

Value addition, beneficiation, and transition minerals-led industrialisation in Ghana and Nigeria

Michael Addaney

Abstract: *This chapter explores how Ghana and Nigeria can leverage their transition mineral endowments to achieve sustainable industrialisation during the global energy transition. It examines the opportunities and constraints facing resource-based industrialisation (RBI) in both countries, drawing on comparative policy and thematic content analysis of national frameworks. The analysis reveals that despite abundant reserves of bauxite, manganese and lithium, both countries face severe governance deficits, infrastructure gaps and energy constraints. Nigeria demonstrates success in leveraging conditional access to resources to attract foreign direct investment for local processing, while Ghana faces economic viability challenges in domestic refining. The chapter's contribution lies in identifying five strategic priorities if transition minerals are to contribute to meaningful industrialisation in the countries: developing comprehensive transition minerals strategies; strengthening legal and fiscal governance; increasing geoscience funding; investing in clean energy infrastructure; and utilising regional integration through the African Continental Free Trade Area (AfCFTA). These*

interventions are essential to promote responsible business conduct in transition-minerals contexts and to prevent the energy transition from perpetuating resource-curse dynamics and global inequality.

1 Introduction: Setting the context for minerals-led industrialisation

The unprecedented increase in demand for transition minerals is being driven by global commitments to mitigate climate change through the energy transition.¹ The transition away from fossil fuels depends on these minerals, which are necessary building blocks for low-carbon technologies such as solar panels, wind turbines, electric vehicles (EVs) and battery storage systems. Between 30 and 40 per cent of the world's transition mineral reserves are in Africa, making it a strategically important region.² Mineral-rich African countries such as Ghana and Nigeria have a unique opportunity to leverage their mineral wealth, including substantial deposits of lithium, cobalt, manganese and rare earth elements, to drive socio-economic development and resource-based industrialisation (RBI).³

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- 1 A Joseph 'Navigating governance challenges in African transition mineral supply chains' SAIIA Policy Insights 151 May 2024, <https://saiia.org.za/research/navigating-governance-challenges-in-african-critical-mineral-supply-chains/> (accessed 8 January 2026); International Energy Agency (IEA) 'The role of critical minerals in clean energy transitions' (2021) 5, available at <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions> (accessed 8 January 2026).
 - 2 NS Ouedraogo & JMM Kilolo 'Africa's critical minerals can power the global low-carbon transition' (2024) 6 *Progress in Energy* 1-14.
 - 3 P Amoako-Arhen & J Nyame 'Mineral resource potential of Ghana: A review' (2023) 43 *Journal of African Earth Sciences* 215, 220-222; M Farooki *The diversification of the mineral economies: A review of the main issues and options*

In the past, African countries' participation in international mineral supply chains has typically been limited to exporting raw minerals.⁴ As a result, they have been unable to enrich their mineral value chains by fully utilising past commodity booms.⁵ The resulting systemic vulnerability often leaves African economies overly reliant on raw-material exports and highly sensitive to commodity price fluctuations.⁶ Breaking this trend by directing mineral feedstocks into domestic industries is now essential to support comprehensive, sustainable growth.⁷ Reducing reliance on the export of raw materials has long been a goal of continental frameworks. For instance, the African Union (AU) adopted the African Mining Vision (AMV) in 2009 as a framework to encourage policy coherence for the sustainable development of Africa's natural resources, with a focus on industrialisation and local value addition (beneficiation).⁸

in P Haslam & P Heidrich (eds) *The political economy of natural resources and development* (2016) 71-88.

- 4 UNCTAD 'Commodities and Development Report 2023: Critical minerals for the energy transition' (2023) UN publication 45-48, <https://unctad.org/publication/commodities-and-development-report-2023> (accessed 8 January 2026).
- 5 TT Kola 'Mineral beneficiation: A continuing African paradox or a panacea for economic growth and skills development' Master's dissertation, University of Pretoria, 2019; M Farooki & R Kaplinsky *The impact of China on global commodity prices: The global reshaping of the resource sector* (2012) 78-92.
- 6 JD Sachs & AM Warner 'The curse of natural resources' (2001) 45 *European Economic Review* 827; MJ Watts 'Resource curse? Governmentality, oil and power in the Niger Delta, Nigeria' (2004) 15 *Geopolitics* 50.
- 7 L Jentel & D Cloete 'Digging deeper: Embedding minerals sovereignty in Africa's mining value chains' South African (Institute of International Affairs Policy Insights February 2025 161, <https://saiia.org.za/wp-content/uploads/2025/02/PI-161-FP-Jentel-Cloete-CORRECTED-VERSION.pdf> (accessed 25 November 2025).
- 8 African Union Africa Mining Vision (February 2009), https://au.int/sites/default/files/documents/30984-doc-africa_mining_vision_english.pdf (accessed 8 January 2026); see also AU Assembly Decision Assembly/AU/Dec.224(XII) (February 2009); JJ Hinshaw 'A review of the African Mining

The intense geopolitical competition, especially between China and Western powers (the UK, EU and USA), all of which are attempting to diversify their transition-minerals supply chains, is now a defining feature of the growing global demand to secure transition minerals.⁹ This dynamic enables mineral-rich African countries to demand significant investment in regional manufacturing infrastructure and local beneficiation in exchange for access to resources.¹⁰ Despite having transition minerals, Ghana and Nigeria are at a crossroads, facing persistent challenges in governance, infrastructure and implementation.¹¹

This chapter serves three interconnected purposes. First, it provides a comprehensive diagnostic assessment of the current

Vision' (2010) 43 *Journal of Energy and Natural Resources Law* 153; MK Mathe and others 'Africa's potential in processing critical mineral' Proceedings of the 2nd Battery Materials Conference, The South African institute of mining metallurgy, Mbombela, Mpumalanga, 6-7 August 2024, <https://www.saimm.co.za/Conferences/files/battery-materials-2024/Battery%20Materials%202024%20-%20Proceedings%20Book.pdf#:~:text=The%20Arena%2C%20Emnotweni%20Casino%2C%20Mbombela%2C%20Mpumalanga%2C%206%20%E2%80%93%207%20August%202024&text=Africa's%20potential%20in%20processing%20critical%20minerals%20can%20be%20realised> (accessed 8 January 2026).

9 Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) 168/2013, (EU) 2018/858, (EU) 2018/1724); United States Inflation Reduction Act, Pub L No 117-169 (2022); Export Control Law of the Peoples Republic of China, Law 58 of 2020.

10 G Gereffi & K Fernandez-Stark *Global value chain analysis: A primer* (2016) 5-12.

11 African Continental Free Trade Area Agreement, done at Kigali, 21 March 2018 (entered into force 30 May 2019), <https://au.int/en/treaties/agreement-establishing-african-continental-free-trade-area> (accessed 8 January 2026); see T Fessehaie & L Rustomjee's 'Resource-based industrialisation in Southern Africa: Domestic policies, corporate strategies and regional dynamics' (2018) 49 *Development Southern Africa* 616.

state of transition minerals governance and industrialisation efforts in Ghana and Nigeria, identifying both successful initiatives and persistent barriers. Second, it develops an analytical framework grounded in RBI theory and the principles of the AMV to evaluate policy coherence and implementation gaps. Third, and most critically, it generates evidence-based, context-specific recommendations to guide policymakers, industry stakeholders and development partners in formulating strategic interventions that can unlock the industrialisation potential of transition minerals while avoiding the pitfalls of resource curse dynamics. The recommendations emerging from this analysis aim to be actionable, addressing three distinct levels: (1) immediate reforms to legal and fiscal frameworks; (2) medium-term investments in infrastructure and institutional capacity; and (3) long-term strategic positioning within continental frameworks such as the African Continental Free Trade Area (AfCFTA). By anchoring its recommendations in a comparative analysis of what has worked (and failed) in both countries, the chapter provides practical pathways for translating mineral wealth into sustainable industrial development.

The chapter proceeds as follows. Part 2 establishes the theoretical and methodological foundation. Part 3 provides a comprehensive overview of the current landscape, examining Africa's transition-mineral endowment, the economic imperatives for beneficiation, and the persistent structural constraints that have historically undermined value-addition efforts. Part 4 presents detailed country-specific analyses of Ghana (4.1) and Nigeria (4.2), evaluating their distinct mineral endowments, governance frameworks, policy initiatives and implementation challenges, followed by a systematic comparative analysis (4.3) that identifies divergent approaches, convergent constraints and transferable lessons between both countries. The chapter concludes in part 5 by reflecting on the

critical choices facing both countries and the broader implications for African RBI in the context of the global energy transition.

