AFRICA'S CARBON MARKET RESILIENCE AMID GEOPOLITICAL SHIFTS



Gaps, Opportunities and Resilience Strategies

2026

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Foreword

Years ago, in the Zambezi Valley, I stood beside a farmer at the edge of his small maize field. A bull elephant had been through in the night. A season's work, his family's food and the school fees lay flattened in the red soil. He looked at the ruin, then at me, a young resource economist who had come to study the very animal that did it, and he asked what the elephant was worth to him.

In 1997, in a conference hall in Harare, governments were insisting the elephant was worth a great deal. They were right. But none of that worth was reaching him. The same animal. Two opposite values.

Carbon markets are the newest attempt to answer his question. What is a standing forest worth, and who gets paid? This report asks a harder version. When a buyer withdraws or the price falls, can the work go on, and can families still count on an income?

My view is that a carbon project is only as resilient as the economy around it. I call that wider economy a landscape economy. One landscape can earn from visitors, from locally processed natural products, from paid restoration work, from renewable energy, from regulated hunting and from carbon. Different activities suit different parts of the land, and no single hectare will carry them all. But a community with several incomes can survive a bad year, and a community that depends on one buyer cannot. I call this a revenue stack. Carbon is one layer of it, and never the whole.

Three conditions make a stack work. First, communities need recognized rights, meaningful consent, a fair share of the proceeds and agreements they can enforce. Second, someone must pay for the preparation: settling who holds the rights, who will pay and how income is shared, before investors arrive. That is work for public institutions and development partners, and the finance that follows must be patient enough for restoration that takes years.

Third, integrity. Reductions must be real and independently verified, and under Article 6 of the Paris Agreement, governments must account properly for international transfers and protect their own climate commitments.

This report maps where Africa is strong, where it is stuck and the choices that can build more resilient markets. It gives governments, investors and development partners a practical agenda. African countries have much to gain by working together, pooling projects, aligning policies and negotiating with more weight. Through the Africa Sustainable Finance Hub, UNDP is working with governments and partners to prepare credible projects, strengthen institutions and bring in finance. I thank the colleagues, governments and partners whose work made this report possible.

The farmer asked what the elephant was worth to him. Let us build markets that can answer him, and that are still serving his children when the buyer has gone.



Maxwell Gomera

maxwell gomera

Director, UNDP Africa Sustainable Finance Hub
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Executive summary

Global carbon markets are undergoing structural transformation driven by the operationalization of Article 6 of the Paris Agreement, tightening integrity standards in the voluntary carbon market (VCM) and increasing scrutiny of credit quality. Market forecasts of near-term opportunity suggest that Article 6.2 volumes could reach 220 $MtCO_2e$ by 2030[1]. Beyond this date, markets for high-integrity credits are expected to increase substantially with the European Union's recent decision to permit the use of high-quality international credits for up to five percent of 1990 net emissions from 2036 towards achieving 2040 climate policy targets, adding an estimated 220 $MtCO_2e$ of Article 6 demand over 2030–2040. However, Africa's ability to capture growing demand has been constrained by the integrity transition, which responds to heightened scrutiny of whether carbon credits represent real, measurable, durable and additional carbon abatement. The response to demand and resulting changes in market rules have significantly affected methodologies across several project categories, particularly REDD+ and clean cookstoves, which have historically accounted for nearly 80 percent of Africa's credit retirements.

Currently, Africa is a significant participant in global voluntary carbon markets, with a modest presence in higher-value compliance markets. The continent supplies a quarter of retired credits, amounting to over 220 $MtCO_2e$ in 2024, with market share steadily increasing. However, only a limited number of countries have operational Article 6 authorization and registry systems. Furthermore, Article 6.2 transactions remain at an early stage. At the time of writing, Ghana's delivery of approximately 12,000 internationally transferred mitigation outcomes (ITMOs) to Switzerland remains Africa's only completed ITMO transfer to date. However, this is changing: Africa's bilateral ITMO supply in the current pipeline is estimated at 6.7 $MtCO_2e$ by 2030. This implies near-term conservative revenues of US$180 million to US$360 million ($30–$60 per ton). Further, the transition of eligible CDM credits (approximately 195 $MtCO_2e$) to Article 6.4 could generate a substantial $2 billion to $4 billion by 2030, subject to applicable eligibility and transition requirements, buyer demand and pricing assumptions.

Africa is well positioned to capture growing demand as a net exporter of carbon credits, suggesting carbon export revenue could become a larger share of its international climate finance receipts, of which it currently accounts for less than one percent. While Africa contributes less than four percent of global greenhouse gas emissions, it holds a substantial reserve of global nature-based mitigation potential, including forests, peatlands, mangroves and regenerative agriculture systems. Further, it possesses some of the world's most abundant solar resources, with high urbanization and growth rates enabling the energy transition and positioning the continent strongly for renewable-based mitigation. ACMI estimates Africa's technical mitigation potential at 2,400 $MtCO_2e$ a year: close to 30 times current annual VCM retirements. This considerable supply opportunity supports its forecast that Africa could sell 300 million credits annually, mobilizing $6 billion for sustainable development. At the same time, demand is expanding beyond voluntary markets towards compliance-linked mechanisms, including the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) and Article 6 cooperation, broadening the potential buyer base for high-integrity African credits.

