INS Guinea

ALUMINIUM PRIMARY

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**1 706,1**	**1 715,5**	**1 704,9**	**1 710,1**	**1 678,4**	**1 685,8**	**1 660,5**	**1 647,1**	**1 652,8**	**1 654,7**	**1 650**
Cameroon	93	90,4	85,2	97	83,3	70,2	66,8	59,1	59,2	63,4	53,7
Egypt	304,2	338,0	314,6	279,1	267,1	290	268	270	250	310	300
Ghana	38,1	33,8	33,0	40,5	42,9	43,9	37,6	39,2	55,6	48,3	50
Mozambique	566,8	558,4	571,1	577,5	571,1	564,8	571,1	564,8	570	517	512
South Africa	704	695	701	716	714	717	717,0	714	718	716	724

(e) estimate; nd = no data available at the time of publication
Source(s): Alucam, World Mining Data, South32

This already fragile base faces a further setback following South32's announcement that the MOZAL smelter in Mozambique—accounting for roughly one-third of Africa's aluminium production—will be placed on care and maintenance in 2026 due to the inability to secure sufficient and affordable electricity supply[99].

The disconnect is striking given the continent's geological advantages. Guinea's bauxite typically contains 44–46% alumina (Al_2O_3) and low levels of deleterious elements such as silica, iron oxide, and phosphorus, making it well suited for refining[100]. Coupled with aluminium's favourable long-term price outlook relative to steel, these characteristics strengthen the strategic case for value-chain integration. Reflecting this shift, Guinea has begun requiring bauxite producers to commit to downstream transformation, and two alumina refineries—developed by SPIC and WCAG—are now under construction[101].

Yet aluminium smelting capacity elsewhere on the continent remains structurally disconnected from African feedstock. Smelters in South Africa, Mozambique, Egypt, Cameroon, and Ghana[102] all rely on imported alumina, sometimes sourced as far as Brazil or Australia[103] (see Infographic: Bauxite & Aluminium Value-Chains). Without domestic or regional alumina supply, African smelters struggle to compete on cost, particularly in environments where power availability and affordability remain binding constraints. Beyond Guinea, Egypt is also putting plans in motion to build alumina refining capacity and support the expansion of its primary aluminium supply-chain.

Clear integration opportunities exist. After Guinea, Cameroon holds Africa's largest undeveloped bauxite resources, with major deposits located close to the existing CAMRAIL railway corridor. Development plans around the Minim Martap project are advancing, with strong potential to move beyond mining into alumina refining that could directly supply the Alucam smelter, creating impactful backward integration.

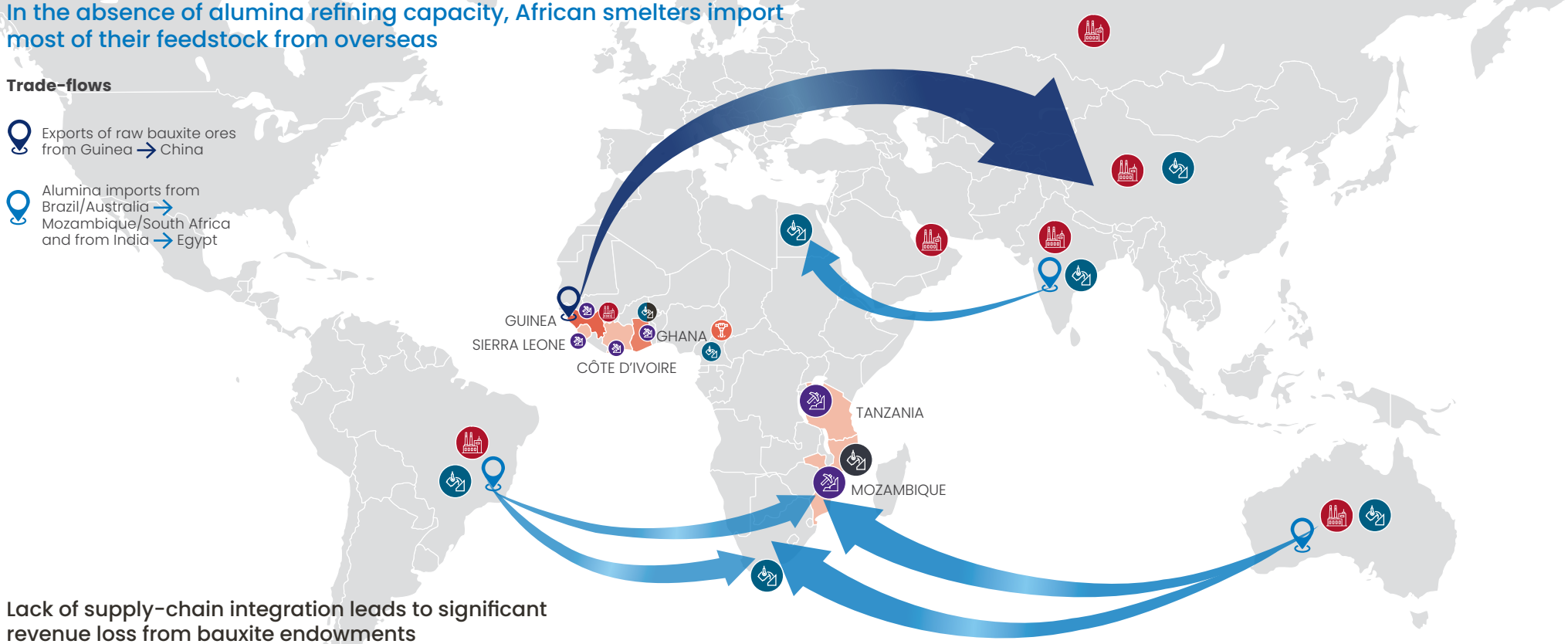
Ghana is pursuing a similarly ambitious strategy through its Integrated Aluminium Industry Master Plan[104], which aims to modernise the under-utilised VALCO smelter, develop domestic alumina refineries, and establish new smelting capacity targeting approximately 300,000 tonnes of aluminium per year.

Beyond alumina and aluminium, additional value can be unlocked through enhanced recovery of by-products from refining residues. Red mud tailings can contain economically meaningful concentrations of gallium, vanadium, and rare earth elements, depending on ore chemistry[105]. While not all bauxite deposits are enriched in these elements, systematic geochemical characterisation of tailings, coupled with targeted R&D and pilot-scale initiatives, could open new strategic revenue streams and improve project economics.

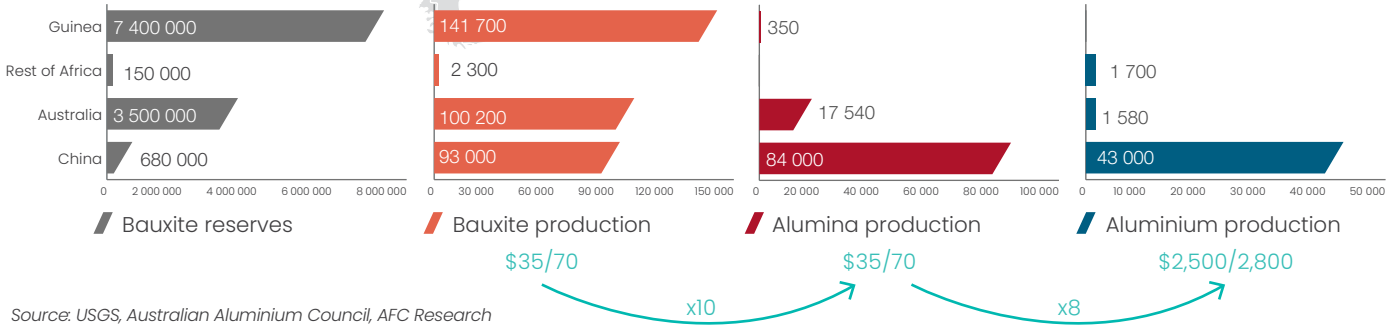
[99] *https://www.south32.net/news-media/latest-news/mozal-aluminium-update*
[100] *African Development Bank (November 2025). Critical Minerals Insight – Bauxite*
[101] *https://www.reuters.com/world/africa/guinea-fast-track-alumina-iron-ore-processing-mines-minister-says-2025-11-12/*
[102] *VALCO currently operates at less than half its capacity.*
[103] *Africa Finance Corporation (2024). State of Africa's Infrastructure Report. The Infrastructure Imperative: Igniting Africa's Industrial Renaissance*
[104] *https://giadec.com/future-operations/*
[105] *https://www.alteo-guinee.com/en/the-project/*

Understanding the fragmentation of African bauxite-to-aluminium supply chains

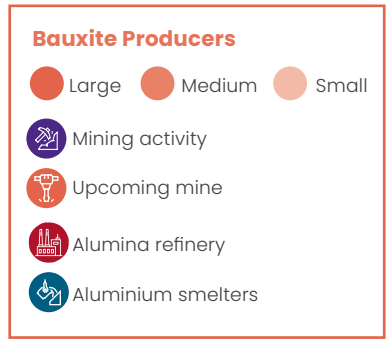
In the absence of alumina refining capacity, African smelters import most of their feedstock from overseas



Lack of supply-chain integration leads to significant revenue loss from bauxite endowments



Source: USGS, Australian Aluminium Council, AFC Research



Copper: Amidst a Tight Global Market, Africa's Supply Growth Hinges on Infrastructure

Copper sits at the core of global electrification and industrial modernisation. Its superior electrical conductivity—second only to silver and gold—makes it indispensable across power grids, renewable energy systems, electric vehicles, and urban infrastructure. Around 65% of global copper consumption is driven by electrical applications, primarily wiring, followed by construction (25%, mainly pipes) and transport (7%)[106]. While substitution is possible in some uses—aluminium for long-distance transmission lines for instance—copper remains irreplaceable in high-performance applications that require reliability, conductivity, and durability.

On the supply side, the global copper market is entering a period of tightening fundamentals. According to the IEA, global mined copper supply is expected to peak in the late 2020s at just over 24 million tonnes before declining sharply to below 19 million tonnes by 2035, driven by declining ore grades, reserve depletion, and asset retirements[107]. Across demand scenarios, the projected supply deficit ranges between 20 and 40% by the mid-2030s. This outlook is already reflected in prices, which closed 2025 at record levels (see price chart), with long-term expectations increasingly converging toward US$15,000 per tonne by 2035.

Copper prices (2014-2025), $/mt

Source: World Bank

[106] *World Bank (October 2025). Commodity Markets Outlook*
[107] *International Energy Agency (June 2025). Global Critical Minerals Outlook 2025*

Africa has emerged as one of the very few regions capable of delivering material new supply into an increasingly constrained global copper market. Near-term supply growth is now heavily concentrated in the Central African Copperbelt spanning the Democratic Republic of the Congo and Zambia. Copper output in the D.R.C. alone has more than tripled over the past decade, surpassing 3 million tonnes in 2024 (see data table) and propelling the country past Peru to become the world's second-largest copper producer. This expansion is being driven by the development and ramp-up of multiple Tier 1 deposits—notably Kamoa-Kakula, Tenke Fungurume, and Kisanfu—positioning the D.R.C. as a critical swing supplier at a time when few new copper provinces are emerging globally.

COPPER

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**2 100,7**	**2 109,1**	**2 077**	**2 182,4**	**2 328,5**	**2 464,8**	**2 663,8**	**3 034,1**	**3 365**	**3 868,6**	**4 193**
Botswana	14,6	13,9	13,1	–	–	–	–	–	–	–	–
concentrates	32,1	8,4	–	1,2	1,5	–	–	11,7	44,3	54,8	48,8
Congo, D.R.	1 065,7	1 069	1 035,6	1 141,4	1 239,1	1 461,1	1 601,2	1 924,4	2 394,6	2 926,2	3 157,6
concentrates	90,1	141,8	189,8	275,1	214,4	234,5	128,9	345,7	463,1	547,8	441,8
smelted	111,7	35,9	26,9	40,9	25,2	66,4	119,1	123	157,0	204,4	157,7
cathodes (refined)	863,9	891,4	818,9	825,3	999,5	1 160,2	1 353,3	1 455,6	1 774,6	2 174	2 558
Eritrea	88,9	61,6	25,3	7,9	17,3	16	21,7	20,2	17,1	17,6	nd
Mauritania	33,1	45	32,8	28,8	32	29,5	28,5	18,8	13,3	7,4	17,8
Morocco	66,5	95,5	113,2	126,1	115,4	109,3	113,0	179,2	110,4	112,4	92,6
Namibia	5,1	3,3	–	–	–	–	–	–	–	–	–
concentrates	21	13,9	–	–	–	–	–	–	–	3,1	15,3
smelted (blister)	36,9	45,2	40,9	45,5	49	46	46,8	42	37,3	35,6	32,9
cathodes (refined)	–	10,7	16,4	15,5	15,2	14,9	15,7	1	–	–	3,5
South Africa (concentrates)	78,7	77,4	65,3	65,5	46,9	52,5	38,3	51,1	49,2	50	53
Tanzania	6,4	6,5	7,2	1,3	–	–	1,7	1,5	6,6	6,3	17,6
concentrates	–	–	–	–	–	–	33,4	16,7	2	5,9	30,2
Zambia*	708,3	710,9	770,6	803,2	868,7	787,7	851,4	830,2	763,6	732,6	820,7
Zimbabwe	12,4	12,2	13,9	8,3	9,1	8,7	7,9	8,6	10,2	12,9	12,9

(e) estimate; nd = no data available at the time of publication
* *Zambian production breakdown between concentrates, smelted and refined copper not available at the time of publication.*
Source(s): Statistics Botswana, CTCPM Mines RDC, World Mining Data, USGS, BGS, ANSADE, Haut Commissariat au Plan (HCP), Managem, Chamber of Mines of Namibia, Department of Minerals South Africa, Ministry of Mines and Minerals Development of Zambia, Zambia Development Agency, ZIMSTAT

COPPER REFINED

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Congo, D.R.	863,9	891,4	818,9	825,3	999,5	1 160,2	1 353,3	1 455,6	1 774,6	2 174	2 558
Congo, Rep.	-	-	-	16	18	18,8	10,3	11	11,9	8,4	nd
Namibia	-	10,7	16,4	15,5	15,2	14,9	15,7	1	-	-	3,5
South Africa (PGM by-product)	78,7	70,9	68,8	66,2	43,9	47	34	49	49	nd	nd
Zambia	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

(e) estimate; nd = no data available at the time of publication
Note: data not available for Zambia and excludes secondary refining and copper scrap recycling, most notably in Egypt
Source(s): CTCPM Mines RDC, World Mining Data, Chamber of Mines of Namibia, USGS

COPPER SMELTED

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Congo, D.R.	111,7	35,9	26,9	40,9	25,2	66,4	119,1	123	157	204,4	157,7
Namibia (blister)	36,9	45,2	40,9	45,5	49	46	46,8	42	37,3	35,6	32,9
South Africa (PGM by-product)	71,8	71,8	68,7	52,6	45	48	35	51	51	nd	nd
Zambia	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd

nd = no data available at the time of publication
Source(s): CTCPM Mines RDC, Chamber of Mines of Namibia, USGS

Africa's copper value chain is also deepening. Processing pathways are split between hydrometallurgy (refining)—dominated by leaching, solvent extraction and solvent electrowinning to produce cathode in the D.R.C.—and pyrometallurgy (smelting), historically concentrated in Zambia. A major step-change occurred at the end of 2025 with the commissioning of the 500,000-tonne-per-year Kamoa-Kakula smelter complex in the D.R.C., now Africa's largest.

However, much of this growth remains landlocked, making logistics and power infrastructure a binding constraint. The Central African Copperbelt is landlocked and developing its resources at scale has required—and will continue to require—innovative logistics and power solutions to overcome distance from seaborne markets and chronic infrastructure gaps. In response, multiple transport corridors are now being upgraded to absorb rising volumes, including the expansion of toll-road networks to crowd in private financing, the planned rehabilitation of the TAZARA railway, and the development the Lobito Corridor.

The Lobito Corridor is particularly strategic. Beyond offering a shorter and more competitive Atlantic export route that diversifies Copperbelt supply away from traditional Indian Ocean pathways, it has the potential to anchor a broader infrastructure ecosystem—supporting fuel supply chains, enabling new power transmission links, and facilitating access to Angola's stranded hydropower resources.

