COUNTING THE COST

—

FROM EXTRACTION TO GREEN TRANSITION

Tackling the Dealbreakers: Finance, Justice and Development

UNU INRA

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Content

Africa is at a critical inflection point. As global climate pressures mount, the continent must confront deepening vulnerability while seizing opportunities in the green economy. This report explores how African countries can manage a just, balanced energy transition, prioritizing development, resilience, and sovereignty in the process.

Multiple global crises are undermining sustainable development and increasing vulnerability across Africa. The continent is contending with the intensifying impacts of climate change, which are wreaking havoc on cities and deepening food security – while adaptive capacity, driven by economic decline and high debt burdens, compounds these pressures. More than ever, addressing structural inequalities and unsustainable practices is critical to building resilience against cascading global and environmental shocks.

Although Africa contributes the least to global emissions, it is showing leadership in green development. However, many fossil-fuel dependent countries are at risk of stranded assets if the transition unfolds without accounting for their development priorities. This could have far-reaching impacts for incomes, employment and economic stability.

At the same time, energy insecurity remains acute. The continent requires $25-50 billion annually to achieve universal energy access by 2030, and a further $200 billion each year to finance its NDCs. Yet, the architecture of climate finance continues to favour loans over grants, exposing Africa to new layers of debt despite the crushing weight of its current debt. A just transition must ensure that new transition imperatives do not lock Africa into further dependency traps. Otherwise, the climate reparative debts of high emitters are evaded, and Africa is caught in a one-way race – pressed to advance the climate ambition of others, while sinking deeper into energy poverty.

Meanwhile, emerging carbon taxation policies, such as the EU's Carbon Border Adjustment Mechanism, threaten to erode Africa's export earnings[1]. This raises a fundamental equity question: how can a continent like Africa – already exposed to the negative externalities of climate impacts - fight back by insulating itself from climate devastation while building the resilient infrastructure needed to protect its economy, safeguard its assets, and provide safety nets for increasingly climate insecure communities?

While many African policymakers and stakeholders argue that industrialization must remain a priority, important strides are being made towards greener development. The continent's vast renewable and mineral wealth offers a unique opportunity to lead in the green and technological revolutions. Africa produces large shares of the world's critical minerals, including 75% of cobalt, and green hydrogen is emerging as a major opportunity. However, retaining control of these resources and ensuring domestic value addition will be vital to securing long-term benefits and preventing a repeat of extractive patterns.

The transition reveals a stark justice deficit: Africa's fiscal space is reduced by stranded assets; its carbon sinks are appropriated and repurposed as offsets for others; its ability to finance resilient climate infrastructure is constrained by rising debt and economic downturns; and some communities are displaced from forest ecologies to meet the demands of carbon 'markets'. At the same time, the continent is locked into new dependencies, forced to rely on external capital to exploit emerging energy sources such as hydrogen and critical minerals, rather than advancing under its own steam.

Africa faces grave political economy questions: paying to repair a crisis it did not cause, counting the cost of resilience under systemic constraints, and managing debts that strip away resources for climate stability. Yet, if the climate problem is fixed, the continent could seize early advantages to confront its greatest development opportunities—from overcoming deep poverty to harnessing dynamic urbanization to building transformative infrastructure.

Justice needs to be reframed in the light of Africa's urgent industrialization agenda and its broader climate ambition. This requires several layers of justice: climate justice, to acknowledge Africa's limited responsibility yet high vulnerability; economic justice, to ensure that industrialization generates value on the continent rather than perpetuating extractive models; and intergenerational justice, so that today's development does not compromise the prospects of future Africans.

Industrialization must stand out as Africa's priority—yet not industrialization at any cost. What is needed is green industrialization: powered by clean energy, anchored in critical mineral value chains, and designed to create jobs, build resilient infrastructure, and foster prosperity while remaining consistent with planetary boundaries.

Asymmetric market power and limited bargaining capacity continue to prevent African countries from fully realizing the value of their resources. Regional integration – through intra-Africa trade, policy alignment and infrastructure development – will be essential to building market strength. A coherent regional strategy could also help consolidate policies and maximize natural resource potential.

By carefully managing fossil-fuel investments, scaling renewable energy, and optimizing critical mineral use, African countries can support industrialization, enable sustainable growth, and capitalize on emerging green economy opportunities. Counting the costs of green transition vs inaction will enable proactive planning and early action to avoid economic disruptions and ensure a just, resilient and inclusive transition.

1 See: UNU-INRA (2021b); MIF (2023)

Key Messages

Africa must balance low-carbon transition with economic stability: An abrupt shift away from hydrocarbons could destabilize economies, constrain debt repayment capacities, and impact millions of livelihoods. **A gradual and inclusive approach is essential to mitigate these risks.** Careful management of fossil-fuels, alongside renewable energy and critical mineral development, can support sustainable growth and industrialization.

Strategic investments in green sectors is essential: Africa's green mineral wealth offers major potential for job creation and industrialization. Policies that support local content, value chain development, and regional integration are vital to maximize gains and reduce reliance on raw exports.

Development priorities must remain central to the transition: While a low-carbon economy is essential, it cannot come at the expense of healthcare, education and poverty alleviation. Tailored, country-specific approaches are needed to balance environmental and social goals.

Innovative financing is critical to bridging the investment gap: Private capital, concessional finance and blended instruments are needed to fund clean energy access and unlock large-scale investments by 2030.

Regional integration can boost Africa's market power: Working together on trade and supply chains can help African producers stay competitive and add more value locally. Regional cooperation will also improve Africa's negotiating power, allowing Africa to thrive in global markets where power imbalances persist.

Global cooperation is essential for a just transition: Geopolitical instability, fluctuating energy markets, and carbon border mechanisms threaten Africa's economic stability. International support, technology transfer, and equitable partnerships are vital to build resilience.

Local ownership and community participation must be prioritized: Ensuring local equity and ownership in green energy projects is essential for a just transition. Inclusive governance frameworks that promote community involvement and support multi-stakeholder collaboration can help ensure local leadership in the green energy transition and foster inclusive, equitable, and just transitions.

An African Green Deal can provide a continental strategy for low-carbon development: Several countries are already shifting towards green industrialization and low-carbon growth, supporting renewables, green minerals, and green technologies. A coordinated effort to align policies and promote value addition will be key to ensuring African countries gain more from their natural resources.

AFRICA REQUIRES
$25-50 BILLION ANNUALLY TO
ACHIEVE UNIVERSAL ENERGY ACCESS BY 2030,
$200 BILLION EACH YEAR TO FINANCE ITS **NDCs.**

1. African economies in the context of the global green transition

1.1 Africa's exposure to multiple global crises

Multiple and cascading global crises in recent years – such as COVID-19, the Russo-Ukrainian war, and the unfolding Middle Eastern crisis – are threatening the development and security of the world's most vulnerable populations, while undermining progress towards the Sustainable Development Goals (SDGs). These interlinking crises have accelerated unsustainable debt. At the same time, persistent stressors, such as climate change and biodiversity loss, have not abated. Instead, they are compounding vulnerabilities, intensifying resource conflicts, and deepening socio-economic inequalities.

African countries are bearing the brunt of climate change impacts, facing growing disruptions to energy supply and food security. Cities across the continent are becoming epicenters of floods, storms, cyclones, and other extreme weather events. These shocks are increasing in both frequency and severity, with devastating consequences. In the Central Sahel and Nigeria, over 52 million people are projected to face acute hunger between June and August 2025. In Eastern Africa, some 61.6 million people were food insecure as of January 2025 – driven in part by a regional warming rate nearly 1.5 times the global average[2].

Countries most exposed to these impacts often have limited capacity to adapt. Even so, Africa is demonstrating commitment and leadership – both in mitigating emissions and in transitioning to a low-carbon economy – despite having contributed very little to the problem.

Responding to these crises and subsequently interlinking the risks faced by developing countries requires a multidimensional approach towards building resilience while pursuing inclusive and sustainable development that benefits the poor. Moreover, Africa's pursuit of climate-resilient development must place equity at the center for truly just transitions.

The challenge now is to confront the structural drivers of inequality and unsustainable practice while preparing for the threat of accelerating climate change.

1.2 Fossil fuel dependence and economic fragility

While the urgent need for African countries to diversify their economies and reduce their heavy dependence on fossil-fuels for energy and export revenue is widely recognized, this cannot come at the expense of the substantial development still required to address widespread energy poverty.

The pace of the transition is critical. A rapid shift in fossil fuel-dependent economies, such as South Africa, could have devastating consequences, including large-scale job losses in the coal industry and related sectors[3]. The instability caused by a disorderly transition could trigger credit downgrades and erode investor confidence. Socio-economic disruption, including rising unemployment and energy insecurity, could spark social unrest. In South Africa, an ageing coal fleet and chronic maintenance issues have already exacerbated energy shortages, leading to frequent load shedding. Declining revenues from fossil fuels will exacerbate these challenges and make it harder to sustain a reliable electricity supply.