This report assesses Africa's carbon market readiness, vulnerability and resilience, providing a perspective on how African countries can effectively navigate demand-side volatility and changing market rules to capture maximum market value as climate mitigation potential is realized. In doing so, it considers the diversity of carbon market trajectories in Africa – from export leaders such as Ghana and Kenya to industrialized economies with well-developed financial sectors such as Egypt and South Africa, and forest-rich countries with significant REDD+ potential, like the Democratic Republic of the Congo. Both Article 6 and VCM readiness and participation are considered.

Some common gaps emerge, highlighting the need for strategic action:

- First, gaps in governance, policy and institutions are likely the largest barriers to improved transaction outcomes, frequently restricting offtake possibilities to the VCM only, with lower requirements and prices;
- Second, gaps in African carbon technical capacity and financial architecture result in reliance on international players and donors, curbing the growth of bankable pipelines, reducing the share of onshore benefits and limiting private capital participation;
- Third, historically Africa's carbon project pipeline has not optimized value capture, due to subscale project size, a focus on lower-cost avoidance credits rather than higher-value removals, and occasionally weak project governance;
- Fourth, effectively navigating the landscape for demand has proven challenging, as a result of fragmented international market rules, weak domestic demand to anchor the industry and a lack of regional coordination.

Private sector participation will be critical to scaling African carbon markets beyond pilot activity. Project developers face persistent bankability challenges, including high upfront development costs, long verification timelines and revenue uncertainty linked to evolving integrity standards. Investors and lenders often perceive carbon projects as high risk due to price volatility, policy uncertainty, delivery risk and limited secondary market liquidity. Addressing these constraints through credit enhancement instruments, long-term offtake agreements, insurance solutions and clearer regulatory frameworks will be essential to mobilize institutional capital and enable locally led project development.

Analysis highlights that Africa's strategic opportunity lies not in expanding volume alone, but also in:

- Building compliance-grade institutional architecture to enable access to high-value sources of demand, drawing on regional capabilities and centres of excellence;
- Growing human capital, not only to strengthen local institutions and project pipelines but also to enable effective commercialization through international negotiation aligned to the objectives of Africa's national carbon market strategies;
- Closing gaps in financial architecture by lowering the transaction barriers that constrain participation by local developers and implementation of novel methodologies, and introducing credit enhancement instruments that derisk private-sector participation;
- Capturing resilient, high-value demand through a three-pronged strategy: scaling high-integrity, Core Carbon Principles-aligned methodologies – diversifying towards technology-driven emission reductions and both nature-based and engineered removal credits; targeting premium buyers; and expanding access to and the volume of domestic offset demand through carbon pricing mechanisms.

To capture this opportunity, a strategic roadmap is presented, centering on UNDP's vision for carbon markets and integrating the actions African governments need to take to implement dual-track market strategies spanning both Article 6 and voluntary markets. This approach recognizes that carbon markets have largely converged on the supply side. It emphasizes the need to establish a robust policy and legal foundation first. Achieving sound governance, institutions and data integrity emerges as the second critical pillar. Third, the importance of an effective carbon supply strategy is recognized as central to developing resilience through diversification and alignment to new standards. Fourth, the roadmap identifies governments as market shapers in a rapidly evolving landscape. Fifth, the roadmap addresses the finance architecture required to achieve scale, recognizing the importance of project preparation and investment derisking to attract private capital and reduce reliance on foreign investment.

Finally, a concise country playbook is provided, outlining a clearly sequenced set of actions to guide policymakers towards full carbon market readiness:

- Horizon 1 focuses on laying foundations for market participation. This is where countries define a national carbon market strategy, legislate the essentials, and establish the core policy and legal framework;
- Horizon 2 focuses on optimizing carbon revenues by shifting from basic readiness to strategic positioning. The emphasis is on improving price realization, strengthening demand alignment and building a more resilient and bankable supply pipeline that can perform under tightening integrity standards;
- Horizon 3 focuses on strengthening market participation by moving from transaction readiness to sustained market performance. The emphasis is on building credibility at scale, reducing transaction friction, and securing durable participation through transparency, predictable rules and stronger regional coordination.