Beyond the Copperbelt, secondary copper supply stories are quietly re-emerging. In Morocco, Managem's Tizert mine is set to enter production over 2025-26 and could double national copper output. In Southern Africa, the Kalahari Copperbelt spanning Botswana and Namibia is returning to the supply picture after nearly a decade of decline and remains materially under-explored[108].

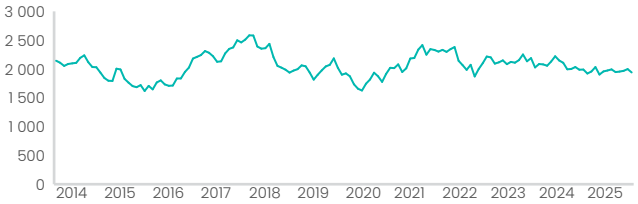
[108] *Botswana's copper production collapsed following the liquidation of BCL Ltd in 2016 and the closure or mothballing of the Selebi-Phikwe, Mowana and Boseto mines. This cycle has now turned after MMG's acquisition of Cuprous Capital in 2023 leading to the restart of the Khoemacau copper-silver mine and the Boseto processing plant, while GCR Group reopened the Tataki (Phoenix) mine in September 2025.*

Lead: Circular Value Chains in a Battery-Driven Market

Lead remains a mature industrial metal with demand anchored overwhelmingly in battery applications. More than 60% of global lead consumption is used in the manufacture of lead–acid batteries[109], the majority of which serve internal combustion engine vehicles through starter, lighting and ignition (SLI) systems. Beyond batteries, lead is used in construction (foil and plumbing), radiation-shielding glass, UV stabilisation in plastics, and solders. While electric vehicle adoption is gradually reducing the long-term growth outlook for lead–acid batteries, demand remains resilient, supported by vehicle sales in emerging markets and by the recurring replacement cycle of existing battery fleets[110].

Reflecting these dynamics, the global lead market remains broadly balanced. After an estimated 5% year-on-year price decline in 2025 (see price chart), prices are expected to stabilise in 2026 and edge up by around 1% in 2027[111]. Unlike many other base metals, lead is less exposed to sharp demand swings or structural supply deficits, in large part because secondary supply plays a dominant role in meeting global needs.

Lead prices (2014–2025), $/mt



Source: World Bank

Africa's primary lead production is limited. African lead is always produced as a by-product of zinc mining, and the continent's output is concentrated in a small number of countries—namely Morocco, Nigeria, South Africa and Namibia (see data table). Several lead–zinc deposits are known in Tunisia but remain undeveloped. As a result, Africa is a modest contributor to global mined lead supply, with limited scope for large-scale expansion through new primary mining projects.

Where Africa's lead story becomes more compelling is in recycling. Globally, refined lead recycling accounts for approximately two-thirds of total supply[112], and Africa increasingly mirrors this structure. Recycled lead production on the continent is estimated to have nearly doubled between 2014 and 2024 (see data table), driven by the growth of battery consumption and informal and formal recovery systems.

LEAD (METAL CONTENT)

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**104,8**	**118,2**	**110,9**	**140,3**	**110,2**	**126,8**	**120,1**	**141,2**	**169,8**	**139,4**	**122,6**
Burkina Faso	1,9	1	–	–	–	–	–	–	–	–	–
Congo, D.R.	0,8	0,7	0,1	–	–	–	–	–	–	–	–
Morocco	39,1	47,5	42,1	54,0	43,1	46,5	54,2	44,5	51,2	37,3	40
Namibia (a)	22,3	18,5	14,9	13,9	14,1	13,8	17,8	20	26,3	20,3	13,6
Nigeria	11,4	16	14,5	24,3	17,9	23,6	20,1	45,5	52,4	41,5	nd
South Africa (a)	29,3	34,6	39,3	48,2	35,1	42,9	28	31,2	40	40,3	27

(e) estimate; (a) concentrate; nd = no data available at the time of publication
Source(s): World Mining Data, CTCPM Mines RDC, Haut Commissariat au Plan (HCP), Chamber of Mines of Namibia, Department of Minerals South Africa, Vedanta Ltd

REFINED LEAD (SECONDARY)

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**74,8**	**62,3**	**68,1**	**65,6**	**65,9**	**84,6**	**82,7**	**98,8**	**120,7**	**118,9**	**124,5**
Algeria	9	9	8	9	9	9	8	9	9	9	nd
Egypt	23	24,0	25	26	26	28	26	27	27	27	nd
Ghana	2,8	3	1,8	1,2	2	5	10	13,5	16,3	18,7	20,4
Kenya	1	1,1	1,1	1,4	1	1	1	1	1	1	nd
Morocco	15	14	11	8	8	8	7	8	8	0,8	nd
Mozambique *-remelted ingots*	2,3	2,5	2,8	3,8	3,4	3,9	4,2	4,6	5,3	4,6	5,9
Nigeria	14	2	9	8	7	17	14	19	36	38	nd
Senegal *-remelted ingots*	2,2	1,9	3,6	3,4	3,7	4,1	4,2	4,9	5,9	5,7	5,7
Tanzania	–	–	–	–	–	2,8	3,4	6,1	6,5	7,6	7,1
Togo	–	–	–	–	–	–	–	–	–	0,7	2,6
Uganda	0,5	0,8	0,8	0,8	0,8	0,8	0,8	0,8	0,8	0,8	nd
Zambia	5	4	5	4	5	5	4	5	5	5	nd

(e) estimate; nd = no data available at the time of publication
Source(s): BGS, USGS, Gravite (financial year from April to March)

The largest recycling capacities are found in Nigeria, Egypt and Ghana, with additional facilities operating across Algeria, Kenya, Morocco, Mozambique, Senegal, Tanzania, Togo, Uganda and Zambia.

Strategically, lead is less about unlocking new mining frontiers and more about building effective circular value chains. Strengthening battery collection systems, formalising recycling networks, improving environmental and occupational standards, and enforcing cross-border controls are central to value creation in Africa's lead sector.

[109] *World Bank (October 2025). Commodity Markets Outlook*
[110] *idem*
[111] *idem*
[112] *idem*

Lithium: The Emergence of Regional Supply Clusters in West and Southern Africa

Lithium has become one of the most strategically important minerals of the energy transition and the backbone of modern energy storage. Electric vehicles account for around 90% of incremental demand growth, while stationary energy storage—currently about 9% of demand[113]—is expanding rapidly as power systems integrate higher shares of renewables. Lithium demand has already tripled since 2020 and is expected to triple again over the next decade, underpinning a strong long-term price outlook despite short-term volatility.

Demand is also highly concentrated and increasingly segmented by battery chemistry: China represents more than three-quarters of global lithium demand, followed by Korea and Japan[114], and the market is splitting into two parallel supply chains—lithium carbonate for LFP batteries and lithium hydroxide for nickel-rich chemistries—reshaping refining strategies and investment decisions across the value chain.

Against this backdrop, Africa has emerged as one of the fastest-growing sources of new lithium supply globally. The continent's share of global lithium mining rose to approximately 11% in 2024–25, with nearly 30% of new global supply growth in 2024 originating from Africa[115]. This growth is organised around two rapidly emerging regional clusters:

- Southern Africa remains the continent's primary lithium hub, anchored by Zimbabwe and extending into South Africa and Namibia. Zimbabwe accounts for most of African production, supported by long-established operations at Bikita and newer large-scale projects such as Arcadia (see data table). Namibia joined the ranks of lithium-producing countries in 2023 through the recovery of high-purity petalite concentrate as a by-product of tin mining at the Uis mine, highlighting the region's polymetallic potential and the role of by-product recovery in scaling supply.
- A second growth hub is now taking shape in West Africa, led by Mali and increasingly complemented by Nigeria. In Mali, production at the Goulamina project began in December 2024 and exceeded 362,000 tonnes of spodumene in 2025, while the Bougouni mine, which started operations in March 2025, produced more than 46,000 tonnes in its first year. Nigeria is also seeing growing lithium output, partly through artisanal and small-scale mining, reinforcing West Africa's emergence as a meaningful new contributor to global lithium supply.

LITHIUM ORE

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Burundi	–	–	–	–	–	–	–	–	–	299	25
Mali*	–	–	–	–	–	–	–	–	–	–	–
Nigeria						133,3	nd	nd	51 524	78 317,29	nd
South Africa	–	–	–	–	–	–	–	–	–	416 131	nd
Tanzania	–	–	–	–	–	–	–	–	732	2 061	52
Zimbabwe	–	–	–	36 323	76 517,27	62 623	20 859	40 726	86 330	745 455	2 508 928

nd = no data available at the time of publication
** Mali's lithium production (spodumene) started in December 2024 only, at Goulamina.*
Source(s): INSBU, EITI, ZIMSTAT, Department of Mines South Africa, Tanzania Economic Survey Book

SPODUMENE (CONTENT)

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Mali*	–	–	–	–	–	–	–	–	–	–	–
Nigeria	❝	❝	❝	❝	❝	–	–	–	95	431	nd
Zimbabwe	❝	❝	❝	❝	❝	–	–	–	–	12 963	40 000

nd = no data available at the time of publication
** Mali's lithium production (spodumene) started in December 2024 only, at Goulamina.*
Source(s): BGS

[113] *International Energy Agency (June 2025). Global Critical Minerals Outlook 2025*
[114] *idem*
[115] *idem*

PETALITE (CONTENT)

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nigeria	-	-	-	-	24	2	2	2	2	2	nd
Zimbabwe	-	-	-	970	1 332	1 191	397	775	1 642	5 726	18 500
Namibia (a)	-	-	-	-	-	-	-	-	-	nd	128

(a) concentrate
nd = no data available at the time of publication
Source(s): BGS, Andrara Mining (financial year March to February)

LEPIDOLITE (CONTENT)

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Namibia	..	..	–	–	88	–	–	–	951	877	nd
Zimbabwe	..	..	..	..	..	–	–	–	–	10	30

nd = no data available at the time of publication
Source(s): BGS

Despite rapid growth in mining, lithium processing remains the weakest link in Africa's value chain. As of 2023, no African country was refining lithium concentrates into battery-grade carbonate, hydroxide or chloride. Most spodumene and petalite concentrates are exported to China, where vertically integrated producers dominate refining and downstream battery materials manufacturing. This leaves Africa capturing only a fraction of the value embedded in its lithium resources.

Policy-led efforts to shift this balance are beginning to emerge. Zimbabwe's upcoming ban on lithium concentrates exports from 2027 is catalysing investment in lithium sulphate facilities—the first of which is expected online in 2026. Importantly, the policy has been applied pragmatically, with exemptions and flexible timelines, and has not significantly deterred exploration activity.

Nigeria is pursuing a similar approach by restricting exports to at least concentrated ores. These experiences underscore that beneficiation policies can be effective when calibrated to market realities and implemented in close dialogue with industry.

Looking ahead, regional integration will be critical to scaling lithium refining in Africa. Individual national outputs may be insufficient to justify large, capital-intensive refineries, but aggregated production from countries such as Ghana, Mali and Nigeria could support shared processing infrastructure in West Africa. Having moved decisively from marginal supplier to meaningful growth contributor, Africa's lithium opportunity now hinges on its ability to move downstream—aligning policy, infrastructure and regional coordination to anchor refining and battery-materials value chains on the continent.

Rare earths: Africa's Opportunity in Diversifying a Highly Concentrated Market

Rare Earth Elements (REEs) comprise a group of 17 chemically similar metals that are critical to a wide range of advanced technologies across the energy, defence, digital, and manufacturing sectors. Among them, the most strategically important are the so-called magnet rare earths—neodymium (Nd), praseodymium (Pr), dysprosium (Dy) and terbium (Tb)—which are essential inputs for high-performance permanent magnets (NdFeB)[116].

These magnets are used in electric vehicle (EV) traction motors, wind turbines, industrial motors, robotics, aerospace systems and advanced defence applications. As electrification accelerates globally, magnet REEs have become indispensable, with few technically or economically viable substitutes.

Global demand for magnet rare earths has nearly doubled since 2015, surpassing 90 kt in 2024[117]. Over the same period, the share of clean-energy technologies in total REE demand expanded from around 8% to more than 20%, driven primarily by EV deployment and wind power installations[118].

Unlike other metals, rare earths are not constrained by resource scarcity, but by supply-chain concentration and geopolitical exposure. The defining characteristic of the rare earth market is its extreme geographical concentration. In 2024, the top three producing countries accounted for 86% of global mined output, with China alone representing roughly 60%[119]. Concentration is even more pronounced downstream: the top three countries controlled 97% of global refined output, with China accounting for 91% of rare earth separation and refining capacity[120].

This concentration has turned REEs into a strategic vulnerability. Recent export controls and geopolitical frictions have illustrated the fragility of existing supply chains—within weeks of new restrictions imposed by China last year, manufacturers such as Ford and Suzuki were forced to halt production of certain vehicle models[121, 122], underscoring the systemic importance of diversified REE supply.

Against this backdrop, Africa currently plays only a marginal role in global rare earth supply, and production data remains fragmented and inconsistent. Existing African supply is largely derived from monazite and mineral sands concentrates, notably in Madagascar —where QIT (Rio Tinto) began monazite production in 2018—as well as in Mozambique and Nigeria. The Gakara deposit in Burundi, a low volume but high-grade rare earth deposits, has been on care and maintenance since 2021 following a government-mandated suspension.

Reporting varies significantly across sources: some datasets capture production only from Madagascar, while others include Burundi and Nigeria. Crucially, no industrial-scale rare earth separation or refining facility is currently operating on the continent.

Africa's longer-term potential is considerable. The continent hosts multiple large and world-class undeveloped REE deposits, including in Malawi, Tanzania, Namibia, Madagascar and southern Morocco. These deposits are geologically competitive by global standards but have remained largely untapped due to the absence of downstream processing capacity and enabling infrastructure. Among these, Logonjo in Angola and Kangankunde in Malawi stand out as the most advanced development-stage projects[123].

A potential inflection point is indeed emerging in Angola, where Pensana's Longonjo project represents Africa's most advanced attempt to establish an integrated rare earth value chain. Longonjo is one of the largest undeveloped rare earth deposits globally and is strategically located along the Lobito Corridor, providing direct rail access to the Atlantic seaboard. The project is designed as a fully integrated operation—covering mining, concentration, calcination and chemical refining—to produce a mixed rare earth carbonate (MREC). Production start is expected in 2027 to supply the eVAC rare earth magnetics facility in South Carolina, United States.

116 *International Energy Agency (June 2025). Global Critical Minerals Outlook 2025*
117 *idem*
118 *idem*
119 *idem*
120 *idem*
121 *https://www.reuters.com/business/autos-transportation/ford-suppliers-receive-chinas-new-streamlined-rare-earth-licences-2025-12-10/*
122 *https://www.reuters.com/markets/commodities/suzuki-motor-halted-swift-car-production-due-chinas-rare-earth-curb-nikkei-says-2025-06-05/*
123 *The project secured financing for its Phase 1 in 2025 and expects to start of production at the end of 2026, with up to 15,300 tonnes or rare earths concentrates annually.*

RARE EARTHS ORES

Tonnes	Source	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Burundi	*USGS*	–	–	–	75	1 075	338	549	341	–	–	–
Madagascar (a)	*EITI*	–	–	–	–	15 870	21 046	28 527	26 080	23 189	30 018	nd
Mozambique (a)	*MOF*	–	–	–	–	–	–	–	12 872	15 268	17 222	16 716
Nigeria (a)	*NEITI*	❝	❝	❝	❝	❝	❝	❝	nd	2 535	2 619,5	nd

nd = no data available at the time of publication
(a) monazite, mineral sands concentrate
Source(s): USGS, EITI, Ministry of Economy & Finance Mozambique

RARE EARTHS (REO-CONTENT EQUIVALENT)

Tonnes	Source	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Burundi*	*WMD*	–	–	–	31	631	195	296	134	–	–	–
Madagascar	*staff calculations*	–	–	–	–	2 000	3 700	4 800	4 500	4 000	5 000	nd
Nigeria	*WMD, USGS*	104	80	–	55	50	54	30	100	380	390	nd

nd = no data available at the time of publication
** In Burundi, the average TREO content in exported rare earths is 45-51%.*
Source(s): World Mining Data, USGS, staff estimates

Zinc: A Case for Re-industrialising a Mature but Under-Invested Sector

Zinc demand is structurally anchored in steel, construction and manufacturing cycles, with over half of global consumption used for galvanising steel to protect it from corrosion. As a result, zinc demand closely tracks activity in construction, automotive manufacturing and infrastructure development, particularly in China, which remains the world's largest consumer[124]. Continued weakness in China's property sector is expected to weigh on galvanising demand over 2026–27, only partly offset by infrastructure investment, power grid expansion and renewable energy deployment[125].