2 Research design, methods and analytical framework

2.1 Theoretical framework: Resource-based industrialisation in the energy transition era

This chapter is anchored in RBI theory, which posits that resource-rich developing countries can achieve structural economic transformation by strategically leveraging their natural resource endowments to develop downstream industries and technological capabilities.¹² The theoretical framework integrates three complementary analytical lenses. First, the AMV framework provides the normative foundation, emphasising mineral linkages (fiscal, backward, forward, knowledge and spatial) as pathways to equitable RBI. The AMV's vision of 'transparent, equitable and optimal exploitation of mineral resources to underpin broad-based sustainable growth and socio-economic development' directly informs the assessment criteria.¹³ Second, institutional economics and governance theory guide the analysis of

12 M Morris & N Fessehaie 'The industrialisation challenge for Africa: Towards a commodities based industrialisation path' (2014) 1 *Journal of African Trade* 1; United Nations Economic Commission for Africa (UNECA) 'Economic Report on Africa 2013: Making the Most of Africa's Commodities: Industrialising for Growth, Jobs and Economic Transformation' (2013, Addis Ababa).

13 African Union Africa Mining Vision (n 9) 6-9; R Kaplinsky & M Morris 'Do the Asian drivers undermine export-oriented industrialisation in SSA?' (2008) 36 *World Development* 254.

how legal frameworks, regulatory institutions and political economy dynamics enable or constrain industrial transformation.¹⁴

This perspective recognises that resource wealth alone is insufficient; effective governance institutions, transparent fiscal regimes and capable regulatory bodies are prerequisites for translating mineral endowments into industrial development. Third, global value chain analysis illuminates how countries position themselves within increasingly complex, geopolitically contested transition-minerals supply chains.¹⁵ This lens examines issues of value capture, technological upgrading, and the strategic choices between exporting raw materials and processing them domestically. These three theoretical lenses converge to form an integrated analytical framework that evaluates: (1) the alignment between national policies and continental frameworks (AMV/AGMS); (2) the effectiveness of governance institutions in implementing industrialisation strategies; and (3) the strategic positioning of Ghana and Nigeria within global transition minerals value chains.¹⁶

14 DC North *Institutions, institutional change and economic performance* (1990) 1-10; D Acemoglu & JA Robinson *Why nations fail: The origins of power, prosperity, and poverty* (2012) 368-395.

15 G Gereffi and others 'The governance of global value chains' (2005) 12 *Review of International Political Economy* 78; G Gereffi 'Global value chains in a post-Washington Consensus world' (2014) 21 *Review of International Political Economy* 9.

16 UNECA & AMDC 'African Minerals Development Centre: Linkages, investment and diversification Harnessing mineral resources for Africa's transformation' (2017, Addis Ababa) 5-12, https://archive.uneca.org/sites/default/files/PublicationFiles/linkages_brochure.pdf (accessed 8 January 2026).

2.2 Research design and methods

Ghana and Nigeria were selected as comparative cases for three strategic reasons. First, both countries possess significant mineral reserves of transition metals (including bauxite, manganese and lithium), positioning them as potential beneficiaries of the energy transition.¹⁷ Second, they represent contrasting governance contexts and policy approaches, enabling identification of divergent pathways and lessons. Third, both countries have articulated industrialisation ambitions tied to mineral processing, thereby providing concrete policy initiatives for evaluation. Methodologically, this chapter employs a qualitative comparative case study design,¹⁸ combining legal and policy analysis with thematic content analysis. The methodology was implemented in three stages, beginning with a comprehensive document review and data collection examining national legal frameworks, policy documents, governance structures, and implementation records from various sources, including government publications and reports from organisations such as UNECA, the Natural Resource Governance Institute and

17 Ghana Geological Survey Authority 'Mineral deposits of Ghana' (2023), <https://www.gsa.gov.gh> (accessed 8 January 2026); T Acheampong and others 'Ghana's extractive sector: Recent trends and outlook' (2024) *OECD Development Centre Policy Brief* 3-6; Adeleke and others (n 4) 108-112; Geological Survey of Nigeria, Mineral Resources Map of Nigeria (2022).

18 RK Ying *Case study research and applications: Design and methods* (2018) 3; see also B Flyvbjerg 'Five misunderstandings about case-study research' (2006) 12 *Qualitative Inquiry* 219; CG Ragin *The comparative method: Moving beyond qualitative and quantitative strategies* (1987) 1-11.

AMDC.¹⁹ The second stage employed thematic content analysis.²⁰ Five key themes emerged: (1) economic viability and value capture of local processing versus exports; (2) governance effectiveness and institutional capacity; (3) infrastructure and energy constraints; (4) policy coherence between national and continental strategies; and (5) implementation track records of industrial transformation efforts. Finally, the third stage comprised a comparative analysis of findings from Ghana and Nigeria to identify patterns of similarity and difference, successful strategies versus ongoing challenges, and context-specific constraints relative to broader lessons,²¹ ultimately supporting the development of both country-specific and overarching recommendations.

2.3 Analytical framework for recommendations

The recommendations developed in this chapter are designed to bridge the gap between policy ambition and implementation reality. Drawing on an analytical framework that combines RBI theory, institutional economics, and the pillars of the AMV, each recommendation addresses specific governance failures, infrastructure constraints, or policy incoherence identified through

19 Ghana Minerals Commission 'Mining Sector Support Programme' (2022); Government of Ghana 'Ghana National Export Development Strategy' 2024-2028 (2024); Federal Ministry of Solid Minerals Development 'Roadmap for the Development of Nigeria's Solid Minerals and Metals Sector' 2016-2025 (2016); Nigerian Minerals and Mining Act, 2007 (as amended).

20 V Braun & V Clarke 'Using thematic analysis in psychology' (2006) 3 *Qualitative Research in Psychology* 77; M Attride-Stirling 'Thematic networks: An analytic tool for qualitative research' (2001) 1 *Qualitative Research* 385.

21 P Collier & A J Venables *Plundered nations? Successes and failures in natural resource extraction* (2011) 33.

thematic analysis.²² The purpose of these recommendations is threefold: (1) to provide actionable guidance for immediate legal and policy reforms; (2) to identify strategic investment priorities that address structural constraints; and (3) to position both countries to leverage regional integration mechanisms. Rather than offering generic best practices, the recommendations are tailored to the specific political economy contexts, institutional capabilities and resource endowments of Ghana and Nigeria, recognising that pathways to minerals-led industrialisation must be context-specific rather than one-size-fits-all.

2.4 Limitations

This analysis is primarily based on policy documents and publicly available data; it does not include primary interviews with government officials or industry stakeholders. The focus on legal and policy frameworks means that informal practices and political economy dynamics are inferred rather than directly observed. Additionally, the rapidly evolving nature of transition minerals markets means that economic viability assessments may shift as technologies mature and market prices fluctuate.

3 The current landscape: Opportunities, constraints and governance deficits

Africa's economic potential in the energy transition is based on its vast mineral endowment.²³ Local beneficiation allows mineral-rich

22 World Bank 'Leveraging Local Content Decisions for Industrial Development: Mining and Oil and Gas' (2020, Washington DC) 25-45.

23 N Mutemeri *Mineral resource governance in Africa: A comparative study*, International Institute for Democracy and Electoral Assistance (2024) 8;

countries to capture significantly higher rents. Currently, battery materials account for only 10 per cent of the supply chain value due to low processing levels.²⁴ This value capture gap underscores the economic imperative for domestic processing.²⁵ For instance, alumina production from bauxite refining is estimated to be 9.4 times more valuable to Ghana than raw bauxite exports.²⁶ As one moves up the value chain, more tax revenue is collected, exposure to commodity price fluctuations decreases, economic diversification is encouraged and long-term job opportunities are created.²⁷ The strategy for achieving value addition places a strong emphasis on strengthening several economic ties between the extractive industry and the broader economy.²⁸

The following figure demonstrates the dramatic disparity in value capture and tax revenue generation across different stages of

African Development Bank Group 'Critical minerals for Africa's inclusive growth and development' (May 2025, Abidjan) 8-15; African Development Bank 'African Economic Outlook 2024' (2024) 89-112.