Glossary

Term	Full form/description
A6.4ERs	Article 6.4 emission reductions
A6IP	Article 6 Implementation Partnership
AAPCM	Africa Action Plan on Carbon Markets
ABM	Adaptation Benefits Mechanism
ACMI	Africa Carbon Markets Initiative
ADB	Asian Development Bank
AEF	Agreed electronic format
AfDB	African Development Bank
AFOLU	Agriculture, forestry and other land use
AGN	African Group of Negotiators
AMC	Advance market commitments
API	Application programming interface
ARMCA	*Autorité de Régulation du Marché du Carbone*
ARR	Afforestation, reforestation and revegetation
Article 6	Article 6 of the Paris Agreement
Article 6.2	Article 6.2 of the Paris Agreement–cooperative approaches
Article 6.4	Article 6.4 of the Paris Agreement–mechanism for mitigation
ART–TREES	Architecture for REDD+ transactions–The REDD+ environmental excellence standard
AU	African Union
AU CCMF	African Union Continental carbon market framework
AUDA	African Union Development Agency
AUDA-NEPAD	African Union Development Agency-New Partnership for Africa's Development
BAU	Business as usual
CAD	Climate action data
CAFI	Central African Forest Initiative
CAIT	Climate Analysis Indicators Tool
CARP	Centralized accounting and reporting platform
CBAM	Carbon border adjustment mechanism
CCB	Climate, Community and Biodiversity
CCP	Core Carbon Principles
CCS	Carbon capture and storage
CDM	Clean development mechanism
CDR	Carbon dioxide removal
CEMAC	Economic and Monetary Community of Central Africa
CMAP	Carbon market activation plan
COAS	Carbon Offset Administration System
COMESA	Common Market for Eastern and Southern Africa
COP	Conference of the Parties (UNFCCC)
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CPAT	Climate policy assessment tool
DEE	Department of Electricity and Energy
DFFE	Department of Forestry, Fisheries and the Environment
DFI	Development Finance Institution
DNA	Designated national authority
DRC	Democratic Republic of the Congo
EAC	East African Community
ECCAS	Economic Community of Central African States
ECOWAS	Economic Community of West African States
EEU	Eligible emission unit (CORSIA)
EGCX	Egyptian Climate Exchange
EGX	Egyptian Exchange
EOL	Economy of Love
EPA	Environmental Protection Authority
ERPA	Emissions reduction purchase agreements
ESG	Environmental, social and governance

Term	Full form/description
ETS	Emissions trading system
EU	European Union
EV	Electric vehicle
FAPA	Fund for African Private Sector Assistance
FPIC	Free, prior and informed consent
FRA	Financial Regulatory Authority
FTC	Federal Trade Commission
FX	Foreign exchange
GDP	Gross domestic product
GGGI	Global Green Growth Institute
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GS	Gold Standard for the Global Goals
HFC-23	Hydrofluorocarbon-23
HHI	Herfindahl-Hirschman Index
HICMI	High-Integrity Carbon Markets Initiative
ICAO	International Civil Aviation Organization
ICP	Independent crediting programme
ICROA	International Carbon Reduction and Offset Alliance
ICVCM	Integrity Council for the Voluntary Carbon Market
IETA	International Emissions Trading Association
IFM	Improved forest management
IFRS	International Financial Reporting Standards
IMF	International Monetary Fund
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial processes and product use
ISO	International Organization for Standardization
ITMO	Internationally transferred mitigation outcome
JCM	Joint Crediting Mechanism
JNR	Jurisdictional and Nested REDD+
JSE	Johannesburg Stock Exchange
KEPSA	Kenya Private Sector Alliance
LDC	Least developed country
LEAF	Lowering Emissions by Accelerating Forest finance
LoA	Letter of authorization
MACC	Marginal abatement cost curve
MIGA	Multilateral Investment Guarantee Agency
MOPA	Mitigation outcome purchase agreement
MoU	Memorandum of understanding
MRV	Measurement, reporting and verification
$MtCO_2e$	Million tons of carbon dioxide equivalent
NbS	Nature-based solutions
NCO	National carbon office
NDC	Nationally determined contribution
NDF	Nordic Development Fund
NEMA	National Environment Management Authority
NGO	Non-governmental organization
NMA	Non-market approach
ODA	Official development assistance
OECD	Organisation for Economic Co-operation and Development
OIMP	Other international mitigation purposes
OMGE	Overall mitigation in global emissions
PACM	Paris Agreement crediting mechanism
PCM	Post-crediting monitoring
PMI	Partnership for Market Implementation (World Bank)
PPF	Project preparation facilities
PPPs	Public-private partnerships
PV	Photovoltaic
RE100	Renewable Energy 100% initiative
REDD+	Reducing emissions from deforestation and forest degradation (plus conservation, sustainable forest management, and enhancement of forest carbon stocks)

Term	Full form/description
RFP	Request for proposal
SA	South Africa
SADC	Southern African Development Community
SBTi	Science Based Targets initiative
SDG	Sustainable Development Goal
SIDA	Swedish International Development Cooperation Agency
SME	Small and medium enterprises
SOP	Standard operating procedure
Swedfund	Swedish development finance institution
tCO_2e	Tons of carbon dioxide equivalent
TPDDTEC	Technologies and practices to displace decentralized thermal energy consumption
UMD	University of Maryland
UNDP	United Nations Development Programme
UNEP-CCC	United Nations Environment Programme Copenhagen Climate Centre
UNFCCC	United Nations Framework Convention on Climate Change
USA	United States of America
VCM	Voluntary carbon market
VCMI	Voluntary Carbon Markets Integrity Initiative
VCS	Verified Carbon Standard (now Verra VCS)
Verra	Independent carbon crediting body managing VCS and CCB
VM/VMR	Verified methodology (Verra)
VM0032	Verified methodology for the Adoption of Sustainable Grasslands through Adjustment of Fire and Grazing
VMR0006	Verified methodology for energy efficiency and fuel-switch measures in thermal applications
VM0007	Verified methodology on REDD+ Methodology Framework
VM0009	Verified methodology for avoided ecosystem conversion
VM0015	Verified methodology for avoided unplanned deforestation
VM0050	Verified methodology for energy efficiency and fuel-switch measures in cookstoves
VVB	Validation and verification body
WASH	Water, sanitation and hygiene
WDI	World Development Indicators