Against this backdrop of subdued demand growth and steadily improving mine and refined supply, zinc prices remained broadly stable in 2025 (see price chart) and are expected to ease by around 2% annually in 2026 and 2027, reflecting a broadly balanced but cyclical market[126].

Zinc prices (2014-2025), $/mt

Source: World Bank

Africa's zinc production has remained broadly stable over the past decade, with supply growth in Eritrea, Zambia and South Africa largely offsetting the closure of Burkina Faso's Perkoa mine (see data table). Zinc on the continent is almost always produced alongside lead, reinforcing its by-product nature and limiting supply responsiveness to zinc-specific price signals. Overall, Africa remains a modest contributor to global zinc supply, but with a diversified base of producing countries and a pipeline of projects that could support incremental growth.

[124] *World Bank (October 2025). Commodity Markets Outlook*
[125] *idem*
[126] *idem*

ZINC ORES (METAL CONTENT)

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**337,3**	**301,8**	**354,2**	**437,8**	**442,4**	**468,7**	**474,9**	**526,4**	**478,1**	**415,5**	**358,0**
Burkina Faso (a)	135,4	126,9	155,7	164,3	183,4	211,2	152,5	166,3	46,8	–	–
Zn content	65	68,8	81,4	92,7	99,2	95,6	73,5	74,3	23,2	–	–
Congo, D.R.	12,7	12,7	12,6	12,3	1,1	1,6	15,3	16,1	13,6	13,4	43,6
Eritrea	–	–	40,9	95,4	125	121,3	121,9	129,6	120,5	116,8	102,8
Morocco (a)	89,6	106	106,3	102,0	113,8	85,9	70,6	79,4	68,8	71,6	51,9
Zn content	45,4	53,7	53,9	51,7	43,6	43,6	35,8	40,2	35,0	33	nd
Namibia (b)	104	99,7	80,6	97,4	107,6	102,7	92,2	83,4	79,7	74,6	78,6
Nigeria	1	1,8	0,9	4,1	1,4	1,0	0,2	3	4,7	5	nd
South Africa (b)	26,1	29,0	26,7	30,8	28,1	125,2	160,8	193,8	224,4	197,6	133
Zambia (a)	–	–	–	–	–	–	–	–	–	171,1	52,1

(e) estimate; (a) zinc ore; (b) concentrates; nd = no data available at the time of publication
Source(s): CNS-BF, BGS, USHS, CTCPM Mines RDC, World Mining Data, Haut Commisariat au Plan (HCP), Chamber of Mines of Namibia, Department of Minerals South Africa, Zijin Mining Group, Ministry of Mines and Minerals Development of Zambia

ZINC REFINED

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Congo, Rep.	-	-	0,5	4,3	0,5	4,8	1,1	12,7	16,1	24,1	nd
Namibia	102,2	82,0	85,4	84,2	66,0	67,3	0,7	-	-	-	-

nd = no data available at the time of publication
Source(s): World Mining Data, Chamber of Mines of Namibia

ZINC SMELTED

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Algeria - *slab*	6,9	7,1	3,1	1,4	2	0,5	0,8	0,4	0,8	0,9	nd

nd = no data available at the time of publication
Source(s): ONS

The continent's main structural weakness lies in beneficiation. Zinc processing capacity has contracted sharply over the past fifteen years following the closure of most refineries, including Zincor in South Africa (2011), Alzinc in Algeria (2017) and NamZinc in Namibia (2020). SOREMI in the Republic of Congo remains the only operating zinc refinery in Africa (see data table), producing zinc ingots via solvent extraction–electrowinning alongside copper cathodes. This contraction has increased Africa's dependence on imported refined zinc, despite the presence of domestic ore supply.

That said, selective opportunities exist to rebuild zinc value chains in a more integrated and regionally anchored manner.

- In Algeria, the Tala Hamza zinc-lead project—one of the world's largest undeveloped deposits—could materially lift output while supporting a shift from imported to locally sourced concentrates at the Alzinc facility once it restarts.
- In Namibia, zinc concentrates production will grow once the expansion of the Rosh Pinah operations is completed in 2026, while Vedanta continues to mature the reconversion of the closed NamZinc Refinery to enable co-treatment of sulphide and oxide ores and process some of its zinc from South African mines across the border.
- In Zambia, the planned redevelopment of Kabwe presents an opportunity to combine new zinc production with environmental remediation and downstream processing.

Taken together, zinc does not present a near-term growth story driven by prices. Instead, its strategic relevance for Africa lies in re-establishing beneficiation capacity, supporting galvanised steel supply for regional construction and manufacturing markets, and embedding zinc production more deeply into local and regional industrial ecosystems, rather than exporting value through unprocessed concentrates.

INDUSTRIAL MINERALS:

Diamonds: Managing Concentration Risk Through Diversification

Diamonds have long been one of Africa's most important mineral endowments. The continent holds over 40% of global industrial diamond resources and continues to account for close to 60% of global diamond production[127], underpinning decades of export revenues, employment, and fiscal stability across Southern and Central Africa. For many countries, diamonds were not just a mining commodity, but a foundation of post-independence economic development and state-building.

That legacy is now under growing strain. The global diamond market is undergoing a structural shift driven by the rapid rise of lab-grown diamonds, which are increasingly accepted by consumers and retailers, particularly in the mid-market jewellery segment. The resulting oversupply has led to sustained price pressure, weakening revenues for natural diamond producers and compressing margins across the value chain[128]. Unlike past cyclical downturns, this shift seems to reflect a permanent change in market structure, rather than a temporary demand shock.

The macroeconomic implications are most visible in Botswana, where diamonds account for around 80% of exports, roughly one-third of fiscal revenues, and close to a quarter of GDP[129]. As prices for natural diamonds have declined, the country has experienced a sharp economic slowdown, highlighting the risks associated with high commodity concentration – even in a well-managed and historically successful mining economy. Similar pressures are being felt, to varying degrees, across other traditional diamond producers.

Across Africa, diamond production is declining among most major producers, including Botswana, the Democratic Republic of the Congo and South Africa (see data table), reflecting both mature assets and weaker market incentives for new investment. Angola is a notable exception. Production growth there has been driven by large-scale assets such as Catoca and Luele, and the country has taken steps to retain more value domestically through the development of the Saurimo cutting and polishing hub. While localisation can help support employment and skills, it does not fully offset the broader price and demand pressures facing the natural diamond market.

The evolving dynamics of the diamond market underscore a clear lesson: diamond wealth must increasingly be complemented by diversification. For diamond-dependent economies, the priority is not to replace diamonds, but to use the revenues, skills, and institutional capacity built around the diamond industry to catalyse broader mining and industrial development—particularly into minerals with stronger structural demand linked to infrastructure, manufacturing, and the energy transition.

DIAMONDS

'000 carats	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa	**64 903,6**	**60 557,4**	**57 733,7**	**67 489,4**	**67 556,9**	**60 478,8**	**51 268,3**	**60 954,6**	**63 220,3**	**51 740,9**	**56 788,1**
Angola	8 791,3	9 016,3	9 021,5	9 438,8	9 433,9	9 121,5	7 909,2	8 723,1	8 763,3	9 754,3	14 027
Botswana	24 668,1	20 778,6	20 501	22 961,3	24 377,5	23 687	16 940,7	22 696,4	24 509,9	18 854	18 324
Cameroon	3,7	2,2	1	1,8	1,8	1,7	2,4	2,7	2,4	3	11,2
Central African Republic	31,9	–	10,7	47,6	13,6	27,5	61,8	92,8	118	111,9	111,4
Congo, D.R.	14 932,9	15 789,2	14 746,4	18 902,8	15 635,4	14 021,3	12 214,4	12 406,3	11 683,4	8 305,8	9 240,7
Congo, Rep.	53,2	40,1	12,1	46,8	47,6	3,0	11,2	4,1	3,5	4,1	1,7
Côte d'Ivoire	1,1	9,2	20,2	7,4	5,7	4,0	4,0	3,9	3,9	2,4	0,9
Ghana	242,3	174,2	141,5	92,2	58,6	37,7	26,5	55,1	82,5	202,8	332,3
Guinea	164,1	166,9	112,8	181,5	292,7	229,2	128,6	273,3	128,8	120,0	113,4
Lesotho	346	304,2	342,0	1 126,4	1 294,3	1 113,5	481,2	339,5	548,2	471,7	695,9
Liberia	80	71,5	62,6	71,2	79,3	54,1	58,8	59,4	60,4	54,7	47,8
Mali	–	–	–	0,0	–	–	–	–	–	0,2	0,9
Namibia	1 885,3	1 764,3	1 573,0	1 804,0	2 007,8	1 700,0	1 447,4	1 466,2	2 137,1	2 326,6	2 319,5
Sierra Leone	620,2	500,0	532,7	319,1	759,8	772,2	686	841,8	681,5	532,9	554,2
South Africa	8 058,8	8 232,7	8 311,7	9 683,0	9 908,2	7 181,0	8 478,4	9 717,6	9 660,2	5 891,9	5 340,2
Tanzania	253,2	216,9	241,7	298,1	385,7	416,7	147,3	47,2	375,5	191	373,7
Togo	–	–	–	0,002	–	–	–	–	–	–	–
Zimbabwe	4 771,6	3 490,9	2 102,9	2 507,6	3 255,1	2 108,3	2 670,5	4 225,2	4 461,5	4 913,6	5 293,3

Source(s): Kimberley, Ministry of Minerals & Energy of Botswana, USGS, Chamber of Mines of Ghana, Chamber of Mines of Namibia

[127] *Staff calculations based on USGS data estimates for 2024*
[128] *https://www.bloomberg.com/news/articles/2025-09-02/botswana-economy-slumps-as-lab-grown-diamonds-spur-market-crisis*
[129] *https://blog-pfm.imf.org/en/pfmblog/2024/07/management-of-botswana-diamond-revenues*

Fluorspar: A Small Market with Strategic Chemical Leverage

Fluorspar plays a critical enabling role across industrial and chemical value chains. Acid-grade fluorspar is primarily used in the production of fluorochemicals, including hydrofluoric acid and aluminium fluoride, which are essential inputs for aluminium smelting, glass manufacturing, fine chemicals, semiconductors, and lithium-ion battery materials. Metallurgical-grade fluorspar is used in iron and steelmaking as a flux to lower melting temperatures and improve slag fluidity, while ceramic-grade fluorspar is consumed in glass and ceramics.

Africa hosts meaningful fluorspar endowments, though production remains geographically concentrated. South Africa holds the continent's largest fluorspar reserves, accounting for roughly 13% of global reserves[130], largely within the Bushveld Complex. The Vergenoeg deposit, currently mined, remains one of the world's largest known fluorspar resources[131]. Fluorspar also occurs widely in phosphate rocks and in vein-type deposits across Africa, often associated with lead, zinc, silver and barite mineralisation (El Hammam, Morocco).

Africa's fluorspar production is highly concentrated and remains limited in terms of beneficiation. South Africa and Morocco are the continent's only significant producers of acid-grade fluorspar, with production in South Africa led by the Vergenoeg and Nokeng mines and Moroccan output sourced from deposits such as El Hammam and Ouled Said. Most African fluorspar is exported to major fluorochemical producers in Asia, the United States and Europe, while domestic downstream conversion into hydrofluoric acid, aluminium fluoride and other fluorochemicals remains limited. As a result, Africa's role in the fluorspar value chain is still predominantly upstream, despite the mineral's strategic importance for aluminium smelting, chemicals, steelmaking and battery-related applications.

At the same time, fluorspar highlights a clear strategic opportunity for value maximisation through integration and by-product recovery. Rather than relying solely on new standalone fluorspar mines, Africa can deepen fluorochemical value chains by leveraging existing industrial ecosystems. Fluoralpha's project at Jorf Lasfar in Morocco illustrates this approach: by recovering fluorine from phosphate rock within a mature mining-to-processing-to-export hub, the project demonstrates how critical fluorine products such as hydrofluoric acid and aluminium fluoride can be produced competitively within existing mining provinces[132]. This model—anchored in infrastructure, co-products and industrial clustering—offers a replicable pathway for capturing higher value from Africa's industrial mineral base.

FLUORSPAR

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**365**	**273**	**296,1**	**301,5**	**300,9**	**327,2**	**385,8**	**557**	**479**	**553,4**	**555**
Morocco	79,8	80,9	73,9	75,5	87,9	73,2	83,8	189,0	77,0	101,4	nd
South Africa	164	121	177	218	212	253	301	367	401	451	nd
Others*	121,1	71,1	45,2	7,9	1	1	1	1	1	1	1

** Others include estimates on Egypt, Kenya (2014-2017), and Namibia (2014-2016).*
(e) estimate; nd = no data available at the time of publication
Source(s): BGS, USGS, Haut Commisariat au Plant (HCP), Department of Minerals South Africa

[130] *Staff calculations based on USGS data estimates for 2024*
[131] *https://www.dmre.gov.za/LinkClick.aspx?fileticket=LvHP_TcTiSs%3D&portalid=0*
[132] *https://www.latribune.fr/afrique-du-nord/maroc/2025-10-01/maroc-fluoralpha-rejoint-le-cercle-ferme-des-industries-du-futur-1033311.html*

Mineral Sands: Africa's Dominance in Feedstock—and the Next Frontier in Value Addition

Mineral sands underpin a wide range of industrial and advanced manufacturing value chains through the production of titanium dioxide (TiO_2) and zirconium-based materials. These minerals are extracted from heavy mineral concentrates—primarily ilmenite, rutile, leucoxene, zircon and monazite—which are significantly denser than common sand minerals and naturally concentrate critical elements such as titanium, zirconium and, in some cases, rare earth elements (REEs).

The mineral sands industry is structurally divided into two distinct product streams with different markets, pricing dynamics and processing pathways.

- The first relates to titanium feedstocks, produced mainly as ilmenite or rutile and upgraded into higher-value forms such as synthetic rutile, slag and titanium dioxide pigment[133]. Around 90% of global titanium mineral production is ultimately used to manufacture TiO_2 pigment, a critical input for paints, coatings, plastics and paper, also widely used in cosmetics and pharmaceuticals[134].

  A smaller but strategically important share—around 6%—is used to produce titanium metal[135], a lightweight, corrosion-resistant material essential for aerospace, defence, medical implants and advanced manufacturing.
- The second stream concerns zircon and zirconium-based products. Zircon is primarily used in ceramic tiles, but also plays a critical role in foundry applications, refractory materials and continuous steel casting. High-purity zirconia and zirconium chemicals are increasingly used in specialty applications, including nuclear fuel rods, catalytic converters, filtration systems and advanced engineering ceramics.

Africa holds an exceptional mineral sands endowment and is already a dominant global supplier across all major product categories. African producers account for over 40% of global ilmenite supply, more than 45% of rutile production, and around 40% of zircon output[136]. Production has historically been concentrated in South Africa, Mozambique, Madagascar, Senegal, Kenya and Sierra Leone (see data tables).

HEAVY MINERAL CONCENTRATE

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Kenya (a)	374,1	549,9	457,5	643,5	597,7	486,2	440	440,8	441,9	280,7	198,5
Senegal	184	633	614	725	774	735	762	804	742	628	883
Sierra Leone	nd	nd	nd	1,2	0,6	13,1	9,9	40	46	93	165,8

nd = no data available at the time of publication
Note: data breakdown for HMC not provided for Mozambique and South Africa.
(a) titanium ore
Source(s): Kenya National Bureau of Statistics (KNBS), Eramet, National Minerals Agency (NMA-SL)

In Kenya's case, production was anchored by the Kwale mineral sands mine—the country's largest mining operation—which ceased operations in December 2024 following depletion of its ore reserves.