- 24 KC Barron and others 'Value addition for whom? Challenges to local participation in downstream critical mineral ventures in Zambia (2024) 20 *The Extractive Industries and Society* 101554.
- 25 UNCTAD Commodities and Development Report 2023 (n 5) 52-54.
- 26 African Union 'African Green Minerals Strategy 2025-2040' adopted by AU Assembly Decision Assembly/AU/Dec.1056(XLII) (February 2025). The AGMS identifies five strategic pillars: (1) improving geological knowledge and data; (2) developing human capital and technology; (3) building mineral value chains; (4) ensuring mineral stewardship and governance; and (5) fostering innovation and research; M Muller and others 'Green minerals and the African energy transition' (2025) 65 *Resources Policy* 104.
- 27 T Acheampong & M Tyce 'The politics of creating markets for localisation: Insights from the Ghanaian downstream petroleum sector' (2019) 164 *World Development* 104; Barron & others (n 24) 5-8.
- 28 G Campbell (ed) *Mining in Africa: Regulation and development* (2009) 35-58; AU Commission Agenda 2063: The Africa We Want – Framework Document' (2015) 45-48; African Minerals Development Centre 'Annual Report 2023' (2024) 8-15.

the transition minerals value chain. Using lithium as a representative example, this analysis shows how African countries that export raw minerals capture only a small fraction of the total value created. In contrast, countries with downstream processing capabilities retain significantly higher economic benefits.

Figure 1: Value Distribution Across the Lithium Value Chain

Value Chain Stage	Processing Activity	Added (% of Final Product)	Typical Location	Tax Revenue per Ton (USD)
Stage 1: Mining	Extraction of raw lithium ore (spodumene, lepidolite)	5-10%	Ghana, Nigeria, Zimbabwe, Mali	\$500-800
Stage 2: Concentration	Crushing, grinding, and flotation to produce lithium concentrate (6% Li ₂ O)	10-15%	Australia, Chile, China	\$1,200-1,800
Stage 3: Refining	Chemical processing to produce lithium carbonate or lithium hydroxide (battery grade)	25-35%	China (60%), Chile, Argentina	\$3,500-5,000
Stage 4: Component Manufacturing	Production of cathodes, anodes, electrolytes, and battery cells	50-65%	China (75%), South Korea, Japan	\$8,000-12,000

Stage 5: Battery Pack Assembly	Integration of cells into battery modules and complete EV battery packs	80-90%	China, USA, Europe, South Korea	\$15,000- 20,000
Stage 6: Final Product	Electric vehicle manufacturing and sales	100%	Global (China, USA, Germany, Japan)	\$25,000- 35,000

Value distribution estimates are based on: Benchmark Mineral Intelligence lithium market analysis (2024); UNCTAD Commodities and Development Report (2023); African Development Bank Critical Minerals Study (2025); and Natural Resource Governance Institute analysis of lithium value chains. Tax revenue calculations incorporate typical mining royalties (3-5%), corporate income tax (25-30%), VAT/GST (5-15%), export duties (0-5% for raw materials, waived for processed goods), import duties on equipment and inputs, and employment-related taxes. Figures represent 2024 market conditions for lithium carbonate equivalent (LCE) pricing.

Key Findings: The Cost of Raw Material Exports

VALUE CAPTURE GAP Currently, African mining countries capture only 5-10% of the final product’s value through raw-material exports. This means countries with processing capabilities capture 90-95% of the value.	TAX REVENUE MULTIPLIER Tax revenue increases 30-40x from mining stage (US\$500-800/ton) to final battery manufacturing (US\$25,000-35,000/ton). This multiplier is the economic rationale for beneficiation.
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GEOGRAPHIC CONCENTRATION China controls 60-75% of the global lithium refining and battery manufacturing market. This concentration means African countries have limited bargaining power when exporting raw materials.	OPPORTUNITY COST Ghana and Nigeria forgo approximately US\$20,000 to US\$30,000 per ton in potential tax revenue by exporting raw lithium rather than developing integrated value chains.
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Note: This illustration uses lithium as a representative transition mineral. Similar value chain dynamics apply to other transition minerals, including cobalt, manganese, nickel and rare earth elements.

The forward (downstream) linkages entail transforming minerals into semi-manufactured, manufactured and refined metals for industrial applications, such as feedstocks for steel and aluminium or battery components (cathodes, precursors).²⁹ The backwards (upstream) linkages comprise creating regional supply chains for the commodities and services that mining operations need, such as capital goods, consumables and services. Currently, 80 per cent of Ghana's mining procurement requirements are met through imports.³⁰ Additionally, the knowledge linkages include building

29 N Mutemeri 'Mineral resource governance in Africa: A comparative study' (International Institute for Democracy and Electoral Assistance, 2024) 45-78; Natural Resource Governance Institute '2021 Resource Governance Index results; Africa Regional Report' (2021) 12-25, https://resourcegovernance.org/sites/default/files/documents/2021_resource_governance_index.pdf (accessed 20 January 2026).

30 United Nations Economic Commission for Africa (UNECA) 'Scaling up value creation and local development in the mining sector in Ghana. Addis Ababa, Ethiopia' (Economic Commission for Africa, 2018).

institutional capacity, human resources (including STEM skills), and research and development. These are essential for innovation and technology transfer.³¹ Finally, the spatial and fiscal linkages focus on developing vital infrastructure (power, transportation and water) that benefits the mining industry and the broader economy, as well as on the transparent and efficient collection of resource rents.³²

To effectively utilise these minerals, Ghana and Nigeria must strategically prioritise value chain segments, such as rare-earth refining and battery precursor production. The objective of the African Green Minerals Strategy (AGMS) is to support equitable RBI through mineral value chains.³³ Adopting ethical and sustainable supply chain governance practices is essential to achieving the developmental benefits of transition minerals. However, transition mineral supply chains in Africa are currently beset by a serious lack of accountability and transparency, which undermines the industry's ability to contribute to sustainable development.³⁴ Governance issues and widespread corruption are already linked to the extraction of transition minerals. Through mechanisms such as profit shifting and illicit financial flows, poor governance, corruption and rent-seeking behaviour, revenue from resource extraction within formal channels

31 C Lanzano and others 'Yesterday mineral supplier, tomorrow battery producer: How green industrialisation can push Africa's economies up the global value chains' (The Nordic Africa Institute, Policy Notes, 2024) 2.

32 As above.

33 Through the realisation of all the mineral linkages (fiscal, knowledge, spatial, backwards, forward, etc) to support equitable resource-based industrialisation and sustainable development, Africa can maximise the developmental impacts of extraction, as per the AMV, thanks to the new investments in the mining and processing of green minerals.

34 T Oluwatola 'Developing Nigeria's critical minerals industry to support the global energy transition' (Africa Policy Research Institute, January 2025), <https://afripoli.org/developing-nigerias-critical-minerals-industry-to-support-global-energy-transition> (accessed 8 January 2026).

of the economy is lost, while wealth remains concentrated among elites.³⁵ For example, jurisdictional disputes between the federal and state governments in Nigeria complicate governance and increase investor uncertainty.³⁶ Ghana is also at risk of increased corruption, particularly in the new mineral development licensing process.³⁷ The state's negotiating position is further weakened by inadequate geological data, resulting in less favourable fiscal terms.

Furthermore, industrialisation efforts are hampered by significant bottlenecks. Extraction and processing are severely hampered by low infrastructure stock levels and inadequate maintenance, particularly in water, transportation and power.³⁸ For energy-intensive downstream beneficiation, a steady and dependable power supply is essential; its absence is a significant deterrent to foreign investors. Additionally, Africa frequently relies on foreign direct investment for technology and capital, which can impede value-chain development because high-level research and development and dividends tend to leave the host country. The research and development capacity required for advanced processing and manufacturing is underfunded, and qualified personnel are in short supply.³⁹ Strategic planning is hampered, and investors who rely on reliable data for risk assessment are deterred by the lack of comprehensive geoscience data in Ghana and Nigeria, which is necessary for the precise evaluation of key mineral deposits.

Against this backdrop of continental ambitions constrained by structural realities, the following section examines how Ghana and

35 Jentel & Cloete (n 7).

36 Oluwatola (n 34).

37 Acheampong and others (n 17).

38 African Development Bank Group (n 24).

39 Kola (n 6).

Nigeria, two mineral-rich West African countries with contrasting governance contexts, are navigating the opportunities and challenges of transition minerals-led industrialisation.

4 Case studies: Progress and challenges in Ghana and Nigeria

This section provides country-specific analyses of mineral endowments, policy frameworks, governance effectiveness and implementation track records in both countries. Then it develops a systematic comparative analysis that illuminates divergent strategic approaches, persistent convergent challenges, and actionable lessons for achieving sustainable value addition in the transition minerals sector.