1. Introduction

Carbon markets are increasingly viewed as a critical source of finance for sustainable development, especially as official development assistance declines amid shifting geopolitical priorities. For Africa, where approximately 90 percent of climate finance has historically come from international public funding[2], developing carbon projects has become central to future climate and economic strategies. Carbon finance can provide African countries with an additional source of funding while respecting national sovereignty and development priorities, without necessarily increasing public debt, and supporting projects that deliver mitigation and, where applicable, adaptation benefits. Land-based project types, such as agriculture and forestry, are central to most African nationally determined contributions (NDCs) and directly underpin the livelihoods of millions of people, placing carbon market development central to the continent's sustainable development agenda.

The continent stands at a critical juncture in the global carbon market landscape. While Africa contributes less than four percent of global greenhouse gas (GHG) emissions[3,4], it possesses significant opportunities for emissions reductions and removals. These opportunities span natural ecosystems, including forests, peatlands, mangroves and agricultural landscapes, as well as renewable energy resources[5]. The continent is home to more than 60 percent of the world's best solar resources[6], offering significant potential for renewable energy-based mitigation.

Despite these natural advantages, African countries accounted for approximately 20 percent of VCM credit issuances in 2024[7], while participation in compliance carbon markets remains at an early stage. Ghana's transfer of approximately 12,000 internationally transferred mitigation outcomes (ITMOs) to Switzerland[8] in 2025 remains the only completed Article 6 transaction in Africa at the time of writing. At the same time, global carbon markets are undergoing a rapid transition. Article 6 of the Paris Agreement is evolving, with new rules governing authorization, corresponding adjustments and accounting. In parallel, voluntary carbon markets are being reshaped by tightening integrity standards, independent assessments, increased buyer scrutiny and evolving market dynamics. These developments present both opportunities and challenges for African countries participating in international carbon markets.

Against this backdrop, African governments are increasingly exploring how carbon markets can support national development priorities, including energy access, nature conservation, climate resilience and economic growth. Countries are establishing national carbon-market frameworks, strengthening measurement, reporting and verification (MRV) systems, and pursuing bilateral arrangements for Article 6 cooperation to mobilize finance and support high-integrity market participation. Progress on these developments varies across the continent, highlighting the importance of country-led approaches that reflect national circumstances, safeguard NDC achievement and ensure equitable development benefits.

In this context, UNDP plays five roles in supporting the development of African carbon markets. First, it supports governments to develop national carbon-market strategies, legal frameworks and institutional pathways for participation in international, including Article 6, and domestic carbon markets. Second, it supports the development and implementation of high-integrity, investment-ready project pipelines through project identification and screening, feasibility assessments, project documentation, MRV design, environmental and social safeguards, while strengthening national capacity to advance projects towards validation, authorization and transactions. **Through this support, UNDP strengthens the capacity of national institutions and project developers to translate mitigation opportunities into viable activities aligned with national climate and development priorities.**

Third, through its High-Integrity Carbon Markets Initiative, UNDP supports the development and application of principles, guidelines and guardrails that promote real, additional and verifiable emissions reductions and removals, alongside broader sustainable development benefits. Fourth, it facilitates partnerships among governments, project developers, financial institutions, and investors to mobilize finance, strengthen project bankability and advance pipeline implementation. Finally, UNDP plays an advocacy and convening role, supporting knowledge exchange, regional cooperation and engagement in international policy processes to strengthen Africa's carbon markets agenda.

This report presents a comprehensive analysis of Africa's current readiness and strategic positioning within global carbon markets. It provides an integrated assessment of policy frameworks, institutional capacity, MRV and registry systems, market exposure, risk profiles and investment prospects across the continent. Drawing on market intelligence and stakeholder insights, comparative country assessments and analysis of the evolving global carbon market governance architecture, this report examines both Africa's strengths and its structural challenges. It highlights the importance of alignment between national climate plans, NDCs and carbon market engagement, as well as coherent policies for maintaining environmental integrity, avoiding double counting and strengthening investor confidence. The analysis indicates that Africa's success in carbon markets will depend not only on technical capacity but also on political coordination, regional harmonization and the robustness of institutional architectures.

This report is organized into four key sections. The first section, Market readiness, assesses the extent to which African countries have established the institutional, legal, technical and governance foundations required to participate in Article 6 and VCMs. It draws on country case studies and continental frameworks to identify readiness gaps and emerging areas of leadership. The second section, Vulnerability and resilience, evaluates Africa's exposure to global market risks, including shifting integrity requirements, project concentration, evolving buyer preferences and broader geopolitical dynamics. It identifies the factors that

shape countries' resilience to these risks. The third section, Gaps and opportunities, maps the systemic constraints that have historically limited Africa's participation in carbon markets, while outlining the opportunities available to countries as global markets evolve. These include opportunities to strengthen regulatory clarity, enhance MRV systems, improve safeguard frameworks, attract investment and leverage regional cooperation. The concluding section, Strategy roadmap, presents a forward-looking framework to guide governments, regional bodies and development partners in building high-integrity, investment-ready carbon market ecosystems capable of delivering durable climate and development benefits.