ILMENITE

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**3 856,4**	**3 888,5**	**4 307,5**	**4 996,2**	**4 563,6**	**5 055,2**	**5 129,5**	**5 376,2**	**6 048,7**	**6 819**	**7 000**
Kenya	281,5	445	359,9	491	463	352	334,9	345	188	192	139,1
Madagascar (a)	–	166,3	268,0	469,3	381,9	448,2	499,8	582	545	613,2	520
Mozambique (incl. leucoxene)	926,8	828,9	1 340,3	1 197,4	1 283,1	1 442,7	1 608	2 071	2 553,3	3 373,2	3 506,5
Senegal	101	427,7	416,2	492,4	506,9	492	521	543	498	421	570
Sierra Leone	35,8	37,6	28,1	57	54,6	61,3	45,8	52,1	58,6	44,8	35
South Africa (a)	2 511,2	1 983	1 895	2 285	1 873	2 250	2 114	1 769	2 190,7	2 114,1	2 142,4
Titanium slag (ilmenite)	1 025,6	755,9	631,2	893,2	nd	nd	nd	#VALUE!	873,7	842,7	nd
Others*	–	–	–	4	1	9	6	14	15,1	60,6	nd

(e) estimate; (a) titanium, concentrate; nd = no data available at the time of publication
Note: QIT Madagascar produces zirsil and monazite
**Others include The Gambia and Nigeria*
Source(s): Kenya National Bureau of Statistics (KNBS), USGS, BGS, Banky Foiben'i Madagasikara (BFM), Ministry of Economy and Finance of Mozambique, Eramet, National Minerals Agendy (NMA-SL), Department of Minerals South Africa, EITI

[133] *Titanium feedstocks are graded by TiO_2 content, ranging from approximately 50% for sulphate ilmenite to around 95% for natural rutile, with rutile commanding the highest value. For more: https://www.iluka.com/media/41fcyzqo/mineral-sands-industry-information-nov19.pdf*

[134] *https://www.energymining.sa.gov.au/industry/minerals-and-mining/mineral-commodities/heavy-minerals*

[135] *idem*

[136] *Staff calculations based on USGS data estimates for 2024*

RUTILE

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**307,3**	**286,6**	**308,4**	**374,8**	**340,8**	**352,9**	**296,9**	**318,2**	**424,4**	**302,2**	**250**
Kenya	52,5	78,9	70	87,2	98,1	85,8	72,8	69,8	163,2	67,6	42,8
Madagascar	–	3,3	5,4	8,1	7,6	5,9	6	6	6	6	nd
Mozambique	6,1	6	7,8	9,1	8,8	8,3	6	8,9	8,9	8,4	9,8
Senegal (incl. leucoxene)	0,7	5,3	9,7	10	9,6	10,1	9,5	11,4	10,5	8	10,2
Sierra Leone	115,1	126,0	148,5	165,5	113,7	132,8	116,6	127,1	135,8	112,2	81,5
South Africa	133	67	67	95	103	110	86	95	100	100	nd

(e) estimate; nd = no data available at the time of publication
Source(s): Kenya National Bureau of Statistics (KNBS), USGS, BGS, Ministry of Economy and Finance of Mozambique, Eramet, National Minerals Agency (NMA-SL)

ZIRCONIUM

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**540,1**	**520,1**	**689,9**	**697,6**	**707,4**	**660,1**	**558,9**	**580,1**	**684,9**	**593,5**	**590**
Kenya	40,1	26	27,7	65,3	36,6	48,4	32,2	25,9	90,7	21,1	16,5
Madagascar	27,3	11,9	15,6	26	22,8	29,5	26	23,1	30,7	34,4	nd
Mozambique	63,1	57,9	215,2	159,7	202	121,8	104,1	123	134,1	143,5	123,7
Senegal	9	45,2	52,6	61,6	64,3	58,4	59,2	63,7	57,1	48,4	68
Intermediate zircon	–	–	–	20,2	29,3	22,3	25,8	27,0	27,0	24,9	35,4
Sierra Leone	2,4	1,4	1,3	3	11,4	8,5	4,6	39,4	34,1	27,8	16,8
South Africa	398,1	377,8	377,4	361,8	340	368,3	307	278	307,3	289,5	289

(e) estimate; nd = no data available at the time of publication
Note: sporadic data disclosure from Nigeria points to zircon extraction there
Source(s): Kenya National Bureau of Statistics (KNBS), USGS, World Mining Data, Eramet, National Minerals Agency (NMA-SL), Department of Minerals South Africa

Despite this scale, downstream beneficiation remains limited. While all African mineral sands operations include mineral separation plants, South Africa remains the continent's sole hub for smelting and upgrading. The country houses one smelter at Saldanha Bay and two at Richards Bay, where ilmenite is smelted into titanium dioxide slag (see data table) and pig iron as a co-product. Elsewhere, most mineral sands products are exported in feedstock form.

GARNET CONCENTRATE

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
South Africa	254,8	285	270,8	211,4	278,2	179,1	153,7	144,9	178,8	96,5	nd

nd = no data available at the time of publication
Source(s): Mineral Commodities Ltd, USGS

New geological provinces are beginning to reshape Africa's mineral sands landscape. Malawi has emerged as a globally significant frontier through the Kasiya deposit, the world's largest rutile and second-largest flake graphite deposit[137]. More broadly, coastal basins across Mozambique, Madagascar, Nigeria and Sierra Leone continue to demonstrate strong potential for additional mineral sands and REE-bearing heavy mineral systems.

Looking ahead, the most compelling opportunity lies in downstream expansion. South Africa's existing smelting base provides a foundation, but selective investments could significantly deepen value capture across the continent. Projects such as Nyanza Metals' proposed titanium dioxide pigment plant at Richards Bay—designed to process both South African and Mozambican feedstock—illustrate the scale of opportunity to move from feedstocks into finished industrial and paint products.

More broadly, mineral sands offer Africa a clear pathway to anchor pigment production, titanium metal, zirconium chemicals and advanced materials industries, leveraging an already dominant resource position to support industrialisation, export diversification and participation in future-facing manufacturing value chains.

[137] *https://sovereignmetals.com.au/kasiya-project/#geology*

Graphite: Positioning Africa as the Anchor of Supply-Chain Diversification

Graphite occupies a unique position among critical minerals. It exists in two distinct markets—**natural graphite**, which is mined, and **synthetic graphite**, which is manufactured from petroleum coke or coal-tar pitch, itself a by-product of the oil and gas industry[138]. While synthetic graphite has gained market share in recent years, particularly in battery anodes, natural graphite retains important structural advantages. Purified natural graphite exhibits a higher crystalline structure and superior electrical and thermal conductivity, while offering a lower long-term cost and carbon footprint than synthetic alternatives. These characteristics make natural graphite particularly attractive for battery applications as well as for high-performance uses in aerospace, semiconductors, and defence technologies, where resistance to heat and mechanical stress is critical.

Demand for graphite has accelerated sharply with the expansion of lithium-ion batteries, of which graphite is the largest component by weight[139]. Global graphite consumption reached approximately 4.8 million tonnes in 2024, growing by 8% year-on-year, with most of the increase driven by batteries[140]. While battery anode manufacturers have increasingly favoured synthetic graphite—up by roughly 30% in 2024[141]—natural graphite remains indispensable. In the medium term, graphite is expected to remain the dominant anode material across all lithium-ion chemistries, with only a gradual reduction in share after 2030 as silicon-enhanced anodes are introduced[142].

Unlike most base and battery metals, graphite pricing is opaque and non-transparent. There is no global exchange or benchmark price; instead, prices are negotiated bilaterally and depend on purity, flake size, processing level, customer specifications, and geopolitical conditions. As a result, graphite markets are highly sensitive to supply disruptions, policy interventions, and trade tensions[143].

This vulnerability is amplified by the extreme concentration of supply chains, particularly for battery-grade spherical graphite, where China dominates mining, purification, spheronisation, and anode material manufacturing. Global reliance on China for graphite has emerged as one of the most significant bottlenecks in electric-vehicle supply chains, exposing manufacturers to geopolitical risk at a time of rapidly rising demand[144].

Africa is structurally well positioned to help rebalance this concentration. The continent hosts approximately 25%[145] of the world's natural graphite reserves, giving it one of the strongest geological foundations globally for supply diversification. Africa's graphite production is concentrated in southeastern Africa, where several world-class deposits are already operating or advancing in Mozambique, Madagascar and Tanzania (see data table).

GRAPHITE

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**12,2**	**14,5**	**14,9**	**17,9**	**155,5**	**209,0**	**82,1**	**207,9**	**287,8**	**171,5**	**165**
Madagascar	5,3	8,1	9,2	13,3	48,1	45,1	61,4	127,6	114,6	60,7	89
Mozambique*	–	–	–	0,8	104	153,0	18,2	77,1	165,9	97,3	34,9
Namibia (a)	–	–	–	2,2	3,5	–	–	–	–	–	–
Tanzania	–	–	–	–	–	10,9	2,5	3,2	7,3	13,5	41,4
Zimbabwe	6,9	6,4	5,6	1,6	–	–	–	–	–	–	–

(e) estimate; (a) graphite flakes; nd = no data available at the time of publication
* *Syrah Resources had to declare force majeure at Balama in 2024 due political unrest in Mozambique*
Source(s): Energy Institute, World Mining Data, Economic Survey Tanzania, Ministry of Economy and Finance of Mozambique, Chamber of Mines of Namibia, USGS

Beyond Mozambique, Tanzania, Madagascar, and Malawi host large, high-quality flake graphite deposits with significant development potential. Northern Mozambique and southern Tanzania, in particular, remain under-exploited relative to their geological prospectivity, while Malawi is emerging as a new province alongside developments such as the giant Kasiya project, better known for rutile but illustrative of the region's broader mineral endowment. Despite this resource base, Africa remains primarily a supplier of raw or minimally processed graphite, exporting most material to China (around 50%), followed by Europe, India, and the United States[146].

Africa's strategic opportunity lies in downstream graphite processing, as battery manufacturers seek to diversify supply chains away from China. With no viable and sustainably substitutes for graphite in battery anodes at scale, and continued demand from electric vehicles and energy storage, graphite stands out as one of the clearest cases where Africa can play a decisive role in reshaping global critical-mineral markets—provided investment, infrastructure, and industrial policy are aligned to support downstream integration.

For instance, Mozambique's Balama mine—the world's largest known natural graphite reserve—has been instrumental in establishing Syrah Resources as the leading producer of natural graphite and active anode material outside China. Balama's output is processed at the Vidalia Active Anode Material Facility in Louisiana[147], which commenced production in 2024, demonstrating Africa's potential role in alternative battery supply chains.

[138] *African Development Bank (November 2025). Critical Minerals Insight – Graphite*
[139] *An average electric vehicle contains around 60 kilograms of graphite anode material. See International Energy Agency (June 2025). Global Critical Minerals Outlook 2025*
[140] *idem*
[141] *idem*
[142] *idem*
[143] *https://www.northerngraphite.com/graphite-pricing/*
[144] *International Energy Agency (June 2025). Global Critical Minerals Outlook 2025*
[145] *USGS*
[146] *African Development Bank (November 2025). Critical Minerals Insight – Graphite*
[147] *https://www.syrahresources.com.au/our-business/vidalia-active-anode-material-facility*

Phosphates: A Strategic Mineral at the Intersection of Food, Industry and Energy Transition

Phosphates are first and foremost a food-security mineral, underpinning fertiliser production and agricultural yields. Yet Africa remains structurally exposed to global price shocks despite holding the world's largest phosphate reserves. China's fertiliser export restrictions since 2021 pushed up international prices (see price chart), revealing how pricing power and supply discipline are exercised largely outside the continent, even as African countries remain net fertiliser importers[148, 149].

Phosphate rock prices (2014-2025), $/mt

Source: World Bank

Yet, Africa has all the core components—reserves, energy, ports, and industrial hubs—to build resilient fertiliser supply chains. The recent shock has therefore accelerated policy efforts to expand domestic production, deepen processing, and reduce exposure to external supply-chain decisions, particularly as food-security pressures intensify under climate and demographic stress.

Africa's phosphate endowment is unmatched. The continent holds close to 60% of global phosphate rock reserves, yet contributes only around 20% of global supply[150], pointing to a substantial gap between geological potential and realised production. Output has remained broadly stable over the past decade and is heavily concentrated in North Africa, with Morocco accounting for roughly two-thirds of African production (see data table).

PHOSPHATE ROCKS

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**42 026**	**39 394**	**40 554,6**	**47 581,5**	**48 236,4**	**50 302,4**	**51 674**	**53 860,5**	**46 403,2**	**44 102,6**	**46 700**
Algeria	1 418	1 288,9	1 274,1	1 112,0	1 204,1	1 338,4	1 205,5	1 811,8	1 804,8	1 907,9	2 000
Egypt	5 378	4 100	4 300	4 800	5 000	5 000	4 800	5 000	5 000	5 000	5 000
Morocco	27 389	26 264	26 928	32 842	34 315	35 277	37 442	38 122	30 457	28 675	30 000
Senegal	942,9	1 242,8	1 781,0	1 550,7	1 829,0	1 910,0	1 820,5	1 888,5	1 904,1	2 027,7	1 961
South Africa	2 011,2	1 852,3	1 696,5	2 079,3	2 058,1	1 825,7	1 807,2	1 725,8	1 985,5	1 744	nd
Tanzania	nd	222,8	23,7	1,4	–	–	28,4	24,5	26,6	31,7	29,8
Togo	1 086	1 150	850	733	931	704	1 321	1 456	1 541,8	1 517,5	nd
Tunisia	3 784	3 240	3 663,7	4 422	2 802,5	4 108,3	3 144,0	3 726,4	3 563	3 093,1	3 274,9
Others	16,9	33,1	37,7	41,2	96,7	139,0	105,5	105,6	120,5	105,7	nd

(e) estimate; nd = no data available at the time of publication
* *Others include Burkina Faso, Malawi, Mali and Zimbabwe*
Source(s): ONS, USGS, Haut Commisariat au Plant (HCP), DPEE Senegal, Department of Minerals South Africa, Economic Survey of Tanzania, INSEED Togo, INS Tunisia, EITI

PHOSPHATES (P_2O_5 CONTENT)

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**13 315,6**	**12 477,2**	**12 645,9**	**14 890,3**	**15 070,3**	**15 562,6**	**16 063,5**	**16 546,4**	**14 631,5**	**13 928,3**	**14 545**
Algeria	482,1	438,2	433,2	378,1	409,4	409,4	455,1	409,9	616	671,5	680
Egypt	1 401	993,8	741,2	1 022	1 000	979,6	885,1	898,4	1 084,9	1 100	1 100
Morocco	8 764,5	8 404,5	8 617	10 509,4	10 980,8	11 288,6	11 981,4	12 199	9 746,2	9 176	9 700
Senegal	309,8	589,1	886,5	841	775,4	855,9	684,3	792,8	860	940,1	942
South Africa	703,9	648,3	593,8	727,8	720,4	639	650,6	621,3	714,8	628	nd
Tanzania	162,4	49	5,2	0,4	0,7	5,1	6,2	5,4	5,9	7	6,3
Togo	394,6	418,1	306,6	266,3	370,8	260,3	488,9	538,9	570,5	561,5	nd
Tunisia	1 097,4	936,2	1 062,4	1 145,3	812,8	1 124,7	911,8	1 080,7	1 033,3	844,2	920

(e) estimate; nd = no data available at the time of publication
Source(s): World Mining Data, staff calculations

Algeria, Tunisia and Egypt form the second tier of producers, while South Africa, Senegal and Togo operate medium-scale supply centres. Smaller volumes are also produced in Tanzania and Zimbabwe, highlighting the geographic breadth—but uneven scale—of African phosphate activity.