4.1 Ghana's path to beneficiation

Ghana's Integrated Aluminium Industry initiative, pursued intermittently since the 1960s, has repeatedly failed due to energy constraints, funding shortfalls and changing political priorities.⁴⁰ Recent attempts under the Sinohydro barter agreement have stalled, illustrating persistent implementation challenges despite policy commitment.⁴¹ At an estimated 900 million tons (Mt), the country currently possesses the second-largest bauxite reserves in Africa.⁴² With the establishment of the Ghana Integrated Aluminium Development Corporation in 2018 (Act 976),

40 T Acheampong & M Tyce 'Navigating the energy transition and industrial decarbonisation: Ghana's latest bid to develop an integrated bauxite-to-aluminium industry' (2024) 107 *Energy Research and Social Science* 103337.

41 Ghana Geological Survey Authority 'Annual Report 2023' (2024) 12-18.

42 As above.

successive governments have sought to revive the Integrated Aluminium Industry initiative vision.⁴³ To produce 20 Mt of bauxite per year, Ghana Integrated Aluminium Development Corporation's Masterplan calls for establishing four mining concessions, two refineries and two smelters.⁴⁴ It is anticipated that maintaining the entire value chain will result in significant value creation. Although bauxite is normally sold for US\$40 to US\$60 per metric ton (MT), it can fetch over US\$400 per MT when processed into alumina, and over US\$2,000 per MT when smelted into aluminium metal.⁴⁵ An estimated 9.4 times as much value is produced by converting bauxite to alumina alone as by exporting raw bauxite.

Similarly, with the recent flagship Ewoyaa Lithium Project, which is high-purity and low in contaminants, Ghana is also poised to become a producer of lithium.⁴⁶ Atlantic Lithium Limited has raised the mineral resource estimate for Ewoyaa by almost 50 per cent, to 21.3 Mt at 1.31 per cent Li_2O .⁴⁷ The first lithium project with favourable fiscal terms, such as a 10 per cent royalty rate (instead of the usual 5 per cent) and a 13 per cent state equity stake (instead of the usual 10 per cent under legislation), was secured when the government issued

43 K Anyemedu 'The politics of industrialisation in Ghana: The aluminum industry' (1993) 20 *African Review of Political* 2001, Third World Network-Africa 23-35; Acheampong & Tyce (n 40) 71; T Akabzaa & A Darimani 'Impact of mining sector investment in Ghana: A study of the Tarkwa mining region' (Draft report prepared for SAPRI, 2001).

44 Acheampong & Tyce (n 40).

45 T Acheampong 'The energy transition and critical minerals in Ghana: Diversification opportunities and governance challenges' (The Extractive Industries Transparency Initiative EITI, May 2022).

46 Atlantic Lithium Ltd 'Ewoyaa lithium project definitive feasibility study' (October 2023), <https://atlanticlithium.com.au> (accessed 8 January 2026).

47 T Scurfield & DS Adjee 'Refining the strategy: The economics of lithium value addition in Ghana' (Natural Resource (Governance Institute, March 2025).

a 15-year mining permit.⁴⁸ The business must assess the feasibility of a refinery as part of the project. Compared with competitors globally, the ambition to refine its hard-rock (spodumene) lithium concentrates domestically is hindered by challenging economic conditions. Due to cost advantages and concentrated technical know-how, China currently accounts for between 93 and 94 per cent of the world's capacity to convert spodumene concentrate into lithium chemicals.⁴⁹

Based on thorough modelling, the proposed lithium carbonate refinery in Ghana is unlikely to benefit Ghanaians much if it is constructed in the coming years.⁵⁰ The refinery, for example, would incur high operating and capital costs. The modelled refinery only breaks even if it buys Ghana's mined concentrate at below-market prices. Otherwise, it incurs a loss on each metric ton of lithium carbonate produced if it pays the market price for the required spodumene concentrate feedstock. Ghana makes more money exporting unrefined concentrate to China, the top buyer, than refining it domestically in a medium-price scenario. Estimates suggest that over the life of the Ewoyaa mine, the government could lose about US\$500 million in revenue from domestic refining, more than half of Ghana's total mining revenue in 2022.⁵¹ For lithium, experts advise Ghana to take a 'mine-and-monitor' strategy. This strategy entails ensuring that the Ewoyaa mine begins production as soon as possible, while monitoring the dynamic market, technological and geopolitical landscape to assess whether conditions change (for

48 J Bofo, S Dotsey & R Spencer 'Energy transition diplomacy: The EU's pursuit of Africa's critical minerals for renewable energy at whose expense?' (2025) 127 *Energy Research and Social Science* 104213.

49 Scurfield & Adjei (n 47).

50 As above.

51 As above.

example, if a sufficient premium of at least US\$3,000/t emerges for non-Chinese supply).

Furthermore, Ghana has been using its substantial medium-grade manganese reserves at Nsuta in the Western Region since 1916.⁵² Manganese production reached 840 kt (4.2 per cent of global production) in 2023,⁵³ while the country's reserves are estimated to be 13 Mt (0.7 per cent of global reserves).⁵⁴ The Ghana Manganese Company's goal of increasing output was reflected in a 18 per cent increase, from 4.6 Mt in 2018 to 5.4 Mt in 2019.⁵⁵ Manganese dioxide battery raw materials and electrolytic manganese metals used in stainless steel can be produced from the medium-grade Nsuta deposit. By building a manganese dioxide facility domestically, Ghana could increase its value capture, thereby positioning itself to supply Europe's expanding battery market and reducing its reliance on South Africa and China for this material.

The country faces several interrelated obstacles that prevent effective beneficiation, notwithstanding these endowments and

52 Acheampong and others (n 17).

53 According to the AMDC, approximately 65% of world production for manganese originates in Africa. The estimated 2023 production and production shares are as follows: South Africa, 7.2 Mt (36%); Gabon, 4.6 Mt (23%); Ghana, 840 kt (4.2%); Côte d'Ivoire, 390 kt (1.9%). South Africa's reserves stand at 600 Mt (32%), Gabon's at 61 Mt (3.2%), and Ghana's at 13 Mt (0.7%).

54 Acheampong and others (n 17).

55 Ghana Extractive Industry Transparency Initiative (GHEITI)'s latest report shows that manganese production increased from 4.6 million tonnes in 2018 to 5.4 million tonnes in 2019, and bauxite production improved from 1.0 million tonnes in 2018 to 1.1 million tonnes in 2019. The 18% increase in manganese production by the Ghana Manganese Company mirrored the firm's objective of ramping up production. See, Ghana Extractive Industries Transparency Initiative report on mining sector (2021-2022) June 2024, <https://eiti.org/sites/default/files/2021%202022%20GHEITI%20Mining%20Report.pdf?hash=1773745200> (accessed 12 January 2026).

aspirational plans. The competitiveness of regional industries is undermined by the country's ongoing structural flaws, including high energy prices, poor infrastructure and high transaction costs.⁵⁶ Ghana's plans to finance its energy transition and industrial decarbonisation are seriously threatened by its high level of public debt, which stands at 83.60 per cent of GDP.⁵⁷ To reach net-zero energy-related carbon emissions by 2060, the country's National Energy Transition Investment Plan calls for an estimated US\$562 billion in total investment.⁵⁸ Project delays and a slow transition process can result from limited funding.⁵⁹

The historical failure to extract the maximum value from these transition minerals is demonstrated by the disclosed revenue data (2004–2019), which show that bauxite and manganese produced meagre returns compared with gold and oil/gas.⁶⁰ Ghana relies on the current royalty-tax (concession) system rather than having a separate fiscal regime for transition minerals. This system has several rigid components that make it difficult to deliver sufficient value to the state. The regime should be reviewed by policymakers, who may want to change the state's minimum 10 per cent free equity or consider allowing the Minerals Income Investment Fund to own additional paid interest in proven transition mineral deposits.⁶¹ To transport processed goods to markets, port, rail and road infrastructure must

56 UNECA (n 30).

57 NEL Anku 'A critical review and analysis of opportunities and challenges for just transitions in Ghana' (South to South Just Transitions & Climate Strategies, 2024).

58 Ministry of Energy (Ghana) 'National Energy Transition Framework 2022–2070: Abridged Version' (Ministry of Energy, Accra, 2022).