> *"In Southern Africa, if you remove fossil-fuel industries, you will see unemployment and poverty increasing. Green jobs cannot come fast enough."*
>
> - Sokwani Chilembo (CEO, Zambia Chamber of Mines & Mining Industry Association of Southern Africa)

2 World Bank (2025). Food Security Update| The Bank's Response to Rising Food Insecurity.

3 Savage (2025). 'We are just sitting here': South African coal belt town split over green transition.

To enable just transitions, a gradual and inclusive approach is essential to mitigate these risks, incorporating measures to retrain and transition the workforce, as well as ensuring no community is left behind. Low-carbon and structural development can be pursued simultaneously. Investment in renewable energy and low- carbon technologies, coupled with efforts to expand energy access, can support a more equitable and sustainable transition.

> *"We feel like we are being rushed. How will we run our economy? We should be left to make African solutions at our own pace."* - Johnstone Chikwanda (Energy Expert, Zambia)

1.3. Global energy dynamics

In previous work by UNU-INRA, strategies for managing stranded assets in Africa's hydrocarbons sector were explored in depth[4]. These analyses highlighted the structural disadvantages faced by many African countries in securing national revenues and developmental returns from fossil fuel exploitation. Despite evolving global dynamics in security, trade and investment, these countries remained at a crossroads – facing critical decisions about how to manage their carbon- and energy-intensive sectors in the context of climate action.

Six years on, consultations with policymakers across East, Southern and West Africa revealed that many did not perceive a conflict between climate goals and continued fossil fuel development. On the contrary, hydrocarbon-rich countries often viewed the two as strategically aligned – seeking to use returns to finance a cleaner and more sustainable development pathway.

> *"It's totally unfair and illogical that we cannot make use of our own resources to advance our economies, while our natural resources previously advanced the western world and still are."*
> - Sidney Martin (Executive Chairman - Broadmind Mining (Pty) Ltd, Namibia)

A shift in global energy dynamics during 2022-2023 reinforced this confidence. As the Russo-Ukraine war escalated, European countries reversed earlier commitments and scrambled to secure new gas reserves, reigniting demand for African hydrocarbons.

This reversal exposed a widening trust gap between Africa and Europe on climate commitments. What had been presented as a principled energy transition came to be seen by many African observers as marked by double standards: gas was condemned in African contexts yet embraced in Europe as a transitional fuel, while Western consumers continued to benefit most from global supply chains.

> *"There is a double standard. They are reclassifying gas and starting coal-fired power plants again. There is hypocrisy between the West and Africa. In terms of contributions, Africa is not the main contributor of greenhouse gas emissions."*
> - Veston Malango (CEO of Namibia Chamber of Mines)

1.4 Energy Access

In the evolving global energy landscape, initiating Africa's transition to net-zero emissions requires a clear understanding of the continent's starting point relative to other regions. At present, Africa is the most energy-deficient continent in the world, accounting for 75% of the global population without access to electricity. In 2022, 600 million people across the continent lacked access to electricity – most of them in Sub-Saharan Africa.

This persistent energy gap is a major barrier to sustainable development. Encouragingly, countries such as Ghana, Kenya, and Rwanda are advancing towards universal access by 2030. According to the International Energy Agency (2022), extending the national grid remains the most practical and cost-effective option for nearly 45% of those expected to obtain access by that date. As of 2025, electricity access in Ghana reached 89.5 % of the population; however, marked disparities remain between urban and rural areas, with rural communities exhibiting significantly lower access rates[5].

In rural areas – home to more than 80% of people without electricity – off-grid solutions such as mini-grids and stand-alone systems, primarily solar-based, are the most viable path forward. However, achieving universal access will require energy investments of $25 billion a year by 2030. **A broader clean energy transition aligned with national climate goals will require significantly more – around $200 billion annually.**

South Africa estimated that it will require at least **US$250 billion** over the next three decades to transform the energy system.

4 UNU-INRA (2019). Africa's Development in the age of stranded Assets.
UNU-INRA (2021). Blind Alleys and Bright Prospects: Africa navigating stranded assets and just transitions.

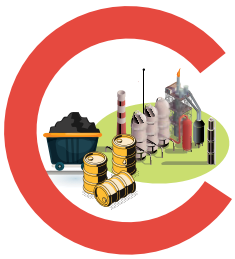
5 World Bank (2025d). SDG 7.1.1 Electrification Dataset.

2. Stranded Assets: Risk and Economic Implications

2.1 Stranded Asset Risk

As the world accelerates its shift towards decarbonization, African countries face growing risks of stranded assets, particularly in the fossil fuel sector, which accounts for 16% of the continent's GDP[6]. An abrupt transition away from hydrocarbons could destabilize economies, constrain debt repayment capacities, and jeopardize millions of livelihoods.

Africa's energy mix is dominated by fossil fuels. Currently, 75% of Africa's installed power-generating capacity and 67.5% of domestic energy production comes from coal, oil and natural gas[7]. Implementing policy changes to phase out fossil fuels, before viable alternatives are in place, could be a precarious path[8]. Many hydrocarbon-rich African countries derive more than half their total export revenues from oil and gas[9]. These industries are especially vulnerable to global climate policies and the growing competitiveness of renewable energy. This highlights the need for strategic planning and a just transition to low-carbon economies to mitigate these risks and ensure a sustainable future for the continent.



75% OF AFRICA'S INSTALLED POWER-GENERATING CAPACITY AND 67.5% OF DOMESTIC ENERGY PRODUCTION COMES FROM COAL, OIL AND NATURAL GAS

For instance, McKinsey projects that about 60% of Africa's current oil production may become uncompetitive by 2040 as international markets pivot to renewable[10]. Coal reserves are also at a high risk of being stranded. Today, coal-fired power plants account for 26.1% of Africa's electricity generation, 85% of which is concentrated in South Africa[11]. A recent assessment of proposed coal plants in Africa shows that only two of 27 planned plants (totaling 13 GW) are likely to proceed, while seven have been shelved or abandoned[12]. According to the Carbon Tracker Initiative, new wind and solar power could be more cost-effective than 96% of existing coal generation globally by 2030, rendering 42% of current coal capacity unprofitable[13]. These trends point to a declining role for coal in Africa, with significant implications for coal-dependent economies.

6 Brookings (2025). Leveraging Africa's inner strength to realize its full economic potential.
7 IEA (2024). Africa Energy system of Africa.
8 UNU-INRA (2019). Africa's Development in the Age of Stranded Assets.
9 Mosusu et al. (2023). Can Extractive Industries Make Countries Happy? What Are Potential Implications for the Geoscientist? Overview and Case Study Examples from Papua New Guinea and Worldwide.
10 Leke et al., (2022). The future of African oil and gas: Positioning for the energy transition.
11 IEA (2024). Africa Energy system of Africa.
12 Tariq & Moss (2023). Coal-to-power today is exceedingly modest outside South Africa.
13 Carbon Tracker (2018). 42% of global coal power plants run at a loss, finds world-first study.

60% OF AFRICA'S CURRENT OIL PRODUCTION MAY BECOME UNCOMPETITIVE BY 2040 AS INTERNATIONAL MARKETS PIVOT TO RENEWABLE

In Tanzania, natural gas is integral to energy supply and industrial processes, providing 70% of electricity and supporting key sectors[14]. A sudden phase-out of gas would risk grid collapse, factory shutdowns, and disruption to mineral production (Tanzania Petroleum, 2025b). Energy stability remains essential for industrial growth.

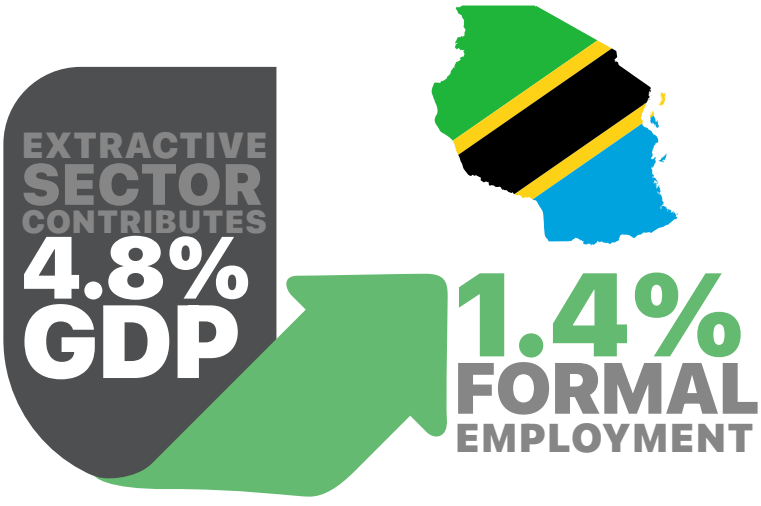
The risk of stranded assets also extends to international investors. OECD-based stakeholders – particularly pension funds – hold over 15% of global stranded asset risk exposure through capital markets[15]. One estimate places global losses from upstream oil and gas assets alone at over US$1 trillion (Semieniu 2022). These losses will affect a wide range of actors, including workers, banks, non-bank financial institutions, supply-chain participants and governments earning royalties from oil and gas concessions.