Together, these analyses provide a detailed and forward-looking view of how African countries can position themselves to participate meaningfully in the global carbon economy. The report identifies the measures required to build robust national systems, attract high-integrity investment and strengthen the conditions for carbon markets to deliver real climate impact while supporting economic transformation across the continent.



A team reviews plans beside a solar installation.
Photo: licensed

2. Analytical framework and limitations

This report was developed amid significant changes in the political environment[9], the international carbon market architecture and African carbon market policy institutions. These dynamics have created uncertainty around market design, demand and supply outlooks, and institutional readiness, which are reflected in the report's analytical approach. A key objective is to support African policymakers in developing resilient carbon market strategies that can respond to this uncertainty.

To account for these uncertainties and provide a basis for the analysis, the study adopted a three-pronged approach:

- Desktop review: A comprehensive review of secondary literature and databases was undertaken to establish the evidence base for the analysis. This included mapping country readiness, as well as key gaps and opportunities;
- Key informant interviews: Interviews were conducted with diverse stakeholders across government institutions and regulatory authorities; private-sector market participants, including banks, project developers and carbon consultants; and researchers and technical experts with experience in climate policy and carbon markets. Enablers such as capacity-building organizations and development finance institutions were also consulted to inform the identification of practical solutions and enabling conditions. Senior experts and decision makers provided their perspectives, mostly on an anonymized basis. A synthesis of interview findings is provided in the data appendix;
- Analysis: The study adopted a comparative case study approach to establish a baseline for assessing country readiness and vulnerability, examining five African countries selected to reflect different geographic regions, levels of market maturity and institutional contexts. The analysis informed the development of resilience strategies, taking into account the diversity of national experience and market outlooks across the continent.

To assess vulnerability to different risks and uncertainties, the study developed a framework examining three dimensions: exposure and sensitivity to market shocks, and resilience (adaptive capacity). Where feasible, scenario analysis was explored to assess the impact of different strategies influencing carbon finance flows to the continent.

Notwithstanding the careful analytical framework design, several risks and limitations remain:

- The analysis may be affected by outdated secondary information, particularly given the rapid evolution of domestic policy and institutions across Africa, as well as international carbon market trends and the Article 6 architecture;
- Some policy conclusions may not be applicable to African countries that were not examined in detail in this study. Policymakers should therefore assess the recommendations in the context of their domestic policy, institutional and market conditions;
- The analysis may not fully reflect the perspectives of all stakeholders, owing to limitations in the study's scope and stakeholder availability and access. This limitation is particularly relevant to policymakers, whose availability for consultation was limited during the preparation of the report, and to local communities, as the study did not include fieldwork.

3. Market readiness



Photo by: UNDP

OVERVIEW

Africa has become a major supplier in voluntary carbon markets, accounting for about a fifth of global voluntary market issuances and a quarter of retirements. However, this position has not yet translated into commensurate value capture. Supply remains heavily concentrated in project types such as REDD+ and clean cookstoves, which have historically attracted lower prices in some market segments. This can expose African markets to evolving integrity requirements and shifting buyer preferences, increasing vulnerability to price pressures and demand shocks. Carbon revenues have also not consistently translated into local development benefits, underscoring the importance of transparent benefit-sharing frameworks and domestic value retention.

Against this backdrop, this section critically assesses Africa's readiness to participate in global carbon markets, focusing on the institutional, regulatory and operational conditions required to transact in international markets. The objective is to evaluate the continent's ability to capture emerging demand for high-integrity carbon credits while navigating a nascent, fragmented and rapidly evolving market. The assessment highlights how gaps in readiness influence competitiveness in both the VCM and Article 6 markets and informs the development of carbon market strategies. Emerging compliance demand channels, including Article 6 cooperative approaches and CORSIA, further underscore the importance of readiness and market alignment.

The analysis begins with an overview of Article 6 and VCM developments, highlighting how integrity reforms, evolving rules and new market safeguards are reshaping global demand and influencing market activity. Africa's supply position is examined through analysis of issuance volumes, pricing performance and project-type composition, drawing on sources including the Berkeley Carbon Trading Project VCM database, BeZero Carbon, Sylvera carbon markets intelligence and publicly reported Article 6 transactions. The analysis highlights Africa's growth as a significant source of carbon credits over the past five years and the continent's early progress in operationalizing Article 6.2 agreements, identifying countries that are emerging as key carbon credit producers.

Host-country carbon market readiness is then assessed as a determinant of Africa's ability to increase its share of carbon market revenues. Five country case studies, reflecting diverse regions, levels of market maturity and institutional contexts, are used to examine emissions profiles, abatement potential, policy developments, institutional arrangements and market ecosystem development.

The assessment finds that readiness gaps are particularly evident at the institutional level. While many African countries have signalled their intention to participate in carbon markets through national climate strategies, fewer than a third have established the full set of operational elements required to transact at scale across international carbon markets. These institutional gaps can constrain access to higher-value Article 6 demand, which requires clear authorization procedures, corresponding adjustment arrangements and interoperable registry systems. As a result, engagement under Article 6 has so far remained concentrated among a small number of early movers, despite growing international demand for compliance-grade credits.