59 Energy Commission of Ghana *Energy outlook for Ghana* (2024) 45–52.

60 Acheampong and others (n 17).

61 Ghana Extractive Industries Transparency Initiative (GHEITI) 'Report on Mining Sector 2021–2022 (June 2024)' 28–35; J Hilson & G Hilson

be developed. For example, latent infrastructure that connects components of the aluminium and bauxite value chain hinders VALCO's ability to operate effectively. In 2016, Ghana's Logistics Performance Index did not compare well with the top performers in Africa and globally.⁶²

In terms of local content and industrial policy, Ghana has implemented a series of strategies to maximise local participation. Still, it has not succeeded in creating broad economic ties commensurate with its mineral wealth. The majority of the country's mining procurement needs are still met through imports, and its mineral output is integrated into global value chains as lower-value crude ores or concentrates, with value addition and job creation occurring abroad.⁶³ The government established specialised state entities, the Ghana Integrated Aluminium Development Corporation and GIISDEC, to concentrate on value chain opportunities for iron ore and aluminium, respectively. The mining sector also lacks understanding of how the energy transition can influence the creation of vital mineral supply chains.⁶⁴

4.2 Nigeria: Leveraging conditional access and diversification

Nigeria possesses strategically important reserves of transition minerals, positioning it as a potential hub for battery and renewable energy manufacturing in West Africa.⁶⁵ The country's geological

⁶² 'Entrepreneurship, poverty and businessification: Youth in contemporary artisanal and small-scale gold mining in Ghana' (2015) 69 *African Affairs* 116.

⁶³ As above.
⁶³ AF Adeleke and others 'Assessment of Nigeria's mineral resources potential for sustainable development' (2022) 15 *Resources Policy* 102, 108-110.

⁶⁴ As above.

⁶⁵ Federal Ministry of Solid Minerals Development, Nigeria Mining Cadastre Portal (2024).

endowment includes significant lithium deposits across multiple states, with exploration indicating reserves capable of supporting large-scale processing operations; rare earth elements in several locations with potential for extraction; and other critical minerals such as tin, columbite and tantalite.⁶⁶ Unlike Ghana's more concentrated mineral geography (bauxite in the Western Region, manganese in the Western/Central regions), Nigeria's transition minerals are distributed across multiple geopolitical zones, presenting both opportunities for regional economic development and challenges for coordinated infrastructure investment.⁶⁷ Nigeria is home to more than 40 distinct types of solid minerals, with an estimated value of mineral deposits exceeding US\$700 billion.⁶⁸ For instance, Nigeria is thought to have the world's fifth-largest lithium reserves.⁶⁹ Similarly, the country is endowed with an estimated cobalt reserve of about 700,000 metric tons as well as other strategic minerals such as copper, manganese, nickel and rare earths.⁷⁰ The country's vital mineral resources offer a huge potential for income generation, both for export and domestic use. Exporting 100,000 tonnes a year, or about 14 per cent of the estimated global supply, could generate over US\$2 billion, given the current high prices for essential minerals like lithium carbonate, which have surpassed US\$20,000 per tonne in recent months.⁷¹ Additionally, estimates

66 As above.

67 As above.

68 A Andreonia & E Avenyo 'Critical minerals and routes to diversification in Africa: Opportunities for diversification into mobile phone technologies – The Case of the Democratic Republic of Congo' Background paper commissioned by the UNCTAD secretariat for the 2023 edition of the Economic Development in Africa Report, August 2023.

69 Geological Survey of Nigeria (n 17).

70 As above.

71 Federal Ministry of Solid Minerals Development (n 65).

from across the continent indicate that Africa could boost its annual exports of processed transition minerals by US\$32 billion by capitalising on opportunities to add value to these minerals.⁷²

The mining industry in Nigeria remains undeveloped despite this enormous endowment. Due to historical neglect after the oil boom, the sector's contribution is low. Only around 0.5 per cent to 0.6 per cent of Nigeria's GDP, or US\$1.40 billion, is contributed by this sector.⁷³ At 0.3 per cent of national employment and 0.02 per cent of exports, it represents a negligible share of both.⁷⁴ Since most mineral resources are exported in raw or semi-processed form, the country's current supply chain capabilities for transition minerals are limited. Nigeria (and Africa in general) realises only about 10 per cent of the end-to-end value of the supply chain for materials such as those used in batteries, due to the failure to pursue beneficiation.⁷⁵ Nigeria's institutional architecture for minerals governance presents a complex landscape of overlapping jurisdictions and evolving regulatory structures. The Nigerian Minerals and Mining Act serves as the primary regulatory instrument, but significant gaps exist, particularly regarding transition minerals.⁷⁶ Multiple agencies hold overlapping responsibilities, including the Ministry of Solid

72 D Olawuyi and others 'Beyond just transition: Advancing responsible and rights-based business practices in the energy and extractives sector' (2025) 10 *Business and Human Rights Journal* 1-10.

73 African Energy Chamber 'Africa's critical minerals and the future of the global energy transition' 12 January 2026, <https://energychamber.org/africas-critical-minerals-and-the-future-of-the-global-energy-transition/> (accessed 20 January 2026).

74 Federal Ministry of Solid Minerals Development (n 65).

75 AMDC (n 53).

76 Nigerian Minerals and Mining Act, 2007 (Cap M12 LFN 2004) secs 1-3, 44-50; Nigerian Minerals and Mining Regulations, 2011; CD Ofoegbu 'Legal and institutional framework for solid minerals development in Nigeria' (2015) 8 *Journal of Humanities and Social Science* 46.

Minerals Development, the Nigerian Geological Survey Agency and state-level mining boards, creating jurisdictional ambiguities.⁷⁷ The federal-state division of mineral rights creates ongoing tensions and legal uncertainties. Additionally, Nigeria faces severe infrastructure deficits that systematically undermine industrialisation ambitions. For instance, despite being Africa's largest oil producer, Nigeria suffers from chronic electricity supply challenges.⁷⁸ Moreover, port capacity, rail networks and road connectivity present bottlenecks. Processing facilities require reliable access to water, which constrains location options.

Despite governance challenges, Nigeria has demonstrated strategic success in leveraging conditional access to resources to attract value-adding investments.⁷⁹ For example, Nigeria's rejection of Tesla's 2022 lithium mining proposal exemplifies its firm stance on requiring local processing commitments. Additionally, the government's establishment of six processing plants across geopolitical zones (Bauchi, Oyo, Kano, Ebonyi, Cross River, Kogi) represents concrete progress.⁸⁰ Similarly, recent announcements of lithium processing facilities with integrated power generation demonstrate investor

77 *Attorney-General of the Federation v Attorney-General of Abia State & 35 Others* (2002) 6 NWLR (Pt 764) 542 (SC); O Olaore 'Revisiting the Nigerian minerals and mining sector: An x-ray of the legal and regulatory framework' (2019) 25 *Annual Survey of International & Comparative Law* 197, 210-215.

78 AA Ibrahim and others 'Infrastructure deficit and industrial development in Nigeria' (2023) 18 *African Development Review* 234.

79 NEITI Nigeria Extractive Industries Transparency Initiative Report 2022 (2023) 35-48.

80 Nigerian Investment Promotion Commission 'FG to build 6 solid minerals processing plants' Press Release (19 February 2022), <https://www.nipc.gov.ng> (accessed 8 January 2026).

confidence.⁸¹ President Tinubu's articulated ambition to make Nigeria 'the solar panel and EV battery manufacturing hub of Africa' provides high-level political commitment.⁸² Furthermore, despite policy ambitions and selective successes, Nigeria confronts deep-seated structural constraints that undermine industrial transformation.⁸³ For instance, corruption risks, regulatory capture and weak enforcement mechanisms persist. There are also jurisdictional conflicts. Federal-state tensions over mineral rights create legal uncertainty that deters long-term investments. This is further undermined by implementation capacity. Announced initiatives often face delays or fail to materialise due to inadequate technical capacity and funding. Market access challenges in Nigeria's complex business environment, including foreign exchange restrictions and import/export procedures, increase transaction costs. Nigeria's approach to the industrialisation of transition minerals demonstrates both instructive successes and cautionary failures. The conditional access strategy represents a more assertive stance than Ghana's and successfully leverages access to resources to demand local value addition. However, this policy ambition is undermined by severe governance deficits, infrastructure constraints and implementation capacity gaps that Ghana has partially addressed through more focused initiatives.

81 Advisors Reports 'Nigeria's second lithium factory takes off in Abuja with \$50M investment' (31 July 2024), <https://advisorsreports.com> (accessed 8 January 2026).

82 'Tinubu welcomes Nigeria's largest lithium plant' *Business Day* 31 July 2024, <https://businessday.ng> (accessed 8 January 2026).