The risks are further compounded by European decarbonization policies. Rising carbon prices and the introduction of the Carbon Border Adjustment Mechanism (CBAM), are making hydrocarbon exports less competitive[16]. As demand for fossil fuels in Europe continues to decline, African producers face increasing financial and social vulnerability.

To manage this challenge, African countries must adopt strategic resource management approaches that balance economic stability with climate ambition. This includes careful planning of fossil fuel investments, development of renewable energy, and optimization of critical mineral resources. **A gradual and inclusive transition will be essential – supported by reskilling programs and social safety nets to mitigate job losses and social disruption, and ensure no one is left behind.**

2.1.2 Typology of Stranded Asset Risk and Transition Ambition

Table 1, below provides a typology of stranded assets risk across six countries, based on field work, with differing fossil fuel dependence and green transition strategies. The first group includes fossil-fuel-dependent countries with weak transition strategies, such as Nigeria. These countries are heavily reliant on oil, gas, or coal exports and are at high risk as stranding could sharply reduce government revenues, weaken fiscal capacity and cause large-scale job losses and social unrest. The transition risk is compounded by limited economic diversification and high commodity price volatility. The second group includes countries with a significant dependence on fossil fuels but making progress towards climate action and diversifying their energy base. These countries face moderate stranding risk and must balance transition fuels with clean energy expansion and managing just transitions, while avoiding new forms of resource dependence (e.g. critical minerals). The third group display emerging and active transition plans and a commitment to renewable energy development. With the right policies, these countries could become leaders in low-carbon development on the continent, but governance, financing and capacity gaps remain critical constraints.



14 National Bureau of Statistics Tanzania (2022). Key Insights from the United Republic of Tanzania's 2022 Energy Balance.
15 Semieniuk, G. et al. (2022). Stranded fossil-fuel assets translate to major losses for investors in advanced economies.
16 Appunn & Wettengel (2024). Understanding the European Union's Emissions Trading System.

Table 1. Stranded Assets Risk & Transition Ambition Typology

Country	Country Overview	Stranded Asset Risk & Fossil Dependence	Economic & Social Costs of Stranding	Transition Ambition & Pathway	Political Economy Constraints	Characteristics / Defining Features
1. High Exposure + Low Ambition		Very High	High	Weak or conflicted	High	Very High fossil fuel dependence, limited diversification, and weak/contradictory transition policies.
Nigeria 	Very high stranded asset risk due to extreme fiscal and export dependence on oil, entrenched subsidy regimes, and weak low-carbon strategy. Policy and investment still fossil-heavy.	• Very high – heavy fiscal and export dependence on oil/gas (89% of exports in 2021, >50% of revenue pre-pandemic); • 37.1bn barrels oil, 206.5 Tcf gas; • Gas as transition fuel; • Large oil/gas infrastructure, refineries, pipelines exposed	• Sharp revenue loss during oil price shocks; risks to social programs in oil regions; • 20% job loss in 2020; high debt (USD 95.8bn); • MSME impacts; • Regional inequalities (Niger Delta, rural north)	• Net-zero by 2060; $410bn/$1.9tn transition cost; • RE Plan targets 47% share by 2030; • JETP ($8.2bn of $10bn annual need); • Gas bridge fuel, local refining; • Critical mineral development potential	• Strong fossil lobby; governance/ corruption; • Illegal mining worth $9bn annually; host community development funds; • Niger Delta equity focus; limited climate finance; • Skills gap in new energy	• Very high dependence on fossil fuels (for exports, fiscal revenues, and jobs). • High stranding risk and economic and social costs of stranding. • Policy frameworks favoring fossil expansion (oil/gas) over renewables. • Entrenched political economy constraints from vested interests. • Weak or conflicted low-carbon transition plans.
2. High Exposure + Active Strategy		High	High	Moderate	High	Significant fossil fuel reliance, but with active transition targets, financing plans, and partial implementation (often slowed by political economy barriers).
South Africa 	High stranded asset risk from coal sector, with significant fiscal and employment dependence. However, has an active Just Energy Transition Strategy and is engaging with international finance (JETP) to support coal phase-out.	• Very high stranded asset risk from coal (53.2bn tons); • Coal 70% of installed power capacity, 73% of primary energy; • Eskom dependent on coal (91% generation); • Large SOE and mining exposure; • Top 20 carbon-intensive economy	• High fiscal and employment vulnerability – mining employs ~459,000 (20% in coal); • Risks to GDP, exports, and sovereign rating; • Inequality (80% of wealth held by 10%); • High unemployment (30–40%); • Load-shedding impacts productivity; • CBAM risk for carbon-intensive exports	• Net-zero by 2050; • Integrated Resource Plan 2019; • Just Transition Framework; • Just Energy Transition Partnership ($8.5bn, $98bn need); • Coal phase-out with RE scale-up; • Battery storage (1,440 MWh planned); • Hydrogen strategy; • Diversification into PGMs for EVs	• Strong coal unions influence policy; • Resistance from vested political/economic actors; • Political contestation around Eskom reforms • JETP transparency concerns; • Equity issues in plant closures; • High governance risk (state capture legacy); • Gender-sensitive transition policies; • Community empowerment focus.	• High to moderate fossil fuel dependence but with active diversification toward renewables and low-carbon industries. • High fiscal and employment vulnerability. • Emerging policy frameworks for just transition and climate action. • Growing renewable energy share or carbon market engagement. • Potential stranding risk, but seeking to mitigate risk through green development and diversified exports. • International partnerships leveraged for transition finance.
Ghana 	High exposure from new gas infrastructure and strong gas-led industrialization push, despite moderate fiscal and employment risks. Transition policy is emerging but gas interests dominate.	• High stranded asset risk from declining oil production and new gas infrastructure; • Oil contributes 50% of domestic energy production, 9% of government revenues (2019). Oil revenue was $1.35bn in 2024. • Natural gas is 18.2% of domestic energy production and 63% of electricity generation; • Government promoting a $60bn petroleum and petrochemical hub while also investing in RE; • Gas positioned as transition fuel.	• Oil revenue decline threatens major social programs (Free SHS, School Feeding); • High debt burden (88.1% of GDP in 2022) under IMF program limits fiscal space for RE; • Energy sector losses approx. 1.7% of GDP annually; • Jobs in oil and gas at risk; • Potential regional inequalities;	• Net-zero target by 2060 (revised from 2070); • Energy Transition and Investment Plan (ETIP) aims to unlock $550bn investments by 2060; • Focus on hydrogen, e-mobility, clean cookstoves, biofuels; • RE Master Plan targets 10% of energy mix by 2030 (current 0.7%); • Gradual RE expansion (solar, mini-hydro, biogas); • Green minerals strategy for lithium, graphite value chains	• Strong gas and oil sector interests; • IMF bailout and conditionalities constrain fiscal space and public investment; • Gender-sensitive policies (Climate Change Gender Action Plan) but uneven just transition planning; • Local content in RE and mining underdeveloped; • Smallholder and SME participation limited; • Illegal mining challenges; • Strong case for critical minerals value-addition and AfCFTA leverage	