Technical capacity constraints also affect readiness. Underdeveloped MRV systems, limited adoption of digital MRV tools and a shortage of locally based validation and verification bodies can increase transaction costs and extend project development timelines. These constraints may be particularly challenging for smaller and locally led developers, potentially reinforcing reliance on foreign intermediaries and contributing to the outward flow of associated revenues.

Country-level analysis reveals significant divergence in readiness. This indicates that targeted, sequenced interventions are required rather than one-size-fits-all solutions. Ghana and Kenya demonstrate comparatively high adaptive capacity, supported by operational Article 6 frameworks and growing institutional maturity enabling additional value capture. Large emitters South Africa and Egypt are advancing strong domestic market structures that could support future scaling through decarbonization of energy systems and strengthened market resilience. Countries with substantial carbon crediting potential, such as the Democratic Republic of the Congo, continue to face governance and institutional challenges.

In conclusion, Africa's ability to benefit from expanding demand for high-quality, high-integrity carbon credits depends less on resource availability than on the speed and coherence with which enabling institutions, rules and systems are established.

3.1. Market overview

3.1.1. Article 6 markets

3.1.1.1. Status

Article 6 of the Paris Agreement was adopted at COP21 in 2015 as a **framework for countries to cooperate in achieving their climate targets.** The Paris Agreement, which succeeded the Kyoto Protocol, requires all Parties to prepare, communicate and maintain successive nationally determined contributions (NDCs), whereas the Kyoto Protocol established binding emissions reduction commitments primarily for developed countries[10]. Article 6 builds on the legacy of the Kyoto Protocol's market mechanisms, namely the clean development mechanism (CDM), joint implementation and emissions trading, within a framework in which all Parties have NDCs[11]. At its core, Article 6 established a framework for an international compliance carbon market within the Paris Agreement regime, recognizing that countries can achieve greater emissions reductions through international cooperation, including the transfer of mitigation outcomes and directing investment towards cost-effective mitigation opportunities.

Alongside Article 6, the global compliance landscape also includes sector-specific mechanisms such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), discussed in **Box 1** below, which requires airlines to meet applicable offsetting requirements using eligible emissions units[12]. While CORSIA operates outside the Paris Agreement framework, it incorporates requirements related to host-country authorization and accounting to address the risk of double counting[13]. This creates an additional source of compliance demand that may interact with Article 6 transactions.

Box 1. CORSIA participation and implications

CORSIA, administered by the International Civil Aviation Organization (ICAO)[14], represents an additional compliance market demand channel relevant to African carbon credit suppliers. While CORSIA operates separately from Article 6 mechanisms, there are areas of alignment between the two frameworks, particularly in relation to host-country authorization, eligibility requirements and measures to address double counting.

CORSIA eligibility is determined by ICAO-approved standards and methodologies. Only emissions units issued from approved programmes and methodologies may be used by airlines for compliance. Certain credit types, particularly some nature-based solutions, face stricter eligibility limitations compared to voluntary markets.

Major registries now tag credits that meet CORSIA eligibility criteria. Host countries can use the Article 6.2 authorization procedure for CORSIA units; however, governments must ensure that eligible credits are correctly tracked[14], authorized where required, and transparently recorded, with corresponding adjustments applied, to prevent double counting.

For African countries, aligning project pipelines with CORSIA-approved methodologies and ensuring registry readiness can provide an additional source of stable compliance demand while strengthening overall market credibility.

Article 6 of the Paris Agreement establishes three cooperative approaches that enable countries to achieve their climate goals. These include two market-based mechanisms, namely, bilateral cooperative approaches under Article 6.2 and the Paris Agreement crediting mechanism (PACM) through Article 6.4, as well as a framework for non-market approaches (NMAs) through Article 6.8[15].

Article 6.2 covers cooperative approaches, which are bilateral or multilateral agreements where a buying country purchases mitigation outcomes from a country that hosts an emissions reduction project to use towards its own NDC[12]. These cooperative approaches are decentralized, as any two or more countries can agree to trade internationally transferred mitigation outcomes (ITMOs) provided that the countries apply corresponding adjustments so that each ITMO is counted only once toward a national target. This decentralized structure contrasts with Article 6.4, which establishes a centralized UN-supervised crediting mechanism with standardized rules and issuance processes.

Japan's Joint Crediting Mechanism (JCM) is a leading example of a bilateral cooperative mechanism that operates similarly to Article 6.2. This is done by enabling the transfer of mitigation outcomes between Japan and partner countries in exchange for investment in low-carbon technologies. Launched in 2013, before the Paris Agreement, the JCM is a bilateral carbon crediting system that Japan developed to finance emission-reduction projects in developing countries and share the resulting credits[16]. Under the JCM, Japanese companies invest in low-carbon technologies in partner countries, and the emissions reduced are quantified and allocated between Japan and the host country. In other words, a portion of the credits is issued to Japan to count toward its NDCs, while the host country also benefits from the technology and part of the credit. The JCM is widely seen as a prototype of how decentralized bilateral cooperative approaches can work under Article 6.2[11]. With the introduction of Article 6.2, Japan has been adjusting the JCM to fully comply with Article 6 rules and processes[17]. The integration of JCM agreements and projects into the Article 6 framework classifies them under Article 6.2, even if many were initiated before its operationalization.