83 Federal Ministry of Solid Minerals Development, Nigeria Mineral Sector Development Roadmap 2024 (2024) 18-25.

4.3 Comparative analysis: Divergent pathways and convergent challenges

4.3.1 *Contrasting approaches to value addition*

Ghana and Nigeria have adopted markedly different strategies for the industrialisation of transition minerals, reflecting distinct political-economy contexts, institutional capacities and policy priorities.⁸⁴ Ghana's approach emphasises partnerships with international corporations and the leveraging of existing mining-sector infrastructure, as evidenced by the Integrated Aluminium Industry initiative and ongoing negotiations over lithium projects. This strategy prioritises feasibility and incremental progress, accepting that some processing stages may not be immediately profitable domestically.⁸⁵ In contrast, Nigeria pursues a more assertive, nationalist stance, exemplified by rejecting Tesla's mining-only proposal and mandating local processing requirements.⁸⁶ Nigeria's approach seeks to maximise value capture through conditional access to resources, even at the risk of deterring some investors. Furthermore, Ghana's minerals governance reflects a more consolidated regulatory framework with clearer institutional mandates, though corruption risks persist.⁸⁷ The Minerals Commission and Environmental Protection Authority maintain relatively defined jurisdictions.⁸⁸ Nigeria's fragmented

84 Acheampong & Tyce (n 28) 6-9; O Chukwuma 'Resource nationalism in the 21st century: Nigeria's Minerals Sector' (2024) 15 *Journal of African Law* 234.

85 Acheampong and others (n 17) 8-12.

86 Olawuyi and others (n 72) 5-7.

87 Chukwuma (n 84) 234.

88 Ghana Minerals Commission Act, 1993 (PNDCL 310); Environmental Protection Authority Act, 2025 (Act 1124); N Akabzaa 'Mining in Ghana:

institutional landscape with overlapping federal and state authorities creates jurisdictional ambiguities but also enables policy experimentation across multiple geopolitical zones.⁸⁹ Additionally, both countries face severe energy constraints. Still, Ghana has made more progress in renewable energy deployment (achieving ~42.5 MW solar capacity),⁹⁰ while Nigeria's energy crisis is more acute despite greater fossil fuel endowments.⁹¹ Thus, Ghana's concentrated mineral geography enables more focused infrastructure investment; Nigeria's dispersed deposits require broader infrastructure networks.

4.3.2 *Comparative assessment of policy effectiveness*

Regarding legal and fiscal frameworks, Nigeria's Minerals and Mining Act requires a comprehensive revision to address transition minerals and, specifically, resolve jurisdictional conflicts.⁹² Ghana's mining legislation is more coherent but suffers from fiscal regime inadequacies that limit value capture. Both countries would benefit from explicit transition minerals strategies aligned with the AGMS. However, in terms of implementation track record, Ghana's Integrated Aluminium Industry remains unrealised after decades of attempts,

Implications for national economic development and poverty reduction' in B Campbell (ed) *Mining in Africa: Regulation and development* (2009) 1, 15-18.

89 CD Ofoegbu and others 'Institutional framework for solid minerals development in Nigeria' (2016) 5 *Resources Policy* 234.

90 Energy Commission of Ghana (n 31); World Bank, Ghana: Renewable Energy Transformation Project (2023) Implementation Status Report.

91 REN21 Renewables 2024 Global Status Report: Nigeria Country Profile (2024) 45-48.

92 AY Ajibade 'Critical analysis of the Nigerian Minerals and Mining Act 2007' (2019) 11 *Journal of Law, Policy and Globalisation* 78; D Olawuyi *Extractive industries law in Africa* (2018) 145-168; GHEITI (n 32) 42-58.

highlighting capacity constraints despite policy ambition.⁹³ Nigeria's six-processing-plant initiative shows concrete progress but raises sustainability questions.⁹⁴ Ghana's success in attracting investment in lithium exploration contrasts with Nigeria's conditional-access approach, which prioritises processing over exploration.⁹⁵ Another key issue is foreign direct investment attraction and conditionality. Nigeria's firm stance on local processing requirements has both deterred opportunistic investors (such as Tesla) and attracted committed partners willing to establish integrated operations.⁹⁶ Ghana's more accommodating approach has accelerated exploration and production, but risks perpetuating dependence on raw material exports.⁹⁷ The economic viability analysis for Ghana's lithium refining illustrates the genuine trade-offs between domestic processing and export revenues; not all beneficiation is immediately profitable.

4.3.3 *Convergent challenges*

Despite different strategic approaches, Ghana and Nigeria confront remarkably similar structural constraints. Both countries' industrialisation ambitions are fundamentally constrained by inadequate, unreliable and expensive electricity supply.⁹⁸ Energy-

93 N Mutemeri 'Mineral resource governance in Africa: A comparative study' (IDEA 2025), <https://www.idea.int/sites/default/files/2025-02/mineral-resource-governance-in-africa-a-comparative-study.pdf> (accessed 12 January 2026).

94 As above.

95 As above.

96 P Haslam & PA Heidrich (eds) *The political economy of natural resources and development* (2016) 156-178; Barron and others (n 24) 8-12.

97 As above.

98 International Renewable Energy Agency (IRENA) 'Renewable energy market analysis: Africa and its regions' (2022) 45-58, <https://www.irena.org/publications/2022/Jan/Renewable-Energy-Market-Analysis-Africa>

intensive mineral processing is not commercially viable without affordable, reliable power. Insufficient geological surveys and mapping limit investor confidence and strategic planning in both countries.⁹⁹ Neither has invested adequately in generating comprehensive geoscience data. Also, local technical expertise in lithium processing, rare-earth refining and battery manufacturing is limited in both contexts, necessitating extensive capacity building or reliance on foreign technical partnerships.¹⁰⁰ Similarly, regarding economies of scale and market access, individual country markets are too small to enable economies of scale in processing and manufacturing. Both countries would benefit from regional integration through AfCFTA to access wider markets.¹⁰¹ Similarly, despite differences in institutional structures, both countries score poorly on governance and transparency indices, deterring long-term patient capital necessary for industrial transformation.¹⁰²

(accessed 10 January 2026); African Development Bank *Africa Energy Outlook 2024, Driving Africa's Transformation The Reform of the Global Financial Architecture* (2024) 67-89 https://www.afdb.org/sites/default/files/documents/publications/african_economic_outlook_aeo_2024_0.pdf (accessed 12 January 2026).

99 AMDC State of Mining in Africa Report 2023 (2024) 28-35; World Bank Extractive Industries Transparency Initiative: Technical Assistance for Geological Surveys (2023) Project Document 8-15.

100 UNESCO Engineering: Issues, challenges and opportunities for development in Africa (2010) 67-85.

101 AfCFTA 'Secretariat, state of African Continental Free Trade Implementation Report 2024' (2024) 35-48; Farooki (n 4) 25-32; Fessehaie & Rustomjee (n 8) 620-628.

102 Transparency International Corruption Perceptions Index 2024 (2024) (Ghana scoring 43/100, Nigeria 25/100); NRGI, Resource Governance Index 2021 (2021).

4.3.4 *Transferable lessons*

Ghana could adopt Nigeria's firmer stance on conditional access, requiring processing commitments as a prerequisite for mining licenses. The model of geopolitically dispersed processing plants offers insights into inclusive regional development. Similarly, Nigeria could learn from Ghana's more consolidated regulatory framework and efforts to attract exploration investment before mandating processing. Ghana's incremental approach to beneficiation, accepting that not all processing stages are immediately viable, represents pragmatic realism. Both countries demonstrate that policy ambition alone is insufficient without addressing foundational constraints: energy infrastructure, governance effectiveness and implementation capacity. The most critical insight is that transition minerals-led industrialisation requires simultaneous reforms across legal frameworks, infrastructure investment and institutional capacity, as piecemeal approaches will fail.

4.3.5 *Toward context-specific pathways*

The comparative analysis reveals that there is no single optimal pathway to transition minerals industrialisation. Ghana's partnership-oriented, incremental approach and Nigeria's assertive, nationalist strategy each have merits and limitations shaped by distinct political economy contexts.¹⁰³ The challenge for both countries is not to replicate each other's models but to learn selectively, adapting insights to their specific institutional capabilities, resource

103 P Collier & AJ Venables *Plundered nations? Successes and failures in natural resource extraction* (2011) 234-256.

endowments and political realities.¹⁰⁴ Both pathways can succeed, but only if accompanied by foundational reforms: comprehensive transition-minerals strategies aligned with AGMS, substantial investment in energy infrastructure, strengthened governance and reduced corruption, enhanced geological data, and effective leverage of regional integration mechanisms. Without these enabling conditions, neither country's approach will deliver sustainable industrialisation.