3. Low–Moderate Exposure + Transition Emerging		Moderate	Moderate	Strong	Moderate	Lower direct fossil fuel dependence, diversified energy mixes, building renewables/critical minerals strategies
Namibia 	Moderate risk, emerging as a leader in linking gender equity with climate policy, renewable-leaning investment trends (especially Green hydrogen).	• Moderate stranded asset risk, indirect coal exposure via electricity imports (40% from South Africa's coal plants); • Heavy import dependence (50–60% of power needs); • Pursuing natural gas (Kudu project) and new oil fields alongside renewables; • Mining sector energy-intensive (25% of electricity use, HFO reliance)	• Limited direct revenue/job loss risk from fossil phase-down; • Fiscal risk from high debt (69.6% of GDP in 2020/21) and trade deficit (16.3% of GDP); • Mining sector majority foreign-owned with limited local revenue retention; • Job creation potential in green hydrogen (15,000 construction, 3,000 permanent); • Climate change impacts on agriculture and water scarcity threaten GDP (-6.5% annual loss estimated) and food security	• Renewable-leaning investment; • Net-zero by 2050; 91% GHG reduction target by 2030; 70% RE in electricity by 2030; • 80% energy self-sufficiency target by 2028; • Green hydrogen strategy: green hydrogen flagship (Hyphen project: $10bn, 2 Mt ammonia/year by 2030); • Solar and wind expansion; • Liberalized power market for IPPs; • Uranium, critical minerals and ammonia production linked to RE • Gender-sensitive NDCs	• Strong governance and judiciary; • Legacy of land inequality and foreign ownership of resources; • Policy push for local content (15% in mining concessions, 30% procurement in green hydrogen projects); • Gender-responsive climate policies; • Risks of revenue leakage abroad; • Emphasis on community ownership, blended finance, and regional integration for green industrialization	• Moderate fossil dependence alongside rich renewable and critical mineral potential. • Transition policy frameworks in early to mid-stages of development. • Structural economic constraints (debt, low fiscal space, governance gaps) slow green transition progress. • Reliance on external financing and international technical support. • Potential for leveraging critical minerals or renewable energy resources, however, constrained by financing or policy coordination. • Push for local ownership, local content and community engagement for just transitions.
Tanzania 	Moderate risk, renewable-focused investments, gender-responsive mining reforms, but nascent energy transition strategy.	• Moderate-to-high stranded asset risk given reliance on natural gas (60% of energy mix), coal reserves (1.9bn tons) and large-scale LNG ambitions; • High oil import dependence exposes economy to global price volatility; • Extractives central to exports and fiscal revenue (gold 17% of exports, 36% of forex earnings in 2019).	• Significant employment dependence in mining (1.5m people, 4.8% of GDP); • Abrupt fossil phase-out risks job losses, poverty and social unrest; • Climate change impacts cost 1–2% of GDP annually; urban infrastructure highly exposed to floods and sea-level rise; • High fiscal constraints and competing priorities limit investment in adaptation/mitigation.	• Abundant RE potential (solar 4–6 kWh/m²/day, 18.4 GW wind potential, 4.7 GW hydro with 12% developed, geothermal); • Opportunity to cut oil import bill, enhance energy security, and create green jobs; • Potential for regional leadership in clean energy; • Current policy still fossil-heavy, prioritizing gas and coal for industrialization; • Critical minerals (graphite, REEs, nickel) could support green tech supply chains.	• Weak cross-ministerial coordination and limited grassroots engagement impede climate policy implementation; • Extractives governance challenged by large foreign ownership, land conflicts, child labor and hazardous mining conditions; • Just transition narrative not yet central to national development planning; • Need for fiscal reforms, human rights safeguards, and multi-stakeholder dialogue to ensure equitable outcomes.	

2.2. The risk of global carbon border mechanisms and carbon taxes

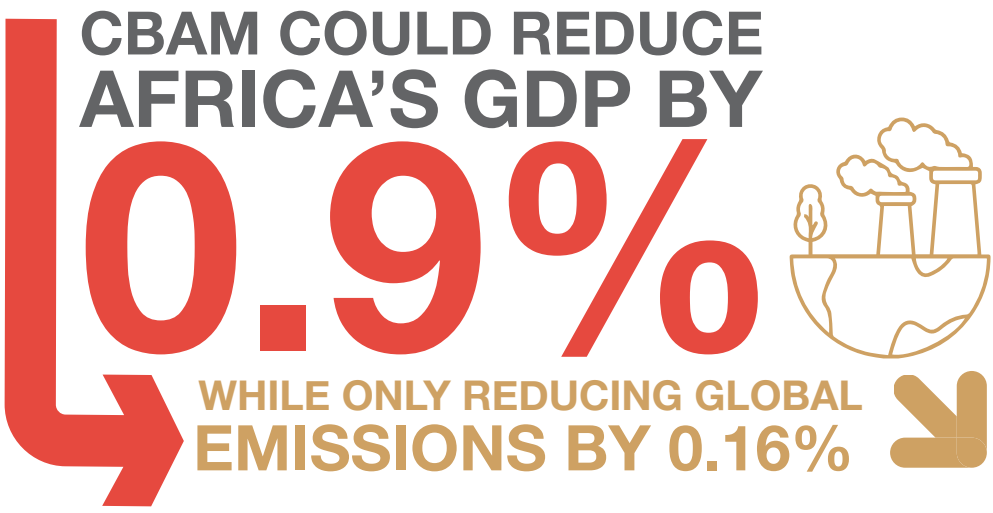
The EU's Carbon Border Adjustment Mechanism (CBAM) presents significant challenges for Africa's pursuit of a just energy transition. While designed to prevent carbon leakage and align global trade with EU climate goals, the mechanism risks reinforcing historical economic inequalities and constraining African development. For instance, the CBAM could reduce Africa's GDP by 0.9%, while only reducing global emissions by 0.16%[17].

CBAM is being phased in gradually, starting with imports of iron and steel, cement, aluminum, fertilizer, hydrogen and electricity[18]. Its impact on African economies could be substantial: the EU is a major export market for African exports, accounting for 26% of fertilizer exports, 16% of iron and steel, and 12% each of aluminum and cement[19]. The African Climate Foundation (2023) estimates that CBAM could cost the continent $25 billion annually, penalizing value-added products and pushing Africa further towards reliance on raw material exports.

For countries like Mozambique, projected GDP losses could exceed 1%, while South Africa's coal-dependent economy faces steep penalties on industrial exports. Nearly 20% of South Africa's iron and steel exports and 30% of aluminum exports are considered at short-term risk[20]. The mechanism also brings complex reporting requirements and carbon content measurement, posing additional challenges for developing nations.

Moreover, African carbon prices – such as Ghana's $8/ton [21] – are far lower than EU rates of $86-108/ton[22]. Yet exporters will be required to purchase CBAM certificates at EU prices, further straining competitiveness.

Although the mechanism is being introduced in stages from 2026 to 2034, its design raises fundamental questions of fairness. Africa, despite having contributed minimally to the climate crisis, is being asked to absorb some of the costs of Europe's decarbonization policies. The CBAM will be phased in as the EU simultaneously withdraws free allowances under its Emissions Trading System between 2026 and 2034, meaning the carbon price on covered imports will steadily rise over the period. While CBAM could, in theory, stimulate green investment in Africa, this would only be equitable if accompanied by international support that addresses power asymmetries, fiscal constraints, and the continent's legacy of economic extraction. This equity gap is stark given Africa's very low historical responsibility (around 3% of cumulative CO_2 emissions) yet high exposure to trade shocks; modelling referenced by the African Climate Foundation suggests CBAM could reduce Africa's exports to the EU by up to 5.7% and shave approximately 0.9% off continental GDP (≈$16bn at 2021 levels) at current carbon prices[23]. Accordingly, any "just" CBAM implementation would need to recycle revenues and mobilize concessional finance/technology transfer to prevent net welfare losses in developing exporters and to expand African firms' access to low-carbon processes[24].