[148] *China accounts for over 45% of global fertiliser supply.*
[149] *African Development Bank (November 2025). Critical Minerals Insight – Phosphate*
[150] *Staff calculations based on USGS data for 2204*

PHOSPHORIC ACID

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**5 798,8**	**5 762,5**	**6 406,7**	**7 405,9**	**7 688,6**	**8 270,2**	**8 879,8**	**9 106,2**	**8 267,1**	**8 055**	**9 300**
Egypt	72	30	50	60	90	60	450	450	450	nd	nd
Morocco	4 400	4 484	4 929	5 709	6 066	6 718	7 123	7 141	6 292	6 163	7 399
purified acid	–	117	90	119	127	114	126	122	136	76	173
Senegal	198,1	263,2	431,1	468	518	560,1	500,8	557,3	562,1	543,2	523
Tunisia (54%)	618,7	475,5	599,1	600,2	435,1	436	393	534,9	533	510,8	395,9
South Africa	510	392,8	307,5	449,7	452,5	382	287	301	294	308,0	355

(e) estimate; nd = no data available at the time of publication
Source(s): USGS, Haut Commisariat au Plant (HCP), DPEE Senegal, INS Tunisia, Foskor

Morocco stands apart as a global benchmark for integrated phosphate development. Its phosphate sector is structured around a complete infrastructure ecosystem: large-scale mines connected by rail to washing and beneficiation facilities, feeding into port-anchored industrial complexes at Safi and Jorf Lasfar. These hubs support the production of phosphoric and purified acids at scale and position Morocco not only as a global exporter, but also as the primary supplier of phosphate and fertiliser products to sub-Saharan Africa, underpinning growing intra-African trade. This leadership will be further consolidated with the commissioning of the Mzinda Phosphate Hub, expected in 2026, which will add 3 million tonnes per year of phosphoric acid capacity.

DERIVATIVES & COMPOUNDS

'000 tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Morocco -*solid fertilizers*											
Triple superphosphate (TSP)	nd	913	1 079	1 149	1 162	1 256	1 165	1 224	1 278	1 892	nd
Monoammonium phosphate (MAP)	nd	1 137	2 189	2 275	2 500	3 359	3 464	3 542	2 309	3 407	nd
Compounds (NPK)	nd	560	782	1 225	974	864	838	1 171	733	678	nd
Diammonium phosphate (DAP)	nd	1 778	2 025	2 592	3 182	3 164	4 220	3 457	4 464	3 772	nd
Dicalcium phosphate (DCP)	–	–	–	–	37	43	55	85	57	58	nd
Monocalcium phosphate (MCP)	–	–	–	–	110	98	116	134	83	90	nd
Senegal – *solid fertilizers*	83,7	108	98,2	200	148,9	162,21	200,94	166,95	86,6	146,4	166,76
Tunisia -*hyperphosphate*	7,6	5,8	11,4	11,6	1,6	8,9	11,3	8,3	17,4	10	0,2
South Africa -*granulation*	307	297	198	324	357	266	238	264	197	256	281

nd = no data available at the time of publication
Source(s): Haut Commisariat au Plant (HCP), INS Tunisia, USGS, Foskor

Beyond Morocco, a gradual but meaningful shift toward downstream beneficiation is taking place. Integrated mining-to-processing operations are now established in Morocco, Senegal and South Africa, and phosphoric acid output across the continent has increased steadily over 2014–2024. Morocco surpassed 7 million tonnes of phosphoric acid production in 2024, while Senegal more than doubled output over the same period, rising from roughly 200,000 tonnes in 2014 to over 500,000 tonnes today (see data table). These gains illustrate the decisive role played by enabling infrastructure—railways, ports, and industrial zones in particular—in scaling phosphate transformation.

Looking ahead, Africa's phosphate strategy faces two parallel priorities. The first is expanding supply to better align the continent's dominant resource base with its own fertiliser needs and reduce structural dependence on prices fluctuations. The second is diversifying beneficiation pathways beyond conventional fertilisers. Phosphates are increasingly relevant to new industrial uses, notably lithium iron phosphate (LFP) batteries for stationary energy storage and entry-level electric vehicles, as well as climate-aligned agricultural inputs. Morocco's recent moves into battery-related phosphate applications—illustrated by the commissioning of COBCO's facilities at Jorf Lasfar in early 2025[151]—demonstrate how phosphate ecosystems can evolve toward future-facing value chains without undermining their core role in food security.

[151] *https://cobco.ma/battery-materials-and-solutions-provider-cobco-takes-a-major-step-forward-with-the-commissioning-of-its-first-batch-of-pcam-nmc-production-lines-in-morocco/*

PRECIOUS METALS

Gold is a Strategic Anchor, Macro Stabiliser, and Formalisation Frontier

Gold has reasserted itself as a strategic asset in the global economy. The recent rally has been driven primarily by investment demand (see price chart), underpinned by heightened geopolitical tensions and macroeconomic uncertainty[152]. Unlike previous gold price spikes—such as in 1979–80—this cycle has not been triggered by extreme inflation or energy shocks. Its defining feature has instead been the unprecedented scale of central bank purchases, which have more than doubled since 2022 compared with the 2015–19 average[153], reinforcing gold's role as a reserve asset and macro-financial hedge. While African central bank holdings have grown more modestly, they have still increased by over 130 tonnes since 2014, led by purchasing programmes in Egypt, Libya, Ghana, Tanzania, Zimbabwe and Mauritius (see data table).

Gold prices (2014-2025), $/troy oz

Source: World Bank

[152] *World Bank (October 2025). Commodity Markets Outlook*
[153] *idem*

GOLD (PRIMARY SOURCES)

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**601,5**	**635,1**	**683,8**	**733,1**	**726,4**	**689,9**	**710,3**	**728,2**	**733,1**	**724,4**	**746**
Burkina Faso	36,7	36,6	38,5	46,5	52,7	50,6	62,4	67,1	58,2	57,3	61
Congo, D.R.	23,6	31,8	30,2	31,5	36,2	33,1	30,9	31,7	28,3	34,6	27,6
Côte d'Ivoire	18,6	23,5	25,1	25,4	24,5	32,6	38,5	41,9	47,9	50,5	54
Egypt	11,7	13,7	17,1	17	14,7	14,9	14,1	12,9	13,7	14	nd
Eritrea	0,8	0,8	0,3	2,6	3,8	2,4	3	2,1	3,2	2,6	nd
Ethiopia	10,3	9,4	8,6	5,4	3,5	2,8	7,5	9,6	5,9	3,5	nd
Gabon	1,1	1,5	1	0,6	0,1	0,1	0,1	1,1	1,1	1,3	nd
Ghana	144,1	116,3	136,6	135,8	158,9	150,3	131,7	90,9	121	132,1	163,7
Guinea	23,5	21,5	29,2	46,8	25,8	27,7	91,8	102	86,2	78,2	72,7
Liberia	0,6	0,8	4,7	6,1	7,3	5,1	4,4	7,9	11,7	13,6	nd
Mali	45,8	46,5	46,9	49,6	60,9	71,2	71,2	69,5	72,2	72,6	60,8
Mauritania	9,6	8,8	7,1	9,1	9,2	13,6	14,1	6,6	17,7	20,1	20,4
Mozambique	0,2	0,2	0,2	0,2	0,5	0,4	0,5	0,8	1,3	1,7	1,6
Namibia	2,2	6,4	7,1	7,8	6,6	7	6,7	7,6	7,4	9,8	10,1
Niger	0,7	1,2	1	0,9	6,2	5,2	2,4	4	4,6	2,5	nd
Nigeria	0,05	0,02	0,03	0,08	0,03	0,04	1,5	2	3	2,6	2,7
Rwanda	0,2	0,8	2	2	2,2	2	2	2	2	2	nd
Senegal	6	5,2	6,1	6,6	11,8	12,5	12,2	15,8	15	12,9	11,1
South Africa	151,6	144,5	142,2	137,3	117,1	105,2	95,8	104,8	89,6	96,6	90
Sudan	73,3	82,4	93	107,3	93,6	57,7	35,7	49,7	41,8	23,2	nd
Tanzania		43,3	45,2	43,5	39,3	48,4	55,8	59,4	56,9	54,8	61,7
Togo	20,6	15,6	14,5	20	10	8,2	3,6	3,6	3,6	3,6	nd
Zambia	4,8	4,2	4,5	4,6	6,4	9,4	3,6	3,6	3,5	2,2	3,1
Zimbabwe	15,4	20,2	22,7	26,5	35,1	29,4	20,9	31,5	37,3	32,1	38,5
Others	3,2	3,4	3,3	6,6	8	6,6	4,8	5,6	6,1	4,3	nd

(e) estimate; nd = no data available at the time of publication
** Others include Algeria, Benin, Botswana, Burundi, Cameroon, Central African Rep., Congo Rep., Eswatini, Kenya, Madagascar, Morocco, Sierra Leone and Uganda*
Source(s): CNS Burkina Faso, CTCPM Mines RDC, DPPSE-CI, USGS, World Mining Data, Ghana Minerals Commission, Ministry of Mines and Geology of Guinea, INSTAT Mali, Ministry of Economic & Finance of Mozambique, Chamber of Mines of Namibia, EITI, DPEE Senegal, Department of Minerals South Africa, Tanzania Economic Survey, Ministry of Mines and Minerals Development of Zambia, ZIMSTAT

African producers have been well positioned to benefit from a higher price environment. Gold remains one of the continent's most widespread and economically accessible minerals, requiring comparatively lower upfront capital, simpler metallurgy, and limited bulk transport infrastructure. This makes it particularly well suited to landlocked and frontier jurisdictions. It also explains why gold exploration dominates new mineral discoveries in Africa[154], and why production has continued to expand across much of the continent despite localised setbacks (see data table)[155].

GOLD (SECONDARY SOURCES)

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa	**742,3**	**769,6**	**859,5**	**899,9**	**938,1**	**947,0**	**932,0**	**993,2**	**999,6**	**997,1**	**1 010,3**
Botswana	1,0	0,8	0,8	0,9	1,1	0,9	0,9	0,6	0,4	0,3	0,0
Burkina Faso	62,2	54,6	57,0	74,6	78,0	83,7	92,1	103,0	96,4	98,0	94,4
Congo, D.R.	35,9	42,7	45,4	49,6	62,9	60,4	52,4	49,1	44,5	45,4	42,3
Côte d'Ivoire	19,4	22,2	23,6	25,7	24,1	32,5	38,0	41,9	48,3	51,2	58,0
Ghana	106,3	95,4	131,4	133,3	149,1	142,4	130,1	124,7	137,2	130,6	140,6
Guinea	32,1	41,0	45,6	46,8	50,8	57,6	56,9	65,0	63,5	63,3	68,0
Liberia	10,0	10,5	14,4	13,7	19,7	18,6	18,8	20,5	21,3	19,9	20,3
Madagascar	11,1	11,7	13,5	13,3	14,0	14,5	13,8	15,5	15,5	15,9	16,2
Mali	60,4	71,5	82,6	75,1	89,7	98,5	93,9	100,7	101,6	103,4	100,0
Mauritania	10,0	9,1	8,1	10,1	10,7	15,1	15,6	8,1	19,3	21,8	21,9
Niger	8,7	10,9	8,7	12,7	10,7	14,5	24,5	34,5	34,5	33,4	33,6
Senegal	8,6	8,7	10,2	11,6	16,5	17,3	15,9	20,2	19,7	17,1	15,3
South Africa	168,6	157,0	155,0	147,3	126,1	113,2	102,5	113,6	98,6	105,7	98,9
Sudan	60,9	67,8	77,5	88,0	76,7	78,0	81,8	85,1	80,1	72,5	73,8
Tanzania	51,8	53,2	55,3	54,6	46,3	46,5	48,4	49,6	50,7	51,7	51,8
Zimbabwe	23,2	25,5	26,5	34,5	51,9	44,4	40,9	46,4	49,4	45,3	50,9
Other	73,2	87,9	104,7	109,1	110,7	109,9	106,7	115,4	119,2	121,9	124,4

Source(s): World Gold Council (WCG)

High prices have amplified long-standing structural challenges, particularly informality and smuggling in artisanal and small-scale mining (ASM). Elevated prices increase incentives for informal production and cross-border leakage, eroding fiscal revenues and undermining macroeconomic management. The scale of the challenge is significant. Swissaid estimates that 435 tonnes of gold were smuggled out of Africa in 2022, worth around US$31 billion at the time—likely far more today given higher prices[156]. Formalising ASM therefore represents one of the continent's largest and most immediate opportunities for domestic resource mobilisation.

To illustrate the magnitude of informality in Africa's gold sector, this Compendium draws on two complementary data sources. The first relies on reported production figures from national authorities and primary public disclosures (see data table 1). The second is based on estimates from the World Gold Council, which infer production using international trade data and gold import declarations by destination markets (see data table 2). The divergence between these datasets – some 265 tonnes in 2024 – provides a useful proxy for the scale of unrecorded production and leakage across the continent.

At the same time, a quiet but important shift toward formalisation and value capture is underway. From having only a handful of gold refineries in 2012, Africa has now built refineries across more than 14 countries, including in states with limited domestic production. Refining capacity is increasingly critical to ensure that central bank purchasing programmes rely on formally refined gold, rather than unrefined artisanal output—which can expand money supply, weaken the effectiveness of monetary policy, and introduce valuation and certification risks[157].

In parallel, several countries—particularly in East Africa (Tanzania, Kenya)—are investing in small-scale, mercury-free processing plants that aggregate ASM production, improve recoveries, enhance traceability, and create regulatory "pinch points" for oversight.

[154] *World Bank (May 2025). Mineral Resources of Africa*
[155] *While South Africa still holds Africa's largest gold reserves, output continues to decline as mines age, deepen, and face rising costs. Mali has also experienced recent production disruptions linked to disputes with large mining operators.*
[156] *https://www.swissaid.ch/en/media/press-release-gold-study-2024/*
[157] *https://www.imf.org/-/media/files/publications/cr/2024/english/1ginea2024001.pdf*

Ghana provides the clearest illustration of what coordinated formalisation can achieve. The establishment of the Ghana Gold Board (GoldBod) in 2025 as the sole buyer and assayer of gold has streamlined gold trading, increased official purchases from small-scale miners, raised incomes for vulnerable populations, and significantly curtailed smuggling.

The macroeconomic impact has been tangible: Ghana has become the largest holder of gold reserves in sub-Saharan Africa (see data table), lifted international reserves above US$10 billion, and recorded one of the strongest currency performances globally in 2024–25[158]. Crucially, this outcome has not been driven by punitive enforcement, but by institutional reform, price transparency, and the integration of ASM into the formal economy.