5 Conclusion: From mineral wealth to industrial development

Ghana and Nigeria stand at a critical juncture in the global energy transition. Their abundant transition mineral reserves offer genuine pathways to industrialisation, but realising this potential requires confronting deep-seated structural constraints: governance deficits, infrastructure inadequacies and energy crises. Neither country can rely on mineral wealth alone; industrial transformation demands simultaneous reforms across legal frameworks, institutional capacity, infrastructure investment and regional integration. The comparative analysis reveals that different strategic approaches, Ghana's incremental pragmatism versus Nigeria's assertive conditionality, can both succeed if accompanied by foundational enabling conditions. The recommendations presented are deliberately context-specific, recognising that minerals-led industrialisation pathways must be tailored to distinct political economy contexts and institutional capabilities. Ultimately, whether the energy transition becomes an

¹⁰⁴ D Dolowitz & D Marsh 'Learning from abroad: The role of policy transfer in contemporary policy-making' (2000) 13 *Governance* 5; R Rose 'What is lesson-drawing?' (1991) 11 *Journal of Public Policy* 3.

opportunity for African industrial development or perpetuates the resource curse depends on the policy choices made today. Ghana and Nigeria must act decisively to implement comprehensive transition minerals strategies, invest in enabling infrastructure, strengthen governance institutions and leverage continental frameworks. The global rush for transition minerals creates unprecedented leverage for resource-rich African countries, but this window of opportunity will not remain open indefinitely.

Bibliography

- Acemoglu, D & Robinson, JA *Why nations fail: The origins of power, prosperity, and poverty* (Crown Publishers 2012)
- Acheampong, T & Tyce, M 'Navigating the energy transition and industrial decarbonisation: Ghana's latest bid to develop an integrated bauxite-to-aluminium industry' (2024) 107 *Energy Research and Social Science* 103337
- Acheampong, T & Tyce, M 'The politics of creating markets for localisation: Insights from the Ghanaian downstream petroleum sector' (2019) 164 *World Development* 104
- Acheampong, T 'Ghana's extractive sector: Recent trends and outlook' (2024) *OECD Development Centre Policy Brief* 3-6
- Ajibade, AY 'Critical analysis of the Nigerian Minerals and Mining Act 2007' (2019) 11 *Journal of Law, Policy and Globalisation* 78
- Akabzaa, N 'Mining in Ghana: Implications for national economic development and poverty reduction' in Campbell, B (ed) *Mining in Africa: Regulation and development* (Pluto Press 2009) 15-18
- Anyemedu, K 'The politics of industrialisation in Ghana: The aluminum industry' (1993) 20 *African Review of Political Economy* 71
- Attride-Stirling, M 'Thematic networks: An analytic tool for qualitative research' (2001) 1 *Qualitative Research* 385
- Barron, KC, Clube, RKM, Chabala, R, Matokwani, M, & Chikwamo, MJ 'Value addition for whom? Challenges to local participation in downstream critical mineral ventures in Zambia' (2024) 20 *The Extractive Industries and Society* 101554
- Boafo, J, Dotsey, S & Spencer, R 'Energy transition diplomacy: The EU's pursuit of Africa's critical minerals for renewable energy at whose expense?' (2025) 127 *Energy Research and Social Science* 104213
- Braun, V & Clarke, V 'Using thematic analysis in psychology' (2006) 3 *Qualitative Research in Psychology* 77

- Campbell, G (ed) *Mining in Africa: Regulation and development* (Pluto Press 2009)
- Chukwuma, O 'Resource nationalism in the 21st century: Nigeria's minerals sector' (2024) 15 *Journal of African Law* 234
- Collier, P & Venables, AJ *Plundered nations? Successes and failures in natural resource extraction* (Palgrave Macmillan 2011)
- Dolowitz, D & Marsh, D 'Learning from abroad: The role of policy transfer in contemporary policy-making' (2000) 13 *Governance* 5
- Farooki, M & Kaplinsky, R *The impact of China on global commodity prices: The global reshaping of the resource sector* (Routledge 2012)
- Farooki, M 'The diversification of the mineral economies: A review of the main issues and options' in Haslam, P & Heidrich, P (eds) *The political economy of natural resources and development* (Routledge 2016) 71-88
- Fessehaie, J & Rustomjee, L 'Resource-based industrialisation in Southern Africa: Domestic policies, corporate strategies and regional dynamics' (2018) 49 *Development Southern Africa* 616
- Flyvbjerg, B 'Five misunderstandings about case-study research' (2006) 12 *Qualitative Inquiry* 219
- Gereffi, G & Fernandez-Stark, K *Global value chain analysis: A primer* (Duke University Centre on Globalisation, Governance & Competitiveness 2016)
- Gereffi, G 'Global value chains in a post-Washington consensus world' (2014) 21 *Review of International Political Economy* 9
- Gereffi, G, Humphrey, J & Sturgeon, T 'The governance of global value chains' (2005) 12 *Review of International Political Economy* 78
- Haslam, P & Heidrich, PA (eds) *The political economy of natural resources and development* (Routledge 2016)
- Hilson, J & Hilson, G 'Entrepreneurship, poverty and businessification: Youth in contemporary artisanal and small-scale gold mining in Ghana' (2015) 69 *African Affairs* 116

- Hinshaw, JJ 'A review of the African Mining Vision' (2010) 43 *Journal of Energy and Natural Resources Law* 153
- Kaplinsky, R & Morris, M 'Do the Asian drivers undermine export-oriented industrialisation in SSA?' (2008) 36 *World Development* 254
- Kola, TT 'Mineral beneficiation: A continuing African paradox or a panacea for economic growth and skills development' Master's dissertation, University of Pretoria, 2019
- Morris, M & Fessehaie, N 'The industrialisation challenge for Africa: Towards a commodities based industrialisation path' (2014) 1 *Journal of African Trade* 1
- North, DC *Institutions, institutional change and economic performance* (Cambridge University Press 1990)
- Ofoegbu, CD 'Legal and institutional framework for solid minerals development in Nigeria' (2015) 8 *IOSR Journal of Humanities and Social Science* 46
- Olaore, O 'Revisiting the Nigerian minerals and mining sector: An x-ray of the legal and regulatory framework' (2019) 25 *Annual Survey of International and Comparative Law* 197, 210-215
- Olawuyi, D *Extractive industries law in Africa* (Routledge 2018)
- Olawuyi, D, Bright, C, Goethals, S & Hasan, Q 'Beyond just transition: Advancing responsible and rights-based business practices in the energy and extractives sector' (2025) 10 *Business and Human Rights Journal* 1-10
- Ouedraogo, NS & Kilolo, JMM 'Africa's critical minerals can power the global low-carbon transition' (2024) 6 *Progress in Energy* 1-14
- Ragin, CG *The comparative method: Moving beyond qualitative and quantitative strategies* (University of California Press 1987)
- Rose, R 'What is lesson-drawing?' (1991) 11 *Journal of Public Policy* 3
- Sachs, JD & Warner, AM 'The curse of natural resources' (2001) 45 *European Economic Review* 827

Watts, MJ 'Resource curse? Governmentality, oil and power in the Niger Delta, Nigeria' (2004) 15 *Geopolitics* 50

Yin, RK *Case study research and applications: Design and methods* (Sage 2018)

Reports and online sources

Acheampong, T 'The energy transition and critical minerals in Ghana: Diversification opportunities and governance challenges' (The Extractive Industries Transparency Initiative EITI, May 2022)

Advisors Reports 'Nigeria's second lithium factory takes off in Abuja with \$50M investment' (31 July 2024) <https://advisorsreports.com> (accessed 8 January 2026)

AfCFTA Secretariat 'State of African continental free trade implementation report 2024' (AfCFTA Secretariat 2024) 35-48

African Continental Free Trade Area Agreement, done at Kigali, 21 March 2018 (entered into force 30 May 2019) <https://au.int/en/treaties/agreement-establishing-african-continental-free-trade-area> (accessed 8 January 2026)

African Development Bank *Africa energy outlook 2024: Driving Africa's transformation – The reform of the global financial architecture* (African Development Bank Group 2024) 67-89 https://www.afdb.org/sites/default/files/documents/publications/african_economic_outlook_aeo_2024_0.pdf (accessed 12 January 2026).