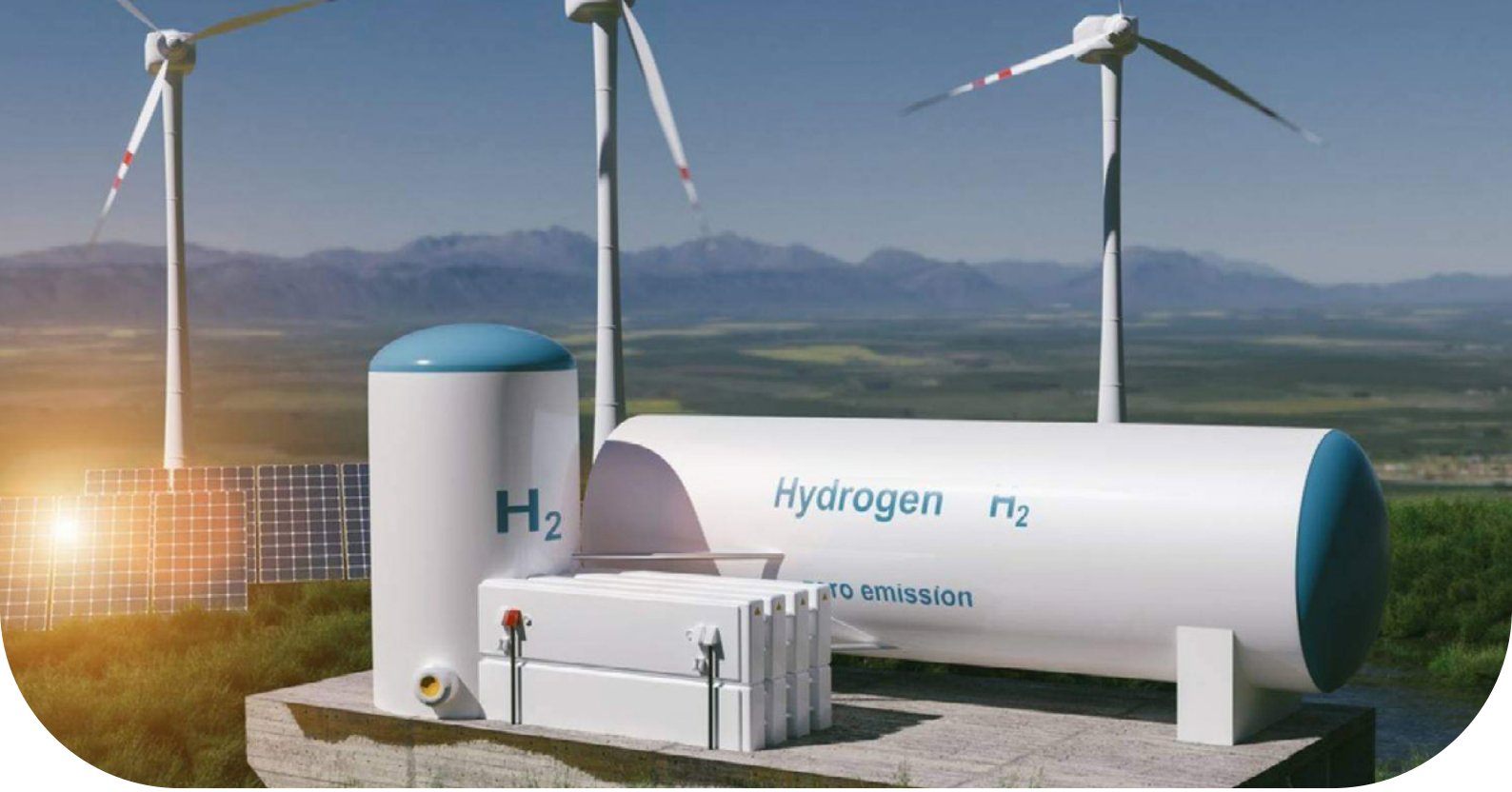


17 MIF (2023). Africa on the road to COP28: reconciling climate & development. Building on the African Leaders Nairobi. Declaration on Climate Change and Call to Action.
18 European Commission (n.d.). Carbon Border Adjustment Mechanism. https://taxation-customs.ec.europa.eu/carbon-border-adjustment-mechanism_en
19 The African Climate Foundation (2023). Implications for African countries of a carbon border adjustment mechanism in the EU (The African Climate Foundation; LSE Firoz Lalji Institute for Africa).
20 TIPS (2024). South Africa's Iron, Steel and Aluminum Industries Readiness to Respond to CBAM.
21 Ernst & Young (2024). Ghana imposes emissions levy.
22 World Bank (2023). How developing countries can measure exposure to the EU's carbon border adjustment mechanism.
23 MIF (2023).
24 EPRS | European Parliamentary Research Service (2023). Fit for 55 explainer: Carbon border adjustment mechanism
Carbon Brief, (2021). Which countries are historically responsible for climate change?
Carnegie Endowment (2023). Citing African Climate Foundation research. A Political Economy Perspective on the EU's Carbon Border Tax — estimated export and GDP impacts for Africa.

Mozambique's projected GDP losses could exceed 1%

CBAM COULD COST THE CONTINENT $25 BILLION ANNUALLY

South Africa's coal-heavy economy risks steep export penalties, with 20% of iron and steel and 30% of aluminum exports at short-term risk.



3. Energy diversification: Renewable energy, green hydrogen and critical minerals

3.1 Africa's climate ambition

Several policymakers and stakeholders interviewed across the continent expressed concern that most conversations around net-zero targets and energy transition pathways are driven by external actors – often without sufficient consideration of Africa's development realities, including energy poverty, food insecurity, weak infrastructure, and conflict.

Although Africa is a low emitter, the pressure to de-carbonize is widely seen as unjust, particularly for countries that have yet to achieve their industrialization goals.

> *"Africa needs to raise its voice to demand for the allowable market space for fossils in a net-zero world"* – Paul Bagabo (Natural Resource Governance Institute)

Many stakeholders view the green transition as part of a broader industrialization and development agenda. A phased approach has been proposed: one that leverages fossil fuel revenues to drive economic growth while simultaneously investing in renewable energy.

Several African countries are now pursuing diversified energy mixes that include both renewable and non-renewable sources. For example, Namibia has set a target of 80% energy self-sufficiency by 2028[25], aiming to increase installed electricity capacity to 879 MW from a combination of biomass (40 MW), wind (90 MW), solar PV (40 MW), heavy fuel oil, and natural gas (50 MW), as outlined in the Harambee Prosperity Plan II[26]. While renewables make up the bulk of this mix, fossil fuels are also seen as essential to energy security.

At the same time, climate ambition is growing. Countries such as Ghana, Nigeria, South Africa, Namibia, and Uganda have revised their NDCs to increase the share of renewables in their energy mix and pursue mitigation actions such as reducing deforestation.

Across the continent, a mindset shift is underway. Policymakers are placing greater emphasis on green industrialization, with new strategies to promote low-carbon development, support renewables technologies, and strengthen the green minerals sector. These efforts are supported by integrated policy reforms aimed at scaling up NDC implementation. There is also growing emphasis on beneficiation and value addition, to ensure that Africa benefits more fully from its natural resource endowments. For instance, in line with its renewed focus on energy transition, Ghana has renamed the former Ministry of Energy to the Ministry of Energy and Green Transition.

The shift away from hydrocarbons opens opportunities for commercializing new energy sources, including renewable hydrogen, and better leveraging Africa's critical minerals base to support global low-carbon transitions.

25 The Southern African Times (2024). Namibia Pursues Ambitious Energy Self-Sufficiency Goal by 2028.

26 HPPII (2021). Harambee Prosperity Plan II 2021-2025: Action Plan of the Namibian Government Towards Economic Recovery and Inclusive Growth.

3.2 Harnessing Africa's mineral wealth

Africa's vast and diverse mineral wealth holds immense potential for both the continent's economic development and the global green transition. Minerals such as cobalt, platinum group metals (PGMs), rare earth elements (REE), gold, and lithium, are essential for renewable energy systems, energy storage, electric vehicles, and other green technologies. Projected global demand for minerals such as graphite, lithium and cobalt could surge by almost 500% by 2050[27].

Currently, Africa plays a central role in the early stages of the green mineral value chain, mainly in exploration, extraction and limited processing. A 2021 UNU-INRA study found that Africa holds 42 of the 66 minerals considered critical to the Fourth Industrial Revolution. The continent produces 20% of the world's uranium, one-third of its bauxite, and two-thirds of its cobalt and platinum. It also provides 50% of global manganese. The Democratic Republic of the Congo and Zambia jointly contribute 75% of global cobalt production. Zimbabwe ranks among the world's top eight lithium producers, with an output of 1,200 tons in 2021.

The global transition to clean energy technologies creates an urgent opportunity for Africa to move beyond raw material extraction. However, the continent's continued reliance on raw mineral exports limits economic benefits and inhibits participation in higher-value segments of the value chain. This raises questions about fairness and who ultimately reaps the rewards from Africa's natural resources. Ensuring local equity and ownership in green energy projects is essential for a just transition.

To realize the full value of its resources, Africa must prioritize local processing, industrialization, and deeper engagement in strategic value chains. Establishing local processing industries can greatly enhance value addition, generate skilled jobs, and boost tax revenues – contributing to poverty reduction and broader development goals. For instance, while raw bauxite sells for around $65 per ton, processed aluminum fetches approximately $2,335 per ton[28]. By moving up the value chain, African countries can also reduce exposure to commodity price volatility and strengthen foreign currency reserves. In 2023, Namibia took steps in this direction by implementing an export ban on unprocessed lithium and other critical minerals.

Continental initiatives such as the African Continental Free Trade Area (AfCFTA) can help unlock regional market integration, remove trade barriers and improve infrastructure. A notable example is the 2022 collaboration between the DRC and Zambia to develop a cross-border value chain for electric vehicle battery production – demonstrating the benefits of regional coordination in maximizing the continent's mineral wealth.

3.3 Green hydrogen

Africa's growing competitiveness in renewable energy presents significant opportunities for economic growth, particularly in job creation and industrialization. Green hydrogen is rapidly emerging as a key energy source of the future and is widely regarded as essential for a sustainable transition. The continent has the potential to produce green hydrogen more cheaply than most other regions, creating an opportunity to meet its own growing energy needs while enhancing its strategic importance in the global energy landscape.

Renewable energy-rich countries are capable of manufacturing green hydrogen and its derivatives. However, a lack of enabling infrastructure continues to pose a major barrier to scaling up production and deployment.

BAUXITE SELLS FOR AROUND $65 PER TON, PROCESSED ALUMINIUM FETCHES APPROXIMATELY $2,335 PER TON

27 World Bank (2020). Mineral Production to Soar as Demand for Clean Energy Increases.
28 Chen et al. (2024), Harnessing Sub-Saharan Africa's Critical Mineral Wealth.

Case study: Namibia

Namibia is now a major player in the emerging green hydrogen economy. It ranks among the top five global locations with co-located wind and solar resources and has access to both sea and land export routes – making it well suited for green hydrogen development. The government has incorporated green hydrogen development into its national economic strategy, the Harambee Prosperity Plan II, and launched the Southern Corridor Development Initiative (SCDI)– its first gigawatt-scale, vertically integrated green hydrogen project.

The country envisions becoming a leading producer of green hydrogen within Africa and globally.

> *"The Namibian hydrogen project is special because it begins to decarbonize Europe, Namibia, and South Africa. It supports the African Continental Free Trade Agreement, creating a scenario where Africans can sell molecules and electrons, not just raw commodities."*
>
> – James Mnyupe (Presidential Economic Advisor, Namibia)

Green hydrogen will provide cheaper electricity, enabling greater value-addition – for example, in domestic smelting. McKinsey estimates that Namibia could produce green hydrogen at US$1.50/kg by 2030.