GOLD HOLDINGS

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Africa	**604,91**	**608,42**	**608,71**	**609,65**	**612,92**	**615,68**	**617,73**	**618,44**	**663,31**	**711,36**	**713,72**	**738,46**
Algeria	173,644	173,644	173,644	173,644	173,644	173,556	173,556	173,556	173,556	173,556	173,556	173,556
Libya	116,637	116,637	116,637	116,637	116,637	116,637	116,637	116,637	116,637	146,652	146,652	146,652
Egypt	75,612	75,612	75,581	76,440	78,382	79,310	80,227	80,909	125,629	126,297	126,882	128,816
South Africa	125,191	125,222	125,253	125,315	125,315	125,315	125,346	125,346	125,377	125,408	125,439	125,470
Ghana	8,740	8,740	8,740	8,740	8,740	8,740	8,740	8,740	8,740	19,504	30,530	37,060
West African Economic and Monetary Union (WAEMU)	36,484	36,522	36,522	36,522	36,522	36,522	36,522	36,522	36,522	36,522	36,522	36,522
Benin												
Burkina Faso												
Côte-d'Ivoire												
Guinea-Bissau												
Mali												
Niger												
Senegal												
Togo												
Morocco	22,064	22,091	22,098	22,105	22,115	22,115	22,115	22,115	22,115	22,115	22,115	22,115
Nigeria	21,368	21,368	21,368	21,368	21,368	21,368	21,368	21,380	21,380	21,380	21,380	21,440
Tanzania										nd	nd	15,370
Mauritius	7,896	8,882	12,429	12,437	12,437	12,439	12,435	12,435	12,426	12,416	12,416	12,416
Guinea	0,221	2,392	0,221	0,221	1,532	3,891	4,174	4,174	4,174	10,293	nd	nd
Tunisia	6,781	6,781	6,781	6,781	6,781	6,781	6,843	6,843	6,843	6,843	6,843	6,843
Bank Central Africa States (BEAC)	4,746	4,746	4,746	4,746	4,746	4,746	4,746	4,746	4,746	4,746	4,746	4,746
Cameroon												
Central African Rep.												
Chad												
Congo, Rep.												
Gabon												
Equatorial Guinea												
Mozambique	5,449	4,983	4,363	4,364	4,370	3,934	3,935	3,935	3,937	3,937	3,937	3,937
Zimbabwe	0,013	0,482	0,013	0,013	0,013	0,013	0,024	0,035	0,169	0,627	2,666	3,476
Burundi	0,030	0,030	0,030	0,030	0,030	0,030	0,030	0,030	0,030	0,030	nd	nd
Comoros	0,018	0,018	0,018	0,018	0,018	0,018	0,018	0,018	0,018	0,018	0,018	0,018
Kenya	0,019	0,019	0,019	0,019	0,019	0,019	0,019	0,017	0,017	0,017	0,017	0,017
Cabo Verde	–	–	–	–	–	–	0,995	0,995	0,995	0,995	–	–
Ethiopia	–	0,249	0,249	0,249	0,249	0,249	–	–	–	–	–	nd

Source(s): IMF IFS, Respective Central Banks, World Gold Council

[158] *https://www.bloomberg.com/news/articles/2025-12-31/ghs-usd-gold-spurs-ghana-s-cedi-to-first-annual-gain-since-at-least-1994*

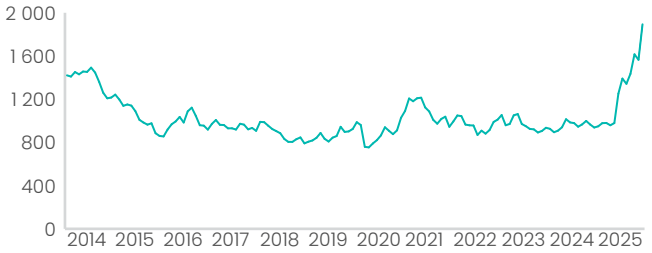
Platinum Group Metals (PGMs): Africa's Strategic Dominance in a Tightening Global Market

Platinum group elements (PGEs) remain among Africa's most strategically important mineral endowments. The continent holds over 75% of global PGM resources[159], concentrated overwhelmingly in South Africa's Bushveld Complex and Zimbabwe's Great Dyke, making Africa the undisputed centre of gravity for global PGM supply. Together, South Africa and Zimbabwe account for more than 80% of global platinum production and rank as the second- and third-largest producers of palladium globally[160], after Russia.

PGMs are valued for their exceptional catalytic properties, corrosion resistance, chemical inertness, and high melting points. These characteristics underpin their widespread use across advanced industrial applications. Automotive catalytic converters remain the dominant end-use, accounting for roughly 60–65% of total PGM demand[161], followed by jewellery, chemical processing, electronics, petroleum refining, and investment demand. While the gradual penetration of electric vehicles is softening long-term growth in autocatalyst demand, this has been partly offset by tighter emissions standards, substitution effects within the PGM basket, and steady demand from industrial and chemical applications[162].

From a market perspective, platinum prices have strengthened into late 2025 amid persistent supply tightness. While demand growth is expected to remain moderate—particularly as EV adoption advances—global supply continues to lag[163]. Mining output is recovering only slowly from recent lows (see data table), with incremental gains expected from South Africa and from recycling in the automotive and jewellery sectors[164]. Even so, supply is projected to remain structurally constrained relative to demand, supporting elevated prices over the medium term (see price chart).

Platinum prices (2014-2025), $/troy oz



Source: World Bank

PGMS

Kg	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**214 760**	**291 361**	**294 408**	**291 220**	**300 518**	**296 536**	**257 602**	**315 538**	**284 045**	**292 036**	**289 000**
South Africa	188 444	275 515	263 653	262 756	270 646	268 172	226 468	284 993	250 246	253 037	nd
Platinum	93 991	139 125	133 241	132 500	137 053	132 989	111 993	141 626	124 401	124 870	nd
Palladium	58 410	82 691	76 273	80 713	80 629	80 684	66 264	84 336	73 104	74 918	nd
Rhodium	12 916	18 722	19 237	18 665	18 608	19 545	16 972	20 875	18 687	18 549	nd
Iridium	nd	nd	nd	6 057	6 357	6 464	6 186	7 007	6 160	nd	nd
Ruthenium	nd	nd	nd	24 821	27 999	28 386	25 053	31 152	27 894	nd	nd
Zimbabwe	26 316	15 846	30 755	28 464	29 872	28 364	31 134	30 545	33 799	38 999	38 640
Platinum	12 483	12 563	15 110	14 257	14 703	13 860	15 010	14 732	16 461	19 180	18 911
Palladium	10 380	10	12 222	11 822	12 094	11 639	12 890	12 620	13 935	15 856	15 603
Rhodium	1 140	1 128	1 322	1 283	1 334	1 224	1 368	1 333	1 462	1 672	1 704
Iridium	851	720	927	nd	586	850	840	610	600	960	810
Ruthenium	1 462	1 425	1 174	1 102	1 155	791	1 026	1 250	1 341	1 331	1 612

(e) estimate; nd = no data available at the time of publication
Sources: Department of Minerals South Africa, World Mining Data, ZIMSTAT

159 *Estimate based on USGS data for 2024.*
160 *idem*
161 *African Development Bank (November 2025). Critical Minerals Insight – Platinum Group Elements (PGEs)*
162 *World Bank (October 2025). Commodity Markets Outlook*
163 *idem*
164 *idem*

Africa's PGM production model is distinctive for its high level of vertical integration. Major producers operate integrated mine-to-refinery value chains, generating not only refined platinum, palladium, and rhodium, but also a range of valuable by-products[165]. PGM operations routinely co-produce gold, as well as chrome, copper, nickel, and cobalt, enhancing overall project economics and resilience across commodity cycles. Smelters and refineries operated by leading producers in South Africa process both domestic and Zimbabwean matte, reinforcing a deeply interconnected regional value chain—although final refining capacity remains concentrated almost exclusively in South Africa (see data table).

PGMS (REFINED)

Kg	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
South Africa*	217 000	294 000	296 000	302 000	296 000	289 000	234 000	332 000	279 000	nd	nd
incl. platinum	109 883	151 156	150 300	154 941	156 300	146 300	117 500	163 400	139 800	nd	nd

nd = no data available at the time of publication
** South Africa also refines PGMs from Zimbabwe*
Source: USGS

However, the sector is not without risk. South Africa's operating environment remains the system's key vulnerability, with power reliability and cost pressures constraining smelting and refining capacity. Given the region's central role in global PGM supply, sustained underinvestment in power and infrastructure poses not only a national challenge, but a global one. Addressing these bottlenecks is therefore critical—not just to stabilise PGM output, but to preserve Africa's position as the backbone of one of the world's most strategically important mineral markets.

[165] *https://www.dmre.gov.za/LinkClick.aspx?fileticket=sQbqBs-kg2Y%3D&portalid=0*

Silver: Dual-purpose Metal at the Intersection of Safe-haven Demand and the Energy Transition

Silver prices reached new record highs at the end of 2025, supported by its unique dual role as both a monetary hedge and an increasingly important industrial input (see price chart). Like gold, the recent rally was initially driven by heightened geopolitical tensions, macroeconomic uncertainty, and renewed investor interest through silver-backed ETFs, reinforced by low inventories at the London Metal Exchange (LME)[166].

Silver prices (2014-2025), $/troy oz

Source: World Bank

Unlike gold, however, silver's demand profile is now structurally anchored in industrial use. Industrial applications accounted for nearly 60% of global silver demand in recent years, up from around 40% in 2015[167], reflecting the metal's growing role in fast-expanding sectors such as solar photovoltaics, semiconductors, electronics, and electrification. In the near term, manufacturing activity and continued installation of photovoltaic panels are expected to underpin demand, while ongoing economic and geopolitical uncertainty continues to support investment demand alongside industrial consumption[168].

This cycle is benefiting a broad set of African producers, although often indirectly. Morocco and Eritrea stand out as Africa's largest primary silver producers, while most of the continent's silver output is generated as a by-product of copper and gold mining in countries such as Botswana, South Africa, Tanzania, or Zambia (see data table). This by-product nature is both a strength and a constraint: it provides exposure to silver price upside without dedicated silver mining investment, but it also makes supply relatively inelastic and complicates production tracking.

[166] *World Bank (October 2025). Commodity Markets Outlook*
[167] *idem*
[168] *idem*

As a result, silver production data in Africa remains fragmented and subject to uncertainty. By-product output is not always consistently reported, and discrepancies can arise between national statistics and international estimates. To provide transparency and context, this Compendium therefore presents two complementary datasets for silver production: one based on national and publicly available sources (see data table 1), and another drawn from The Silver Institute, which relies on trade data and global market intelligence (see data table 2). Together, they help frame the scale, direction, and limits of Africa's silver production within a tightening and increasingly strategic global market.

SILVER (PRIMARY SOURCES)

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**337,3**	**356,9**	**330,4**	**338,0**	**278,4**	**339**	**323,2**	**331,1**	**335,8**	**386,5**	**355**
Botswana*	22,3	2,8	–	–	–	–	–	10,4	31,2	43	35,4
Burkina Faso	–	2,4	5,7	5,5	6,2	5,7	10	8,9	7,3	7,9	9,3
Congo, D.R.	6,5	2,4	0,8	3.376	3,4	3,4	3,4	3,4	3,4	3,4	nd
Eritrea	47,4	38,9	13,2	1,2	31,0	44,8	65,3	68,6	49,9	48,5	53,2
Ghana	4	4	3,1	4	4	4	3	1	1	6	7,6
Mali	2,5	2,6	2,6	2,9	2,8	3	3	3	3	3	nd
Morocco	186	231	222	239	154	190	165	167	159	201	179
Namibia	1,1	0,9	4,7	6,5	3,9	7,8	7,5	5,8	5,2	5	7,5
South Africa	49,2	51,9	55,6	62,5	46,5	55,9	38,1	37,1	45,7	41,9	nd
Tanzania	14,5	15,6	18,0	10,9	12	12,6	13,2	9,3	13,6	14,5	3,1
Zambia	–	–	–	–	9,3	7,2	9	9	9	7	nd
Others*	3,8	4,4	4,7	5,5	5,3	4,6	5,7	7,5	7,6	5,3	nd

(e) estimate; nd = no data available at the time of publication
** Botswana's silver production growth is attributed to the resumption of activities at the Khoemacau copper and silver mine; **Others include Algeria, Côte d'Ivoire, Ethiopia, Niger, Nigeria, Senegal, Sudan and Zimbabwe*
Source(s): Statistics Botswana, ITIE-BF, World Mining Data, USGS, Haut Commissariat au Plan (HCP), Managem, Aya Gold & Silver Department of Minerals South Africa, Zijin Mining Group, Tanzania Economic Survey, BGS

SILVER (SECONDARY SOURCES)

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**480**	**550**	**542**	**540**	**423**	**474**	**438**	**465**	**514**	**558**	**575**
Morocco	244	281	311	319	243	284	249	248	271	277	266
Botswana	26	4	4	0	0	0	0	20	51	77	95
Eritrea	53	98	98	79	54	50	72	75	55	66	83
South Africa	55	58	60	68	51	62	39	41	52	55	44
Others	102	109	69	74	75	78	78	81	85	83	87

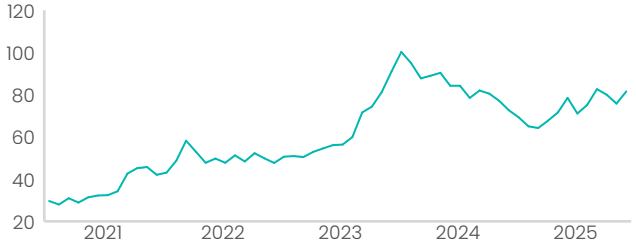
(e) estimate
** Others include D.R. Congo, Zambia, Burkina Faso, Tanzania, Zimbabwe, Mali, Ghana, among others*
Source: World Silver Survey, The Silver Institute

MINERAL FUELS

Uranium: Re-emerging Supply Amidst Renewed Nuclear Ambitions

Uranium is once again a strategic energy commodity. Nuclear power is regaining momentum globally as countries seek reliable baseload generation, energy security, and low-carbon power sources. In 2023, uranium prices reached a 15-year high of $80 per tonne[169] and have remained elevated since (see price chart). Against this backdrop, Africa occupies a meaningful position, holding around 21% of global uranium reserves and accounting for roughly 17% of current global supply[170]. This endowment places the continent among the few regions capable of responding to renewed demand growth as uranium markets tighten.

Uranium spot prices (2014-2025), $/t



Source: World Bank

Africa's uranium industry has historically been anchored by a small number of producers. Namibia has been a pillar of global uranium supply for decades and remains the continent's most stable – and growing – producer (see data table). Niger was once a leading supplier, but output has declined sharply following end of operations at Akouta in 2021, followed by political changes and disputes with long-standing partners since 2023. South Africa's uranium output has historically been produced largely as a by-product of gold mining, rather than through dedicated primary uranium operations[171].

URANIUM (OXIDES)

Tonnes	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Africa (e)	**8 933**	**8 117**	**8 011**	**8 734**	**9 656**	**9 604**	**9 504**	**9 185**	**8 825**	**9 845**	**9 859**
Malawi	369	–	–	–	–	–	–	–	–	–	–
Namibia	3 839	3 473	4 082	4 981	6 514	6 458	6 382	6 784	6 617	8 238	8 647
Niger	4 057	4 116	3 479	3 449	2 911	2 983	2 991	2 248	2 020	1 332	962
South Africa*	668	528	450	304	231	163	131	153	188	275	250

(e) estimate
** Uranium is currently produced from Vaal River operations by processing the reef material from the Moab Khotsong (gold) mine.*
Source(s): World Nuclear Association, Chamber of Mines of Namibia, Department of Minerals South Africa

After a prolonged downturn, Africa's uranium sector is now showing early signs of recovery. Improved market conditions have enabled the return of several idled assets. In Namibia, the Langer Heinrich mine resumed production in 2024 after being suspended since 2018[172], reaffirming the country's role as Africa's uranium anchor. Malawi followed in August 2025, when production restarted at the Kayelekera Uranium Mine after nearly a decade of inactivity[173]. In Niger, development is advancing at the Dasa project, currently the biggest greenfield uranium mine under development in Africa[174], signalling the potential for a broader recovery beyond restarts of legacy operations. These developments point to a gradual rebuilding of African uranium supply capacity in the short- and medium-terms.