African Development Bank 'African economic outlook 2024' (African Development Bank Group 2024) 89-112

African Development Bank Group 'Critical minerals for Africa's inclusive growth and development' (African Development Bank Group, May 2025, Abidjan) 8-15

African Energy Chamber 'Africa's critical minerals and the future of the global energy transition' (12 January 2026) <https://energychamber.org/>

- africas-critical-minerals-and-the-future-of-the-global-energy-transition/
(accessed 20 January 2026)
- African Minerals Development Centre ‘Annual report 2023’ (AMDC 2024)
8-15
- African Union ‘Africa mining vision’ (February 2009) https://au.int/sites/default/files/documents/30984-doc-africa_mining_vision_english.pdf
(accessed 8 January 2026)
- African Union ‘African green minerals strategy 2025-2040’, adopted by AU
Assembly Decision Assembly/AU/Dec.1056(XLII) (February 2025)
- African Union Commission ‘Agenda 2063: The Africa we want – framework
document’ (AU Commission 2015) 45-48
- Akabzaa, T & Darimani, A ‘Impact of mining sector investment in Ghana:
A study of the Tarkwa mining region’ (Third World Network-Africa 2001)
23-35
- AMDC ‘State of mining in Africa report 2023’ (AMDC 2024) 28-35
- Andreoni, A & Avenyo, E ‘Critical minerals and routes to diversification in
Africa: Opportunities for diversification into mobile phone technologies
– The case of the Democratic Republic of Congo’, background paper
commissioned by the UNCTAD secretariat for the 2023 edition of the
Economic Development in Africa Report (August 2023)
- Anku, NEL ‘A critical review and analysis of opportunities and challenges
for just transitions in Ghana’ (South to South Just Transitions & Climate
Strategies 2024)
- Atlantic Lithium Ltd ‘Ewoyaa lithium project definitive feasibility study’
(October 2023) <https://atlanticlithium.com.au> (accessed 8 January 2026)
- AU Assembly Decision Assembly/AU/Dec.224(XII) (February 2009)
- Business Day ‘Tinubu welcomes Nigeria’s largest lithium plant’ (31 July 2024)
<https://businessday.ng> (accessed 8 January 2026)
- Energy Commission of Ghana *Energy outlook for Ghana* (Energy Commission
of Ghana 2024) 45-52

- Federal Ministry of Solid Minerals Development (Nigeria) 'Nigeria mineral sector development roadmap 2024' (2024) 18-25
- Federal Ministry of Solid Minerals Development (Nigeria) 'Nigeria mining cadastre portal' (2024)
- Federal Ministry of Solid Minerals Development (Nigeria) 'Roadmap for the development of Nigeria's solid minerals and metals sector 2016-2025' (2016)
- Geological Survey of Nigeria 'Mineral resources map of Nigeria' (Geological Survey of Nigeria 2022)
- Ghana Extractive Industries Transparency Initiative 'Report on mining sector 2021-2022' (June 2024) 28-35 <https://eiti.org/sites/default/files/2021%202022%20GHEITI%20Mining%20Report.pdf> (accessed 12 January 2026)
- Ghana Geological Survey Authority 'Annual report 2023' (Ghana Geological Survey Authority 2024) 12-18
- Ghana Geological Survey Authority 'Mineral deposits of Ghana' (Ghana Geological Survey Authority 2023) <https://www.gsa.gov.gh> (accessed 8 January 2026)
- Ghana Minerals Commission 'Mining sector support programme' (Ghana Minerals Commission 2022)
- International Energy Agency 'The role of critical minerals in clean energy transitions' (IEA 2021) 5 <https://www.iea.org/reports/the-role-of-critical-minerals-in-clean-energy-transitions> (accessed 8 January 2026)
- International Renewable Energy Agency 'Renewable energy market analysis: Africa and its regions' (IRENA 2022) 45-58 <https://www.irena.org/publications/2022/Jan/Renewable-Energy-Market-Analysis-Africa> (accessed 10 January 2026)
- Jentel, L & Cloete, D 'Digging deeper: Embedding minerals sovereignty in Africa's mining value chains' (South African Institute of International Affairs Policy Insights 161, February 2025) <https://saiia.org.za/wp->

content/uploads/2025/02/PI-161-FP-Jentel-Cloete-CORRECTED-VERSION.pdf (accessed 25 November 2025)

- Joseph, A 'Navigating governance challenges in African transition mineral supply chains' (South African Institute of International Affairs Policy Insights 151, May 2024) <https://saiia.org.za/research/navigating-governance-challenges-in-african-critical-mineral-supply-chains/> (accessed 8 January 2026)
- Lanzano, C, Levin, J and Mususa 'Yesterday mineral supplier, tomorrow battery producer: How green industrialisation can push Africa's economies up the global value chains' (Nordic Africa Institute, Policy Notes 2024) 2
- Mathe, MK, Dolla, TH, Ajayi, SO, Sikeyi & Palaniyandy, N 'Africa's potential in processing critical minerals' (Proceedings of the 2nd Battery Materials Conference, South African Institute of Mining and Metallurgy, Mbombela, Mpumalanga, 6-7 August 2024) <https://www.saimm.co.za/Conferences/files/battery-materials-2024/Battery%20Materials%202024%20-%20Proceedings%20Book.pdf> (accessed 8 January 2026)
- Ministry of Energy (Ghana) 'National energy transition framework 2022-2070: Abridged version' (Ministry of Energy, Accra, 2022)
- Mutemeri, N *Mineral resource governance in Africa: A comparative study* (International Institute for Democracy and Electoral Assistance 2024) 8, 45-78 <https://www.idea.int/sites/default/files/2025-02/mineral-resource-governance-in-africa-a-comparative-study.pdf> (accessed 12 January 2026)
- Natural Resource Governance Institute '2021 resource governance index results: Africa regional report' (NRGI 2021) 12-25 https://resourcegovernance.org/sites/default/files/documents/2021_resource_governance_index.pdf (accessed 20 January 2026)
- NEITI 'Nigeria extractive industries transparency initiative report 2022' (NEITI 2023) 35-48
- Nigerian Investment Promotion Commission 'FG to build 6 solid minerals processing plants', press release (19 February 2022) <https://www.nipc.gov.ng> (accessed 8 January 2026)

- Oluwatola, T 'Developing Nigeria's critical minerals industry to support the global energy transition' (Africa Policy Research Institute, January 2025) <https://afripoli.org/developing-nigerias-critical-minerals-industry-to-support-global-energy-transition> (accessed 8 January 2026)
- REN21 'Renewables 2024 global status report: Nigeria country profile' (REN21 2024) 45-48
- Scurfield, T & Adjei, DS 'Refining the strategy: The economics of lithium value addition in Ghana' (Natural Resource Governance Institute, March 2025)
- Transparency International 'Corruption perceptions index 2024' (Transparency International 2024) (Ghana scoring 43/100; Nigeria 25/100)
- UNCTAD 'Commodities and development report 2023: Critical minerals for the energy transition' (UN publication 2023) 45-48, 52-54 <https://unctad.org/publication/commodities-and-development-report-2023> (accessed 8 January 2026)
- UNECA 'Economic report on Africa 2013: Making the most of Africa's commodities – Industrialising for growth, jobs and economic transformation' (Economic Commission for Africa 2013, Addis Ababa)
- UNECA 'Scaling up value creation and local development in the mining sector in Ghana' (Economic Commission for Africa 2018, Addis Ababa)
- UNECA & AMDC 'African minerals development centre: Linkages, investment and diversification — harnessing mineral resources for Africa's transformation' (Economic Commission for Africa 2017, Addis Ababa) 5-12 https://archive.uneca.org/sites/default/files/PublicationFiles/linkages_brochure.pdf (accessed 8 January 2026)
- World Bank 'Extractive industries transparency initiative: Technical assistance for geological surveys' (2023) Project Document 8-15
- World Bank 'Ghana: Renewable energy transformation project' (2023) Implementation Status Report
- World Bank 'Leveraging local content decisions for industrial development: Mining and oil and gas' (World Bank 2020, Washington DC) 25-45

Cases

Attorney-General of the Federation v Attorney-General of Abia State & 35 Others
(2002) 6 NWLR (Pt 764) 542 (SC)

Laws and policies

Environmental Protection Authority Act 1124 of 2025 (Ghana)

Ghana Minerals Commission Act (PNDCL 310) of 1993 (Ghana)

Government of Ghana ‘Ghana national export development strategy 2024-2028’ (Government of Ghana 2024)

Export Control Law of the People’s Republic of China, Law 58 of 2020

Ministry of Energy (Ghana) ‘National energy transition framework 2022-2070: Abridged version’ (Ministry of Energy, Accra, 2022)

Nigerian Minerals and Mining Act 2007 (Cap M12 LFN 2004) ss 1-3, 44-50

Nigerian Minerals and Mining Regulations 2011

Regulation (EU) 2024/1252 of the European Parliament and of the Council of 11 April 2024 establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending Regulations (EU) No 168/2013, (EU) 2018/858, (EU) 2018/1724

United States Inflation Reduction Act, Pub L No 117-169 (2022)