Namibia's key investment partner is Germany, supported by the EU. On 26 May 2023, Namibia signed a US$10 billion green hydrogen investment deal with Hyphen, a German energy company. Hyphen will lead development, implementation and operations, including building factories, pipelines and ports, with the goal of producing two million tons of ammonia per year by 2030.

The project is expected to create up to 15,000 new jobs during construction and 3,000 permanent roles once operational, with targets for 90% of these jobs to be filled by Namibians and 20% by youth. It also includes a target of 30% local procurement of goods, services and materials[29].

The Namibian government has the option to take up to a 24% equity stake – valued at US$2.4 billion – in the project. So far, the country has raised €540 million in donor and concessional funding through partnerships with the European Union and the Global Gateway Initiative[30].

The Feasibility and Implementation Agreement (FIA) outlines that the government will receive land rentals of €12.2 million during the feasibility phase, €10 million annually during financing and construction, and €26 million annually once operational. Hyphen will also pay 5% royalties on gross revenues and corporate income tax. The project term is around forty years[31].

One of the major policy challenge concerns ownership and return on investment The 24% equity stake requires a significant upfront commitment of US$2 billion, raising the question of how Namibia can finance this share without incurring unsustainable debt. If the government is unable to raise the necessary funds, its share in long-term revenues will be limited, and profits will flow primarily abroad. Ensuring social equality and community ownership in renewable energy projects is essential to ensure just transitions.

> *"It's not just about getting a check from others. It's about having Namibian ownership in our own resources. We aim to build equity and transition from being a buyer to being a stakeholder with real agency in these projects."*
>
> - James Mnyupe (Presidential Economic Advisor, Namibia)

Green hydrogen projects are are often export-oriented and tied to European demand. Retaining control of these resources and ensuring domestic value addition will be vital to securing long-term benefits and preventing a repeat of extractive patterns. The key challenge lies in developing local financing mechanisms. Mobilizing domestic private capital – rather than relying on international loans – will be critical to de-risk investment and ensure adequate national ownership. In parallel, Namibia must ensure sufficient local content and domestic absorption of the technology.

TOP 5 GLOBALLY FOR CO-LOCATED WIND AND SOLAR RESOURCES

29 Hyphen (2023a). The Government of the Republic of Namibia approves entry into a pioneering US$10bn Agreement to develop Sub-Saharan Africa's Largest Green Hydrogen Project with Hyphen Hydrogen Energy.

30 Hyphen (2023a).

31 See: Government of the Republic of Namibia and Hyphen Hydrogen Energy Feasibility and Implementation

3.4 Natural gas as a transition fuel

Natural gas remains a bridging fuel for much of Africa. The continent's gas future holds great promise, driven by substantial untapped reserves. With a staggering 620 trillion cubic feet (Tcf) of proven reserves – equivalent to 7.5% of global reserves – Africa is a key player in the evolving energy landscape[32]. Notably, approximately 84% of gas reserves at the pre-production stage globally are located in Africa, underscoring its strategic significance[33].

> *"We need oil and gas to move out of oil and gas."* - Dr. Adeyemi Dipeolu - Nigeria, Presidential Advisor

For instance, The Government of Ghana has inaugurated an Implementation Committee to oversee the country's second Gas Processing Plant (GPP II) which is projected to enhance energy security, reducing dependence on costly imported liquid fuels and save USD 500 million biennially, create over 1,000 jobs, and strengthen the country's position as a regional energy hub[34].

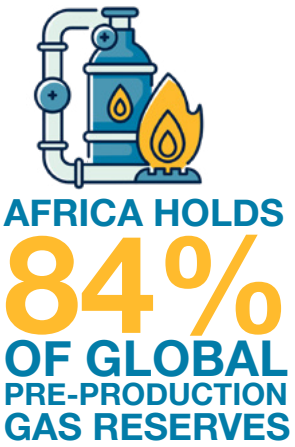
The emergence of new players in Africa's gas market, including Mozambique, Senegal, Tanzania, Mauritania, South Africa, Ethiopia and Morocco, signals a paradigm shift. These nations collectively hold over 5,137.5 billion cubic meters (bcm) of gas reserves, potentially emitting around 11.9 billion tons of CO2. However, exploiting these resources presents serious environmental challenges. Local communities and ecosystems have raised concerns[35] and while gas is marketed as cleaner than coal, its full lifecycle—from extraction to industrial use—releases significant methane and carbon dioxide. Recent IEA Methane Tracker data show average upstream methane leakage rates of 1.7%, with satellite-based monitoring detecting "super-emitters" that raise effective warming potential to levels comparable with coal over a 20-year horizon[36]. New monitoring techniques have revealed high levels of leakage across supply chains, further undermining natural gas's reputation as a low-carbon fuel[37].

The Russian invasion of Ukraine triggered a short-term spike in European demand, increasing interest in African gas to plug immediate supply gaps. This shift exposed the absence of long-term commitment from developed countries to meaningful, sustained long-term climate action[38].

Table 2. Pre-production Reserves in Africa by Country.

Country	Reserves (bcm)	Percentages
Mozambique	2307.4	44.9%
Senegal	778.7	15.1%
Mauritania	574.6	11.2%
Tanzania	512.5	10%
Algeria	192.7	3.7%
Egypt	192.6	3.7%
Nigeria	155	3%
Angola	143.6	2.8%
Libya	102.2	2%
South Africa	96.3	1.9%
Ethiopia	42.5	0.8%
Morocco	39.4	0.8%

Source: (Global Energy Monitor, 2023).

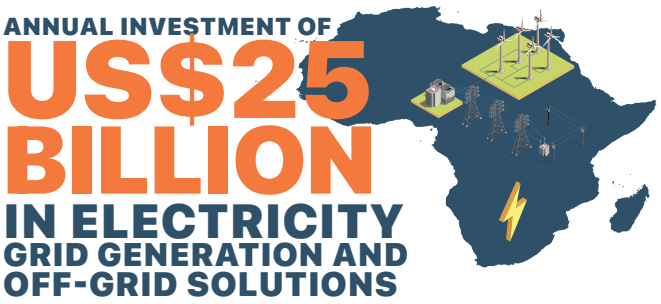


While Africa has a legitimate right to develop, this must not become an excuse to pursue strategies that risk locking economies into carbon-intensive pathways and future stranded assets. European and other markets are likely to phase out gas rapidly, driven by carbon border taxes and decarbonization policies, which may leave new African producers behind.

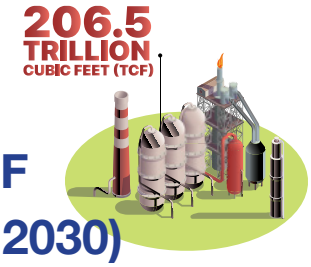
If planned extraction projects proceed, Africa's gas production could surge by a third by 2030, requiring an estimated US$329 billion in investment for upstream development and export infrastructure[39]. However, a large share of this capacity is earmarked for export,

32 GlobalEnergyMonitor (2023). New Hubs of Gas Extraction in Africa.
33 GlobalEnergyMonitor (2023). New Hubs of Gas Extraction in Africa.
34 Ghana Ministry of Finance (2025). Implementation Committee for Second Gas Processing Plant Inaugurated.
35 GlobalEnergyMonitor (2023). New Hubs of Gas Extraction in Africa.
36 Alvarez et al. (2018). Assessment of methane emissions from the U.S. oil and gas supply chain.
37 African Climate Foundation (2022). Just energy transitions and natural gas in Africa: balancing climate action and structural transformation.
38 Sokona et al. (2023). Just transition: a climate, energy and development vision for Africa.
39 GlobalEnergyMonitor (2023). New Hubs of Gas Extraction in Africa.

Yet there are promising domestic use cases. For example, the Songo Songo gas field in Tanzania has supported the economy since 2004, bolstering energy availability, lowering costs, and creating jobs. It currently provides around 45% of the country's electricity, reducing its reliance on costly imports[40]. To eradicate energy poverty across Africa by 2030, annual investment of at least US$25 billion in grid and off-grid electricity solutions will be required[41].

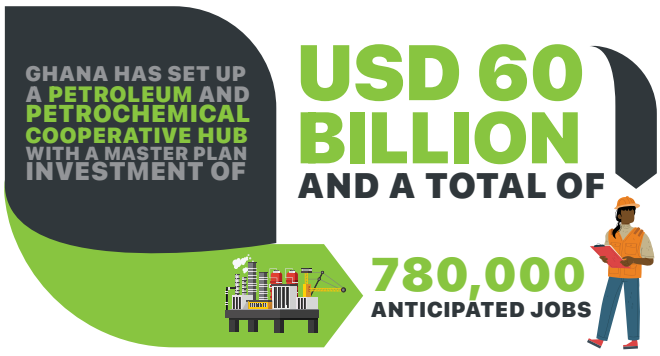


Mozambique is poised to become the continent's second-largest gas producer, expected to supply 18% of Africa's gas production between 2020 and 2050. New entrants like Mozambique could contribute over 50% of production by 2038[42].