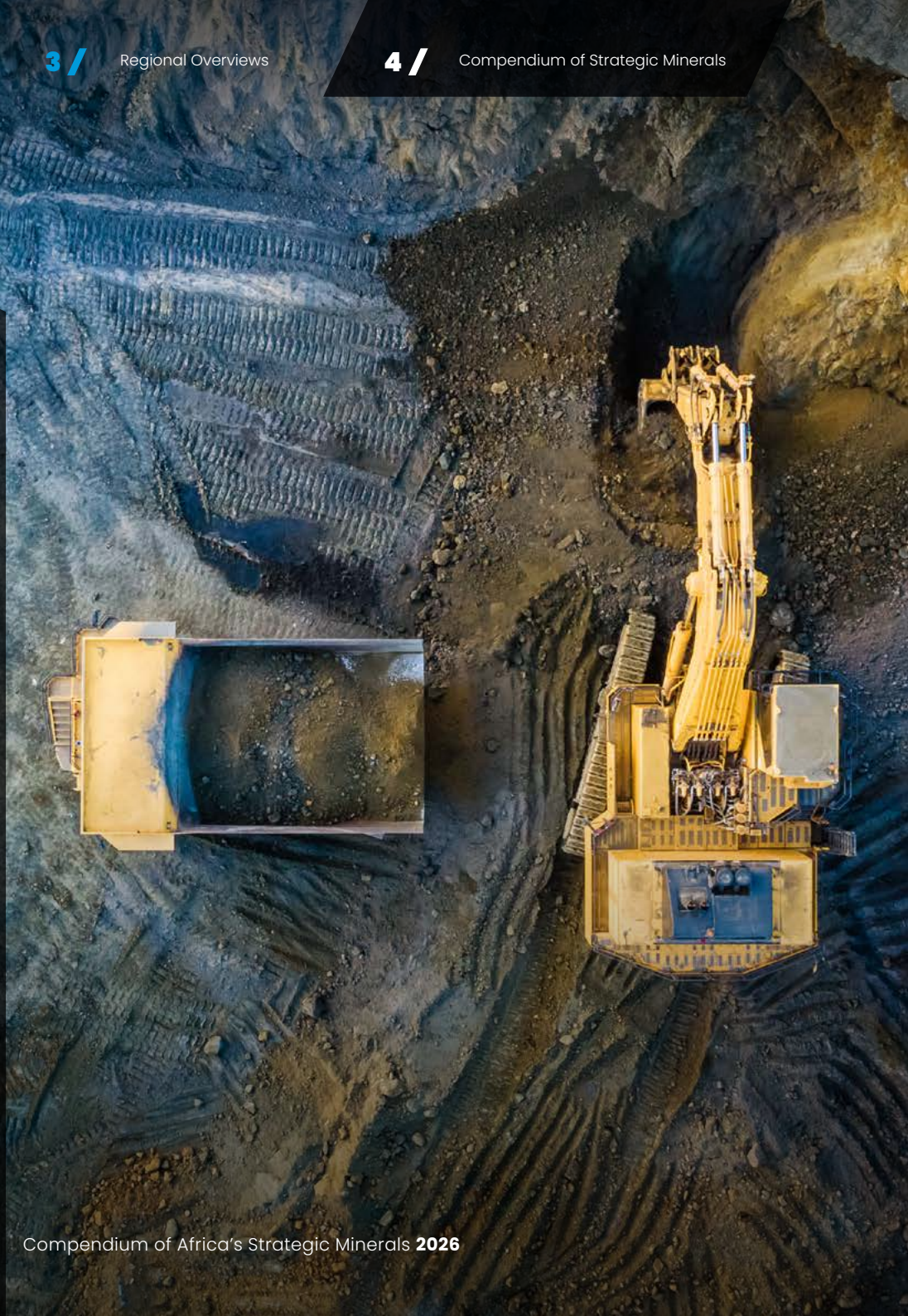
169 *https://www.bloomberg.com/news/articles/2023-11-21/uranium-exceeds-80-as-tighter-market-draws-attracts-speculators?embedded-checkout=true*
170 *https://www.oecd-nea.org/jcms/pl_103179/uranium-2024-resources-production-and-demand*
171 *idem*
172 *https://www.paladinenergy.com.au/wp-content/uploads/2025/08/61200829.pdf*
173 *https://lotusresources.com.au/projects/kayelekera-overview*
174 *https://globalatomiccorp.com/Operations/Uranium/Dasa-Project/default.aspx*

New entrants are also beginning to reshape the regional outlook. Tanzania is emerging as a future uranium producer through the development of the Mkuju River Project. In 2025, a Rosatom-affiliated company commissioned a pilot uranium processing facility with a broader view to develop a full-scale plant with a planned capacity of up to 3,000 tonnes of uranium per year[175]. Together with Namibia and Malawi, Tanzania could form the nucleus of a new phase of uranium supply growth on the continent.

At the same time, uranium mining and nuclear power development remain structurally disconnected in Africa. South Africa remains the only country operating a nuclear power plant, with decades of experience at Koeberg and ongoing discussions around capacity expansion. Elsewhere, nuclear ambitions are accelerating: Egypt's El Dabaa nuclear power plant is set to add 4,800 MW to the grid, while Ghana, Kenya, Uganda, and Rwanda are laying the institutional and regulatory foundations for future nuclear programmes[176]. Yet even with domestic uranium resources, African countries would continue to rely on overseas enrichment services to produce nuclear fuel.

Africa's dependence reflects a broader structural constraint around uranium enrichment. Uranium enrichment is one of the most concentrated segments of the global nuclear fuel cycle. Russia currently supplies around 44% of global uranium enrichment services with other facilities located in China or France[177]. Africa has no enrichment capacity of its own, meaning that value addition beyond mining remains offshore regardless of domestic resource endowments.

Small Modular Reactors (SMRs) are often cited as a potential solution for African power systems due to their lower capital intensity and modular deployment. SMRs typically have capacities below 300 MWe and are designed to support grid stability and incremental expansion. However, most SMR designs still rely on low-enriched uranium fuel, and many next-generation reactors require high-assay low-enriched uranium (HALEU), enriched between 5% and 20% uranium-235[178]. At present, only Russia, the United States, and China have the infrastructure to produce HALEU at scale, reinforcing Africa's reliance on external suppliers even under advanced reactor scenarios.



[175] *https://rosatom.ru/en/press-centre/news/marking-a-milestone-in-the-development-of-tanzania-s-strategic-uranium-reserves/*
[176] *https://www.nuclearbusiness-platform.com/media/insights/africa-uranium-momentum*
[177] *https://www.energy.gov/ne/articles/uranium-enrichment-explained*
[178] *https://www.iaea.org/bulletin/fuelling-the-future-building-fuel-supply-chains-for-smrs-and-advanced-reactors*

Appendix 1: Review of Africa's Minerals Endowment and Minerals Exploration Trends

Any assessment of Africa's mineral wealth must begin with a clear acknowledgement of uncertainty. Knowledge of the continent's mineral endowment remains largely inferential, derived from incomplete and uneven geological mapping—much of it decades old—supplemented by episodic exploration and fragmented data collection. Large areas of the continent remain poorly mapped by modern geological, geophysical, and geochemical standards. As a result, commonly cited figures are likely to understate Africa's true mineral potential.

This structural deficit in geological knowledge carries material economic consequences. Limited, outdated, or inaccessible data constrains sustained exploration investment, delays the identification of commercially viable deposits, and weakens the ability of countries to capture the full economic benefits associated with rising global demand for minerals. It also inhibits the shift from raw material exports towards domestic processing, beneficiation, participation in higher-value mineral value chains.

Against this backdrop, this chapter provides a structured and pragmatic overview of Africa's known mineral endowments, based on the best information currently available. It does not seek to offer a definitive global inventory, but rather to synthesise existing evidence in a form relevant for strategic planning, investment assessment, and industrial development.

The analysis draws on recent authoritative literature, including the 2024 Agence Française de Développement report "*Le potentiel minier de l'Afrique: Panorama, enjeux et défis*"; the World Bank's May 2025 report "*Mineral Resources of Africa*", notably its use of the MinEx database; and the African Development Bank's November 2025 paper *"A Dozen Critical Minerals for Africa's Inclusive Growth and Development"*. Together, these publications provide a robust analytical baseline on resource endowment, development relevance, and structural constraints, while stopping short of being exhaustive.

Structural Under-Exploration Despite High Discovery Potential

Africa remains significantly under-explored relative to its geological potential and landmass, despite consistently strong discovery rates. The continent's share of global mineral exploration spending declined from around 16–17% in 2014 to approximately 10% in 2024[179]. Over the past decade, annual non-ferrous exploration budgets in Africa have averaged between US$1.0 and US$1.38 billion per year[180]. By comparison, both Australia and Canada each recorded non-ferrous exploration budgets roughly twice that level each in 2024 alone[181].

This pattern reflects a structural under-allocation of global exploration capital to Africa. First, because the continent accounts for approximately 22% of the world's landmass (excluding Antarctica) and hosts some of the most prospective and under-explored geological terrains. Second, the decline in exploration spending contrasts sharply with Africa's strong exploration outcomes. Between 2013 and 2023, Africa accounted for around 20% of global Tier 1 discoveries and 14% of Tier 2 discoveries[182].

This divergence points to a persistent efficiency gap: Africa generates a disproportionately high share of world-class discoveries relative to the exploration capital it attracts.

Beyond constrained exploration budgets, Africa faces a structural shortfall in modern, high-resolution geoscientific data. While parts of the continent have benefited from successive waves of geological work, overall coverage remains uneven and, in many areas, well below the standards observed in more mature mining jurisdictions.

Airborne magnetic surveys currently cover at least 75% of the African continent, providing a first-order dataset[183]. Coverage is materially lower for airborne radiometric data (gamma-ray spectroscopy), which remains incomplete across several regions. Ground-based gravity data are more limited still, with approximately 200,000 measurements across the continent[184]. Satellite-based datasets partially mitigate these limitations, but effectiveness declines sharply in the Sahel and densely forested regions.

[179] *Gracelin Baskaran (May 2025). "Underexplored and Undervalued: Addressing Africa's Mineral Exploration Gap." Center for Strategic & International Studies (CSIS) Commentary using S&P Global Capital IQ database. https://www.csis.org/analysis/underexplored-and-undervalued-addressing-africas-mineral-exploration-gap*

[180] *Pietro Guj, Richards Schodde, Boubacar Bocoum and James Cust (May 2025). "Mineral Resources of Africa." World Bank Group.*

[181] *S&P Global. "World Exploration Trends 2024." https://www.spglobal.com/market-intelligence/en/news-insights/research/world-exploration-trends-2024*

[182] *Pietro Guj, Richards Schodde, Boubacar Bocoum and James Cust (May 2025). "Mineral Resources of Africa." World Bank Group.*

[183] *idem*

[184] *If these measurements had been collected on a regular grid – which is far from the case – they would correspond to an average spacing of roughly 40 kilometres, a resolution insufficient for modern exploration targeting. See Pietro Guj, Richards Schodde, Boubacar Bocoum and James Cust (May 2025). "Mineral Resources of Africa." World Bank Group. Estimates rely on exploration expenditure data extracted from S&P Global Market Intelligence and MinEx Consulting's estimates*

Africa as a Cost-competitive Exploration Frontier

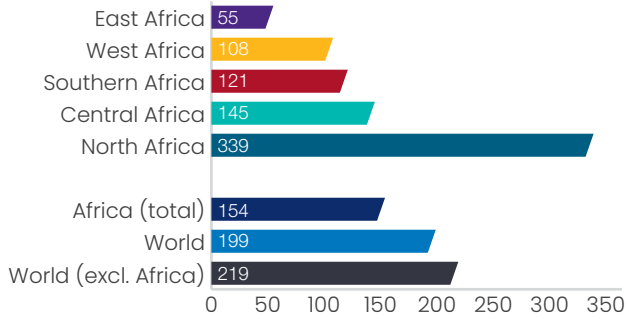
Despite constrained exploration budgets, Africa consistently delivers some of the highest exploration returns globally when measured by discovery cost efficiency. The average cost of making a significant mineral discovery in Africa is estimated at approximately 70% of the global average—around US$154 million compared with US$ 219 million for the rest of the world[185].

Cost competitiveness is especially pronounced in certain regions and commodities. East and West Africa exhibit favourable cost profiles, reflecting a combination of high geological prospectivity and relatively underexplored terrains. At the commodity level, Africa stands out sharply in:

- Iron ore, where the average discovery cost is estimated at US$55 million in Africa, compared with about US$ 893 million in the rest of the world;
- Gold, where discovery costs average US$ 76 million in Africa versus US$ 232m globally.

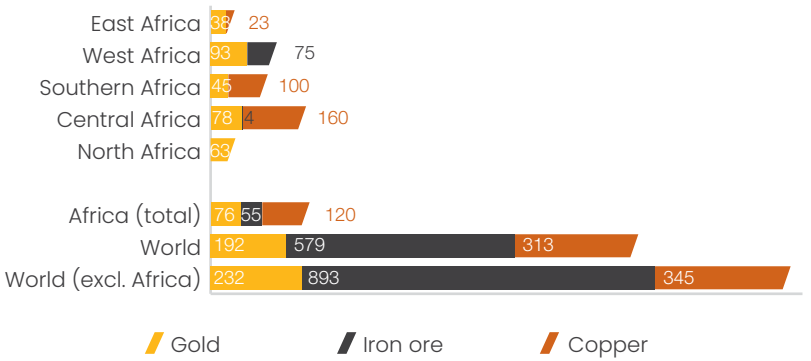
These patterns reinforce a central paradox of Africa's mining sector: high discovery efficiency despite structural underinvestment. They suggest that improved data coverage, sustained exploration spending, and supportive policy frameworks could yield materially higher discovery rates at globally competitive costs.

Figure: Africa Delivers the Highest Discovery Value per Dollar Spent
Average cost per discovery for all commodities, US$m (2014-23)



Source: World Bank (May 2025). Mineral Resources of Africa. Calculations based on exploration expenditure data extracted from S&P Global Market Intelligence and MinEx Consulting's estimates.

Figure: At the commodity level, gold and iron ore exploration is particularly competitive
Average cost per discovery for gold, iron ore and copper, US$m (2014-23)



Source: World Bank (May 2025). Mineral Resources of Africa. Calculations based on exploration expenditure data extracted from S&P Global Market Intelligence and MinEx Consulting's estimates.

Sustaining World-Class Discoveries Through Modern Exploration

Africa continues to deliver world-class mineral discoveries within established mining jurisdictions and well-known geological provinces. Recent examples include the Platreef platinum-group metals deposit in South Africa's Bushveld Complex, the Kamoa-Kakula copper–cobalt system in the Democratic Republic of Congo, and the Mingomba copper deposit in Zambia's Copperbelt. These discoveries reaffirm both the exceptional quality of Africa's mineral endowment and the continued relevance of mature provinces when explored effectively.

At the same time, the economics of mineral discovery are becoming more challenging. Most near-surface and easily identifiable deposits in established provinces have already been found. Future discoveries increasingly depend on deeper, more complex, and less obvious targets, raising the technical and financial threshold for successful exploration.

Sustaining discovery rates therefore requires a step-change in exploration capability. Modern exploration relies on advanced geochemical sampling and analysis, deeper-penetration airborne and down-hole geophysics, and the integration of large, multi-layered datasets using advanced processing and visualisation techniques. In leading mining jurisdictions, these approaches are supported by strong, well-funded geological survey institutions that provide high-quality, publicly accessible geoscientific baselines.

[185] *idem*

In Africa, geoscientific information exists but is often outdated, fragmented, and difficult to access. Public geological mapping is generally available only at coarse scales, while higher-resolution datasets vary widely in quality and coverage. Even where detailed data exist, they are rarely harmonised—sometimes not even within the same country—limiting their usefulness for systematic exploration targeting.

Data fragmentation is further reinforced by institutional silos. Geoscientific information is dispersed across multiple holders with limited coordination or data-sharing mechanisms, including:

- Ministries of Mines and national geological survey agencies, which often make data available only for purchase;
- Former colonial geological survey repositories, where ownership has historically been contested, despite recent progress in repatriating legacy datasets[186];
- Mining companies and geological consultancies holding permit-scale datasets restricted to specific licences, with a few exceptions[187];
- Academic and research institutions, where data is often embedded in scientific publications rather than consolidated datasets[188].

Crucially, modern geological mapping must extend far beyond traditional lithological maps. Effective geological surveys establish the lithological, stratigraphic, tectonic, and metallogenic frameworks that underpin exploration and investment decisions. This requires the systematic acquisition and integration of geophysical datasets—including magnetic, radiometric, gravity, seismic, and electromagnetic surveys—as well as geochemical sampling, conducted both on the ground and through airborne platforms. Without these complementary datasets, exploration risks remain elevated and capital deployment becomes less efficient.

As a result, Africa's current geoscientific data landscape remains misaligned with its ambition to attract sustained exploration investment and unlock the next generation of discoveries. While the continent's geological potential is well established, the absence of modern, harmonised, and easily accessible geoscientific foundations continues to constrain exploration intensity. Addressing this gap—through renewed investment in geological surveys and open data platforms—represents one of the most direct levers for translating Africa's proven prospectivity into future discoveries and long-term economic value.

Geoscientific Data Must Evolve

Modern mineral exploration is no longer driven by chance discoveries at surface, but by the systematic integration and interpretation of large volumes of geoscientific data. Future exploration success will depend on the quality, accessibility, and interoperability of geoscientific databases, and increasingly on the ability to deploy advanced data analytics, artificial intelligence (AI), and machine learning (ML) techniques across them.

Information systems and document management should therefore become a strategic pillar of Africa's exploration competitiveness. Developing data-rich geographic information systems (GIS) and making them accessible through modern geoportals is no longer a technical add-on, but a prerequisite for attracting exploration capital and de-risking investment. In this respect, some African geological surveys have already made meaningful progress.

Advanced geological and mineral information systems are now operational in a growing number of African countries. Publicly accessible geoportals hosting various levels of geological, geophysical, and mineral data exist, for example, in Burkina Faso, Cameroon, Ethiopia, Kenya, Namibia, Tanzania, and Tunisia. Several other jurisdictions are actively digitising historical datasets and upgrading their GIS platforms, reflecting a growing recognition of the strategic value of accessible geoscientific information.