The Article 6.4 mechanism establishes a centralized crediting mechanism supervised by the Article 6.4 Supervisory Body, a United Nations (UN) entity[18]. Both private and public projects can register with the Supervisory Body and, upon achieving verified emissions reductions, can issue carbon credits. These credits, known as A6.4ERs, can be purchased by countries, companies or individuals[19]. Now known as the Paris Agreement Crediting Mechanism (PACM), this mechanism is viewed as the successor to the Kyoto Protocol CDM, which issued about 2.4 billion Certified Emission Reductions between 2005 and 2020[20]. While the aggregate primary traded value is not reported, the CDM would have generated from $5 billion to $15 billion for climate action in developing economies[21], yielding the world's first scalable market-based mechanism to facilitate financial flows from the Global North to the Global South. Since Article 6.4 also caters to corporate offsetting, conferring the credibility of a multilateral framework without requiring the

host country to remove transacted mitigation outcomes from its NDC compliance, it may eventually absorb much transactional volume in the VCM.

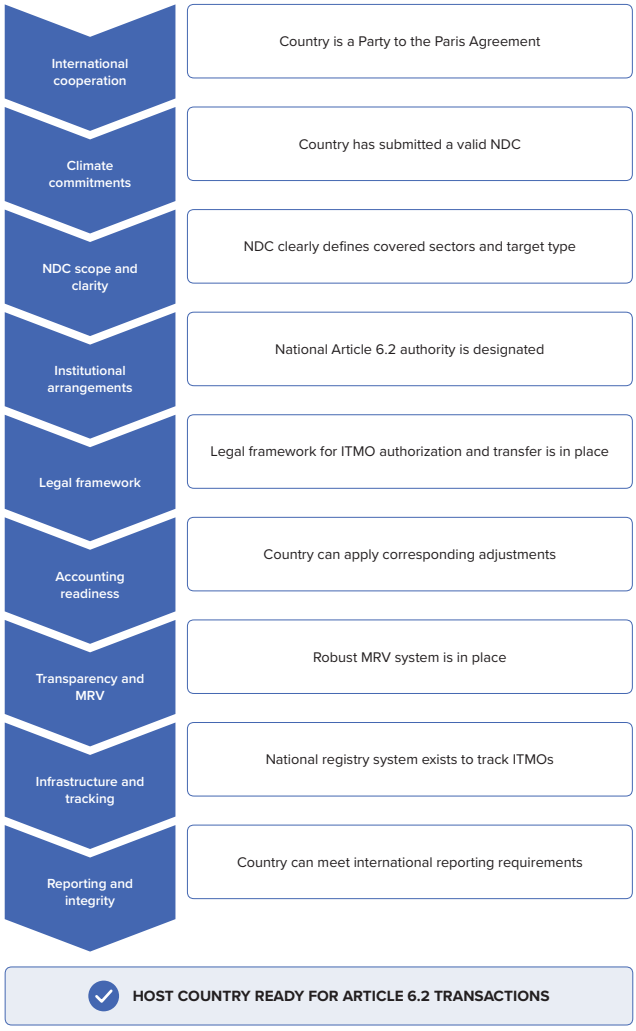
Article 6.8 outlines collaborative climate efforts outside carbon markets. Specifically, a country can provide climate finance, technology transfer or capacity building to support another country's implementation of NDCs, without involving the exchange of carbon credits. Although essential for comprehensive cooperation, Article 6.8 does not establish a market, meaning there are no designated 'buyers' or 'credits'. This distinction is particularly significant for adaptation and resilience initiatives, where measuring vulnerability reduction can be challenging.

The operationalization of Article 6 has advanced unevenly across its mechanisms. At international climate negotiations, there has been more focus on market-based mechanisms (Article 6.2 and 6.4)[22]. Article 6.2 is already operational, with several countries piloting authorized transfers.

Article 6.4, while now formally operationalized following COP29, is not yet fully implemented[23]. COP29 removed the final legal barriers by adopting the PACM standards, but Article 6.4 activities can only begin once the Supervisory Body accepts methodologies under the new rules and the registry infrastructure becomes functional. First issuance of Article 6.4 emission reductions (A6.4ERs) is expected in 2026, based on announcements made by the Supervisory Body at COP29[18]. The recently agreed PACM under Article 6.4 creates fresh market opportunities for emerging economies, but also carries significant integrity and systems risks given current gaps in MRV, standardization and tracking infrastructure. This reinforces the importance of strengthening national readiness before engaging at scale[24].

Although Article 6.8 was put into operation in 2022, its adoption has been slow[22], with the first project only registered at the beginning of 2025[25]. The absence of a detailed operational framework has hindered the implementation of NMAs, prompting the adoption of a work programme of NMAs at COP29 in 2024[26]. While this may help to advance operationalization, adoption may remain low, as many countries favour market-based mechanisms[27].