NIGERIA'S "DECADE OF GAS" (2021-2030) STRATEGY AIMS TO ATTRACT $US14 BILLION IN FOREIGN INVESTMENT, CREATE TWO MILLION JOBS, AND SCALE GAS INFRASTRUCTURE

Nigeria is also leveraging its gas resources to support energy security and economic diversification. With over 200 Tcf of reserves, Nigeria's "Decade of Gas" (2021-2030) strategy aims to attract $US14 billion in foreign investment, create two million jobs, and scale gas infrastructure. Countries such as Ghana and Nigeria could also boost petrochemical industries – potentially generating millions of jobs – by processing gas into higher-value products for both export and domestic use. For example, the government of Ghana continues to look for investors to explore the new potential of oil blocks and has also set up a petroleum and petrochemical hub with a master-plan investment of USD 60 billion and a total of 780,000 anticipated jobs. According to the proposed strategy, the hub is anticipated to revolutionize the economy by 2030, resulting in a 70 percent increase in GDP and a reduction of export taxes of approximately $1.56 billion (PHDC Investment Guide, 2022).



While projects such as Songo Songo have delivered benefits, a persistent challenge remains: the prioritization of exports over domestic needs. This raises questions about fairness and who ultimately reaps the rewards from Africa's natural resources.

40 AFREC (2023). The State of African Energy 2023 Outlook.
41 IEA (2022). Africa Energy Outlook 2022.
42 GlobalEnergyMonitor (2023). New Hubs of Gas Extraction in Africa.

3.5 Taking ownership of the transition

The continent must clearly define its objectives for resource utilization and resist external influences. A strategic approach to resource management is essential to avoid situations in which resource-rich countries function merely as exporters of raw materials. In short, the region outsources the value addition and relinquishes associated profits to others – empowering external entities and multinationals to assert control.

Strategic resource-management is more critical than ever in the current energy landscape and emerging fossil fuel markets. The development dimension should take center stage, emphasizing the continent's unwavering commitment to its fundamental priorities.

4. Financing the transition

4.1 Africa's financing needs

Africa's transition will require substantial infrastructure investment. Achieving universal energy access by 2030 demands $25-50 billion annually, while meeting NDC targets under a clean-energy transition scenario will require $200 billion a year. However, existing financing mechanisms, predominantly loan-based, risk exacerbating debt burdens. A shift toward grant-based funding, blended finance, and innovative instruments is critical to enable just transitions.

The continent's ability to shift to low-carbon growth depends heavily on the affordability and efficiency of alternative fuel sources. As these improve, they may help reduce Africa's longstanding reliance on petroleum subsidies. The abundant availability of underutilized low-carbon energy technologies, particularly renewables, presents an opportunity to expand energy access and accelerate investment in energy infrastructure (IEA, 2022).

Stakeholders stress that unless climate financing commitments are met – alongside global solidarity to help Africa manage debt and developmental challenges – the push for net zero could deepen existing vulnerabilities. By adopting a comprehensive and inclusive financing strategy, Africa can achieve a sustainable, equitable and resilient transition.

> *"Public debt and unemployment are big issues for Africa. Stranded assets have become another layer of concern"* - Dr. Daniel Benefoh, EPA-Ghana

4.2 Just Energy Transition Partnerships in Africa: Navigating Challenges, Unlocking Opportunities

The emergence of Just Energy Transition Partnerships (JETPs) marks a move towards more inclusive and fair solutions for tackling climate change, especially in areas significantly affected by energy shifts. Since COP 26, several countries in Africa, including South Africa, Egypt and Senegal, have committed to JETPs. These partnerships introduce a new framework – one that links decarbonization with social justice and inclusive economic growth.

In South Africa, where over 80% of electricity is generated from coal[43], the JETP launched at COP26 aims to accelerate the shift to renewables, support job creation, and mitigate impacts on coal-dependent communities. An initial $8.5 billion in international support is being mobilized (2023–2027), with an additional $3.5 billion committed by Denmark, the Netherlands, and Spain. The Implementation Plan seeks to raise over $98 billion within five years, signaling a strong emphasis on private-sector investment in new energy capacity[44]. South Africa's just transition framework centres on managing the social and economic consequences of the country's climate mitigation and adaptation policies while placing human development concerns at its core.

43 The Conversation (2022). South Africa is hooked on fossil fuels: how it got here and how it can get out.

44 Presidential Climate Commission (2022). A Framework for a Just Transition in South Africa.

Egypt used its COP27 presidency to advocate for equity-centered energy transitions. In 2022, it launched the Nexus of Water, Food and Energy (NWFE) Country Platform, committing US$10 billion to the energy sector, with the European Bank for Reconstruction and Development (EBRD) as the lead partner[45].

Senegal joined the JETP in 2023, targeting 40% renewable energy in its electricity mix by 2030. Backed by France, Germany, Canada, and the EU, the deal offers €2.5 billion over 3–5 years – primarily in preferential loans, with €150 million in grants. Senegal also plans to finalize a long-term low-emission development strategy (LTS) by 2024[46].

Despite their promise, the JETP agreements have encountered significant hurdles. Key investment programs have progressed more slowly than anticipated. Many agreements were announced before the necessary technical and coordination mechanisms were in place. Public consultations – particularly on justice elements – have also taken time. Additionally, there are concerns about transparency and the potential for corruption and mismanagement. These challenges are compounded by the political sensitivity of transitions, such as the decommissioning of coal assets. Effective governance, community engagement and transparent financial mechanisms will be crucial in ensuring the success of just transition partnerships and preventing the mismanagement of funds.

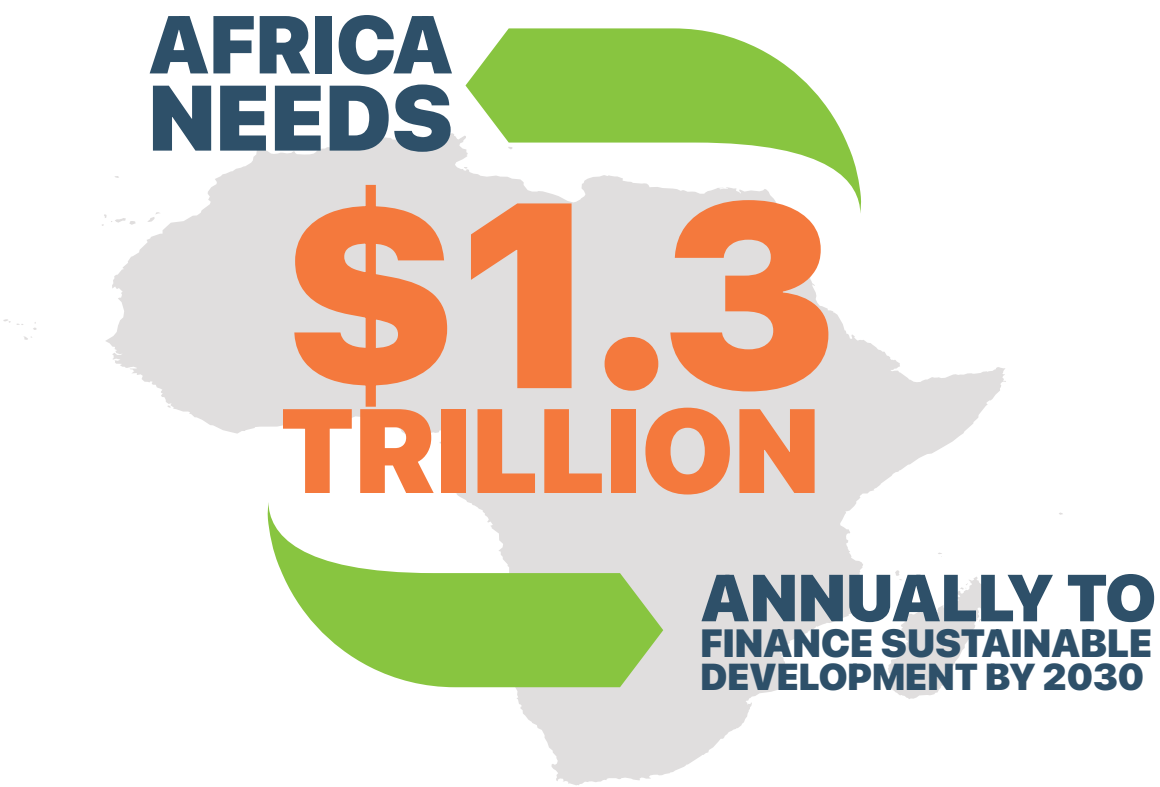
There is also a risk that JETPs could reinforce historical patterns of extraction and dependency. Trade conditions and reporting obligations could erode national sovereignty, limiting Africa's control over its transition pathways.