However, progress remains uneven and constrained by structural bottlenecks. The digitisation and harmonisation of geoscientific data is a lengthy and resource-intensive process, often hampered by limited funding. It typically involves locating, retrieving, and digitising legacy data held across multiple repositories highlighted above—each using different formats, standards, and classification systems. In many cases, insufficient geodata infrastructure further limits the ability to ingest, integrate, and maintain these datasets within a unified system.

As a result, Africa's current geoscientific databases are generally not yet comprehensive or standardised enough to support large-scale deployment of AI and ML applications[189]. Effective use of these technologies requires consistent metadata, harmonised legends, machine-readable formats, and spatial interoperability—conditions that remain only partially met in most jurisdictions. Strengthening cooperation between geological surveys, universities, and research institutions will be essential to build domestic expertise in geospatial data science, AI, and ML.

At the same time, new digital tools offer an opportunity to leapfrog traditional constraints. For both geological surveys and exploration companies, the use of large language models and automated data-processing tools can significantly accelerate data cleaning, standardisation, and document management, improving overall data quality and enabling more systematic application of ML-based exploration methodologies (See Case Study Appendix 3).

[186] *In 2019 for instance, BRGM donated its lithology collection on Madagascar back to the country.*
[187] *SEMS Exploration notably provides several geological maps of West Africa*
[188] *See for instance Sorbonne University, Stanford University or Princeton University*
[189] *Pietro Guj, Richards Schodde, Boubacar Bocoum and James Cust (May 2025). "Mineral Resources of Africa." World Bank Group.*

These opportunities are particularly compelling given Africa's rapidly expanding digital ecosystems and technology hubs. Across the continent, vibrant tech communities remain under-utilised in the mining and geoscience space. In more mature mining jurisdictions, open and searchable geoscientific data has enabled the emergence of specialised start-ups applying AI to mineral exploration, such as GoldSpot Discoveries Corporation in Canada and Earth AI Pty Ltd in Australia. These companies provide AI-driven targeting and decision-support services to exploration firms. A similar ecosystem could emerge in Africa, provided that high-quality geoscientific data is made accessible and machine-readable.

Governance and transparency models for spatial data management can be replicated for geological mapping data. South Africa's Spatial Dimensions and its Lanfolio portal already offer updated, digitised and detailed mining cadastres on Angola, Botswana, Cameroon, D.R.C., Ethiopia, Guinea, Kenya, Liberia, Malawi, Mauritania, Mozambique, Namibia, Senegal, South Sudan, Tanzania, Togo, Uganda and Zambia—with Côte d'Ivoire added in September 2025[190]. It demonstrates how harmonised, publicly accessible spatial data platforms can be established at scale. A comparable approach for geoscientific data would materially improve transparency, reduce entry barriers for explorers, and support regional integration of exploration efforts.

Encouragingly, new models of cooperation between governments, financiers, and the geoscientific community are beginning to emerge. South Africa has taken a first step in this direction through the Junior Mining Exploration Fund (JMEF), established in partnership between the Council for Geoscience, the Industrial Development Corporation (IDC), and the Department of Mineral Resources[191].

Such initiatives are particularly relevant as they replicate financing models that have already demonstrated strong economic returns in mature mining jurisdictions. In Australia, the Exploration Incentive Scheme (EIS) co-funds up to 50% of eligible exploration data collection costs, including early-stage drilling in frontier greenfield areas and for deeper concealed targets. An independent review of the scheme over its first six years found that every AUD 1 m invested generated approximately AUD 23.7 m in benefits to the state economy[192].

Together, these examples illustrate how targeted public co-funding of exploration can materially de-risk early-stage projects, crowd in private capital, and accelerate the generation of high-quality geoscientific data. Replicating and scaling such models across Africa would directly support junior explorers—who account for the majority of exploration activity on the continent—while strengthening national geological knowledge and improving the overall efficiency of mineral discovery.

[190] *https://fr.apanews.net/governance/cote-divoire-lancement-du-portail-e-cadastre-minier/*

[191] *The fund's first funding window of ZAR 160m (US$ 9.6m) closed in July 2024 and supported eight junior exploration projects focused on minerals such as copper, nickel, graphite, lithium, and rare earths. Several of these projects have already progressed to geophysical data acquisition and target definition,. A second funding window of ZAR 240 m (US$ 14.5m) has since been launched at the end of 2025, with an expanded list of eligible minerals including tin, tungsten, uranium, gold, antimony, arsenic, and fluorspar. The fund is managed by the IDC and issues non-repayable grants, convertible to equity upon discovery of a viable ore body.*

[192] *ACIL Allen Consulting 2015, Exploration Incentive Scheme Economic Impact Study: Geological Survey of Western Australia, 78p.*

Appendix 2: Case Study: Artificial Intelligence in Geological Data Processing: Early Lessons from Africa

Artificial intelligence (AI) is rapidly transforming mineral exploration by enabling the integration, processing, and interpretation of vast and heterogeneous geoscientific datasets. In a sector where prospective targets are increasingly deeper, concealed, or structurally complex, AI-driven approaches are becoming a critical complement to traditional geological methods, particularly in data-poor or fragmented environments such as much of Africa.

One of the most prominent examples of AI-assisted exploration is provided by KoBold Metals, a California-based company specialising in data-centric mineral discovery. KoBold has developed an automated geological data integration and analysis platform—known as TerraShed—designed to synthesise large volumes of geoscientific information across multiple scales. Using this approach, KoBold has discovered the Mingomba copper deposit in Zambia, one of the world's highest-grade discoveries estimated at approximately 247 million tonnes at an average grade of 3.64% copper[193].

Importantly, company executives have explained how success depended on the progressive identification, validation, digitisation, and standardisation of geoscientific information sourced from multiple repositories, formats, and vintages before it could be deployed effectively in AI models.

Early applications of similar approaches are now emerging in Africa, led primarily by junior exploration companies. In mid-2024, London-listed Botswana Diamonds launched an AI-enabled geophysical data processing programme, partnering with UK-based firms Planetary AI and International Geoscience Services. The initiative focuses on applying AI and advanced data analytics to reprocess existing geophysical datasets, with the objective of identifying priority targets that may not have been evident through earlier interpretations.

Similar experimentation is underway in North and Southern Africa. Morocco-based Aterian is cooperating with Lithosquare to deploy data science and AI techniques in target generation across projects in both Morocco and Botswana. These initiatives illustrate how AI tools are increasingly being used not only to generate new insights, but also to extract additional value from legacy datasets collected decades earlier.

Taken together, these examples highlight both the promise and the prerequisites of AI-driven mineral exploration. While algorithmic capability is advancing rapidly, the effectiveness of AI applications remains fundamentally dependent on the availability, quality, accessibility, and interoperability of geoscientific data. In data-constrained environments, the principal value of AI lies in its ability to integrate disparate datasets, standardise inconsistent records, and reduce uncertainty at early stages of exploration.

[193] *New York Times (July 2024). "A.I. Helped to Spot a Copper Mining Bonanza in Zambia." https://www.nytimes.com/2024/07/11/climate/kobold-zambia-copper-ai-mining.html*

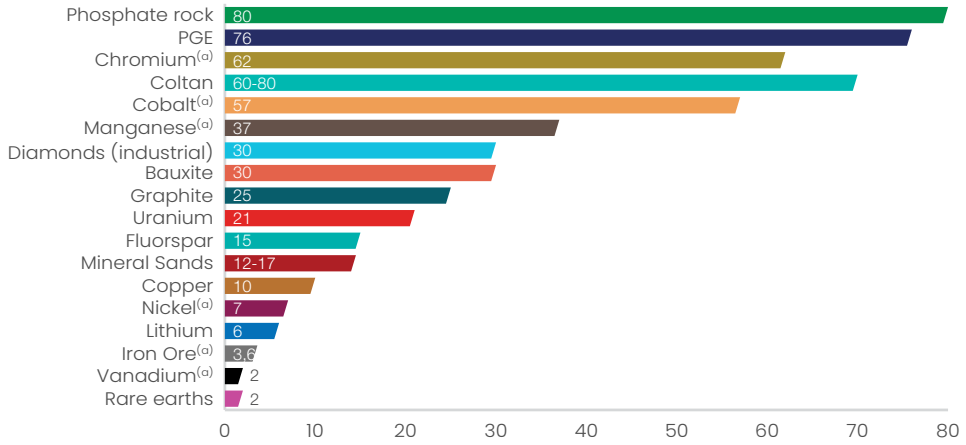
Appendix 3: Data Coverage and Methodological Basis: the MinEx Database

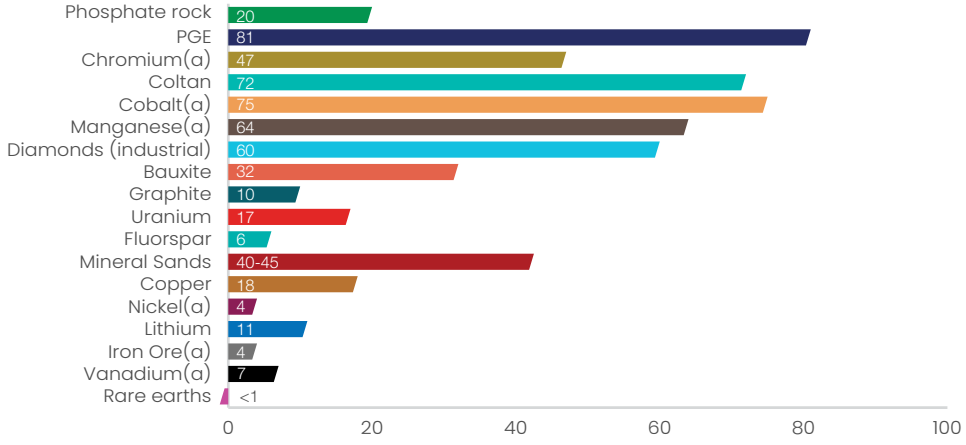
The estimates of Africa's aggregate mine-site values presented in this Compendium draw on the global mineral deposits database compiled by MinEx Consulting, widely regarded as the most comprehensive and systematically curated repository of large and economically significant mineral deposits worldwide. The database currently contains information on 64,414 unique mineral deposits globally, of which 51,301 are classified as "minor" and excluded from this analysis due to limited commercial relevance at scale.

Within this global inventory of significant deposits, Africa accounts for a material share relative to other major regions, reflecting its broad geological endowment. Although comprehensive global regional breakdowns for all deposits by continent are not publicly available from MinEx, broader geological assessments consistently show that Africa holds a large proportion of global mineral reserves and deposits. For example, Africa is estimated to host around 30 % of the world's known mineral reserves, including 40 % of global gold reserves and up to 90 % of platinum-group metal reserves, along with substantial shares of other key commodities[194].

In production terms, Africa contributes a significant proportion of global output across a range of commodities —for instance, historically accounting for substantial shares of world cobalt, manganese, platinum, and diamond production even as its share of modern exploration spending remains below 10% of the global total.

Africa's global share of minerals reserves and production





(a) ferro alloys
Note: share of PGE production relates to platinum only, with shares being even higher for ruthenium (99%) and iridium (97%).
Source: USGS; African Development Bank Group's minerals factsheets; Agence Francaise de Developpement; Nuclear Energy Agency, AFC Research

Taken together, these data affirm that Africa's share of significant known deposits and reserves is comparable to, if not larger than, many other major mining regions on a resource-intensity basis, and that the continent's deposit stock is a major component of the global mineral inventory used to underpin comparative endowment and development analyses.

[194] *Bright Simons, "The 'Strategic Mirage' of Africa's Green Minerals Wealth," ODI, 16 May 2024, https://odi.org/en/insights/the-strategic-mirage-of-africas-green-minerals-wealth/.*

After this filtering, the MinEx database identifies 1,957 significant mineral deposits across Africa, spanning operating mines, closed operations, undeveloped deposits, and projects at pre-feasibility and feasibility stages. For the purposes of this Compendium, AFC further refined the dataset to 1,707 deposits across the defined set of strategic commodities, including bauxite, chromium, cobalt, copper, diamonds, fluorite, gold, graphite, iron ore, lead, lithium, manganese, heavy mineral sands (including rutile and zircon), nickel, niobium, platinum-group elements, phosphates, potash, rare earth elements, silver, soda ash, tantalum, tin, tungsten, uranium, vanadium, and zinc.

This refined dataset provides a consistent and comparable foundation for analysing Africa's mineral endowment at scale. It captures deposits of material relevance to industrialisation, infrastructure development, domestic consumption, and energy systems, while deliberately excluding smaller occurrences unlikely to support large-scale investment or regional value-chain development.

Mine-Site Value Estimates and Interpretation

To facilitate cross-commodity and cross-deposit comparison, the MinEx database estimates an indicative "mine-site value" expressed in US dollars per metric tonne of ore. This measure reflects the combined value of primary and by-product metals contained in the ore, based on average historic prices over the preceding three years (with data for this Compendium updated to October 2025), and adjusted for indicative recovery rates as well as transportation, treatment, and refining charges.

These values represent indicative in-situ estimates at the mine gate and should not be interpreted as project economics. They do not account for capital expenditure, operating costs, royalties, taxation, financing costs, or regulatory and fiscal conditions. Accordingly, they serve as a proxy for geological and metallurgical endowment rather than an assessment of commercial viability.

Of the 1,707 deposits included, 594 are reported with reserve estimates only. For these assets, indicative assumptions have been applied to derive "ballpark" values, reinforcing the need for further drilling, technical studies, and feasibility work to refine resource definitions and reduce uncertainty.

Appendix 4: Data Coverage and Methodological Basis: the Compendium of Africa's Strategic Minerals

The *Compendium of Africa's Strategic Minerals* adopts a pragmatic, multi-source research methodology tailored to a sector characterised by fragmentation, uneven disclosure, and limited statistical standardisation. Rather than relying on a single dataset or institution, the Compendium integrates desk-based research, systematic aggregation of public data, and direct engagement with African stakeholders to develop the most comprehensive and internally consistent picture of mineral development across the continent.

The initial phase focused on the systematic collection and consolidation of publicly available data on mineral production, processing, and trade. Sources were drawn from a broad range of international, regional, and national institutions, including:

- United States Geological Survey (USGS) and British Geological Survey (BGS);
- *World Mining Data*, provided by the Austrian Federal Ministry of Finance (BMF);
- The Energy Institute's *Statistical Review of World Energy*;
- African central banks and national statistical offices;
- Ministerial reports and official government disclosures;
- Extractive Industries Transparency Initiative (EITI) reports;
- Chambers of Mines; and
- International commodity associations, including the World Gold Council, World Nuclear Association, International Manganese Institute, International Chromium Development Association, and the International Copper Association.

Cross-source aggregation revealed material data gaps and methodological inconsistencies across countries and reporting systems. These included differences in units of measurement, methodological approaches, and reference periods; the use of export data as a proxy for production in some cases; discrepancies between calendar-year and fiscal-year reporting; variations between gross ore tonnages and contained metal content; and, in some instances, conflicting figures published by different public agencies within the same country. These inconsistencies reflect structural features and institutional capacity gaps in the sector rather than isolated reporting errors.

To address these limitations, the consolidated datasets were submitted to national authorities and selected mining companies for validation, clarification and supplementation where feasible. Ministries of Mines were engaged to confirm reported figures, harmonise methodological approaches, and help fill identified data gaps. At the time of publication, formal inputs and confirmations had been received from Ghana, Botswana, Burundi, Zimbabwe, Uganda, Sierra Leone, South Africa, and the Democratic Republic of Congo.

The resulting dataset should therefore be interpreted as the product of an iterative and collaborative process rather than a definitive statistical record. The Compendium prioritises transparency, consistency, and comparability over time, recognising that precision and coverage will improve as reporting practices strengthen, institutional capacity deepens, and stakeholder engagement expands.

This first edition is intended to establish a baseline for Africa's strategic minerals resource database. By publishing an initial, structured, documented and openly-sourced dataset, the Compendium seeks to catalyse further engagement from governments, industry participants, and investors, and to progressively enhance both the scope and robustness of future editions.

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