To succeed, a comprehensive strategy is needed – one that addresses fiscal vulnerabilities, recognizes historical injustices and rebalances power in global partnerships. Alongside new investment, a just transition also demands a profound re-thinking of development priorities, grounding them in fairness, sovereignty and international cooperation.

4.3. Innovative financing

Private investment and innovative financing tools, including concessional funding, will be essential to closing the clean energy funding gap and delivering universal access by 2030. Blended finance instruments are especially important for mobilizing large-scale capital flows.

Grant-based funding can play a catalytic role – by de-risking markets and enabling favorable conditions – but must be used strategically. Poorly targeted grants risk entrenching structural dependencies and undermining Africa's long-term development goals. Financing approaches must therefore prioritize both scale and sustainability.



45 NWFE (2023). Egypt's Country Platform for Nexus Water Food Energy Program.
46 European Commission (2023). The EU and the International Partners Group announced a Just Energy Transition Partnership with Senegal combining climate and development goals.

5. Turning risk into opportunity

5.1 Decarbonization trade-offs

While Africa's decarbonization can bring substantial benefits, it also entails notable trade-offs, especially in terms of resource use and dependence, technology access, environmental costs, economic dependence, and waste management.

A key concern is that Africa may continue to act primarily as a raw material exporter, due to limited access to advanced technology and a limited capacity to manufacture or assemble renewable energy technologies, such as solar panels and wind turbines. This could perpetuate dependence on external technologies and limit the continent's ability to develop a robust renewable energy industry and fully capture economic gains.

Another challenge involves the environmental and social impacts associated with technologies, particularly electric vehicle (EV) batteries. The extraction of critical minerals such as lithium, cobalt and nickel for these batteries often results in severe environmental and social harm, including habitat destruction, water pollution and poor working conditions[47]. Recycling capacity for these technologies, especially batteries, remains limited[48], raising further concerns around waste and pollution. This complicates the perception of renewables as "clean" and underscores the need for responsible sourcing, sustainable supply chains, and investment in recycling infrastructure.

The transition also threatens jobs in fossil fuel sectors – such as coal mining and oil extraction – especially in regions heavily dependent on them. In South Africa, for example, the coal sector remains a major employer, and a shift to renewables could lead to job losses and economic disruption[49]. Balancing the benefits of renewables with the social costs of the transition is critical to ensuring a just and equitable process that protects employment and community well-being.

These trade-offs also raise questions about Africa's future in the global economy. Will it remain a raw-material exporter or move towards innovation-driven sectors? Challenges such as the environmental cost and waste associated with renewable technologies must be addressed. This will require investment in R&D to improve technology efficiency and affordability, alongside policies that foster a sustainable renewable energy industry.

EMPLOYER ENGAGED
458,954
INDIVIDUALS
IN **2021**, 4.7%
OF WORKFORCE

47 Zheng, M. (2023). The Environmental Impacts of Lithium and Cobalt Mining.
48 Dror et al. (2022). 3 challenges en route to electric vehicle batteries driving the circular economy.
49 World Resources Institute (2021). South Africa: Strong Foundations for a Just Transition.

5.2. Harnessing the opportunity

Resilient energy systems can act as a safeguard against increasing vulnerabilities, climate-related stressors and hazards. Integrating renewable energy creates opportunities to improve efficiency, address service reliability, and unlock broader macroeconomic potential – stimulating fresh avenues of development.

By managing fossil fuel investments carefully, leveraging renewable energy potential, and optimizing critical mineral resources, African countries can foster industrialization, promote sustainable growth, and seize opportunities in the green economy. Proactive planning and early action will be essential to minimize economic disruptions and ensure a just and resilient transition. A gradual, inclusive approach – with reskilling programmes and social safety nets – can reduce social impacts and equip workers with the skills needed for new green jobs. Ensuring local equity and ownership in green energy projects is essential for a just transition.

Social equality should be central to climate programs design, to ensure that costs and benefits are distributed fairly. Local participation and ownership in clean energy initiatives, such as solar or wind projects, can maximize domestic value creation, strengthen economic resilience, and help manage the social and economic impacts of stranded fossil fuel assets.

To navigate this complex transition, Africa must improve resource management, develop local value chains, and attract sustainable investment. A dual approach – scaling renewables while strategically utilizing fossil fuel like natural gas in the short term – can help minimize disruption and support long-term transformation.

6. Conclusion & Recommendations

The success of Africa's green transition depends on whether it delivers just outcomes. This means protecting workers and economies from the costs of stranded assets, ensuring that local people own and benefit from new green industries, and shielding countries from falling into debt traps and unfair trade penalties. Justice in Africa's green transition means rebalancing power — moving from extraction toward sovereignty, equity, and inclusive development. Tackling the dealbreakers of finance, justice, and development is essential for a truly transformative green future.

Africa's energy transition presents both a profound opportunity and a complex challenge. Seizing its full potential will require strategic clarity, decisive action, and international cooperation. The following recommendations set out key policy, financing, and governance priorities to support a just, inclusive, and development-first transition – on Africa's terms.

Assess opportunity costs and long-term risks

Policymakers should conduct a thorough evaluation of the opportunity costs and long-term risks associated with continued fossil fuel investment. This includes assessing potential financial, environmental and social impacts. Given the declining costs of renewables and the escalating risks linked to fossil fuels, including stranded assets, climate change and air pollution, renewables are increasingly emerging as the more sustainable, economically viable and responsible long-term choice.

Manage the pace of the transition

Flexible transition timelines are essential. They acknowledge the unique challenges and developmental stages across African countries and allow transitions to proceed at a pace that safeguards sustainable development while contributing to global climate goals. Revenues from fossil fuel exports can be strategically used to finance renewable energy projects and broader transition efforts. It will be critical to capitalize on fossil fuel assets before they become stranded.

Focus on transition minerals and technology development

Africa must recognize and respond to rising global demand for the critical minerals necessary for clean-energy technologies. At the same time, investment in ICT and digital technologies will be crucial for modern industrialization and the energy transition. This includes scaling mining and processing capacity, while ensuring these gains support broader developmental goals. Value chains for critical green minerals must be built with adequate local content and ownership for maximum benefits. Legislation should be introduced to combat illegal mining, ensure safe and sustainable practices and engage local communities.

Promote local content and ownership

Local content policies and community ownership models – across both fossil fuel and clean energy sectors – can drive inclusive growth, create jobs, and integrate communities into the energy value chain. Empowering local participation and ownership in clean energy projects, such as solar and wind, will enhance domestic value creation, strengthen economic resilience, and reduce the social and economic costs of transitioning from stranded fossil fuel assets.

Leverage concessional funding and regional infrastructure investments

Public-sector concessional funding remains vital for developing critical energy infrastructure, especially transmission and distribution. These investments are foundational to scaling both upstream and downstream renewable energy projects and building resilient, sustainable energy systems. Regional approaches to infrastructure can ease transition pressures and advance continental integration.

Unlock private-sector development and financing.

To mitigate losses from stranded assets, governments should create enabling environments that attract private investment. This includes improving regulatory transparency, reducing risk, offering targeted incentives, and using blended finance models. The private sector is key to bridging financing gaps and ensuring a stable transition – especially through public-private partnerships and risk-sharing mechanisms. Emerging opportunities in green hydrogen, decentralized clean energy, and clean tech manufacturing should be prioritized.

Institutionalize transparency and accountability measures in resource allocation

Strong governance is essential to ensure fossil fuel revenues are reinvested in the transition. Mechanisms such as public audits, blockchain tracking, and independent oversight committees can improve transparency and curb corruption. Nigeria's Renewable Energy Master Plan (REMP) aims to channel oil revenues into clean energy, targeting a 10% share of total energy consumption by 2025. The Nigeria Extractive Industries Transparency Initiative (NEITI), aligned with global EITI standards, offers a model for oil revenue governance that could be extended to renewable reinvestment. Sierra Leone's blockchain land registry also provides a template for tracking energy revenues and contracts.

Establish monitoring and evaluation frameworks with carbon tracking

Robust monitoring and evaluation systems are needed to track progress on transition goals and inform policy adjustments. These should track key metrics, including carbon emissions in industrial production, to help reduce exposure to instruments like the EU's Carbon Border Adjustment Mechanism (CBAM). A strong M&E framework will also support green industrialization and guide the shift away from stranded fossil fuel assets.

Strengthen social safety nets for a just transition

Social equality must underpin climate action. Strengthened social protections – including reskilling programs, income support, and job placement services – are needed for workers impacted by the transition, especially in fossil-fuel dependent regions such as South Africa's Mpumalanga or Nigeria's Niger Delta. Strategies should include vocational training in clean energy and community-based economic diversification, to mitigate disruption and promote a fair transition.

Foster collaboration and partnerships

Partnerships across government, the private sector, civil society, and international actors will be key to a successful transition. Regional and continental cooperation can support knowledge exchange, pool resources, and catalyze energy investments. Regional economic communities and the African Continental Free Trade Area (AfCFTA) offer platforms to scale low-carbon transition efforts across borders.

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