Figure 1. Host country readiness requirements for Article 6.2 participation.



3.1.1.2. Milestones and developments

After its introduction in 2015, the formalization of Article 6 rules was concluded in 2021. At COP26, an agreement was reached on the Paris Rulebook, establishing guidelines for Article 6.2 and Article 6.4[28]. Rules on avoiding double counting of carbon credits were outlined to ensure environmental integrity. Additionally, rules were established for transitioning certain CDM credits into Article 6.4, and it was agreed that five percent of proceeds from transactions under Article 6.4 would be allocated to the Adaptation Fund[29].

In 2022, the focus shifted to the implementation of Article 6 rules, including the establishment of the Article 6.4 Supervisory Body to begin technical work[30]. Efforts to develop infrastructure for tracking and verifying carbon markets continued to evolve as countries and stakeholders worked to operationalize these rules. Achievements included the development of draft guidance on methodologies, removals and registries, as well as a framework for the accreditation and authorization of credits.

The first pilots of Article 6.2 transactions took place in 2023. Countries are establishing digital registries to track ITMO transfers and deploying advanced MRV platforms that support accurate, transparent monitoring and reporting of emission reductions. The Ghana/Switzerland transaction in 2025 marked the first ITMO transfer between an African country and a developed nation, highlighting the potential of Article 6.2 to drive cooperative climate action[31].

Market access under Article 6.2 is determined by a host country's ability to demonstrate institutional and technical readiness. The most important indicators include:

- **Letters of authorization (LoAs) and standard operating procedures (SOPs)**: Countries must have established processes for authorizing activities and ITMO transfers. Each participating Party determines its own arrangements for authorizing the use of ITMOs toward NDC achievement, in line with its national circumstances, and institutional and legal systems[32]. Ghana provides an example of good practice; its national carbon market framework and operational manuals set out clear institutional arrangements for LoA issuance, benefit sharing, registry operation and ITMO transfers[33]. In contrast, the absence of such clarity in other countries often results in institutional overlaps or coordination challenges across sectors. Defining responsibilities across the entire value

chain is therefore critical to minimize coordination failures and enhance investor confidence;

- **Centralized accounting and reporting platform (CARP) reporting**: CARP provides the foundation for transparency, requiring regular reporting. Parties must submit information using the agreed electronic format by 15 April each year, covering all ITMO-related actions recorded in their national registry during the previous calendar year (1 January to 31 December)[28];
- **International registry connectivity**: Parties must either establish their own registries or connect through the international registry to enable transfers. Notably, the international registry and the related interim solution are still under development[28]. Once operational, the international registry will be integrated into the CARP and allow for interoperable connections to ensure transparent tracking from issuance to cancellation[34]. These will enable ITMOs to move between accounts in the same Party's section, to another Party's section, and to accounts in a connected or non-connected registry[35].

A comprehensive overview of Article 6.2 readiness requirements on a continuum reflecting a typical progression to full participation is shown in Figure 1.

Article 6 transactions are dependent on corresponding adjustments by host countries. Consequently, there is a growing demand for credits with LoA[36]. This is where the CARP under the United Nations Framework Convention on Climate Change (UNFCCC) becomes critical: it is the official repository where countries must submit detailed reports of ITMO authorizations, transfers and adjustments[37]. Without CARP submissions, buyers – sovereign nations under Article 6 – cannot verify whether credits are properly adjusted in national inventories, undermining the environmental integrity and credibility of the market. Thus, transparency hinges on CARP as it ensures alignment between international credit use, domestic accounting and compliance systems, safeguarding both sovereign climate commitments and corporate offsetting frameworks, while avoiding any issues related to double counting.

Article 6.2 is currently the only operational market mechanism under Article 6, meaning that all early-stage buyer activity is concentrated in bilateral cooperative approaches. In these transactions, carbon accounting rigour is viewed as critical to achieve global decarbonization. This focus on avoiding double counting of emission reductions limits demand for pre-Paris Agreement vintages (i.e. produced before 2021), requires host countries to engage in corresponding adjustment and necessitates conservative baselines and/or retirement buffers (known as overall mitigation in global emissions [OMGE] contributions)[38]. In the absence of an operational UNFCCC carbon crediting programme, however, transactions rely on the mainstream independent carbon programmes, i.e. Gold Standard and Verra. Project types range from community-based activities such as clean cookstoves and electric micromobility (Switzerland and Ghana) to industrial energy efficiency (Switzerland and Thailand). Carbon avoidance credits are widely accepted.

The adoption of Article 6.4 standards in 2024 at COP29 in Baku has removed the last legal barriers for implementation[15]. The Supervisory Body's work plan for 2025 includes finalizing accepted methodologies and establishing the registry infrastructure, with the first credits expected to be issued in 2026 following registry operationalization[15].

Key foundational elements of the Article 6.4 mechanism are now operational. Specifically, the Supervisory Body has approved the standard on methodology requirements to assess and develop projects, and a standard outlining rules for removal projects[15]. These standards came

Figure 2. Timeline of key developments influencing Article 6 activity.



into effect on 9 October 2024. In addition, the Supervisory Body has approved the first Article 6.4 methodology, marking a further significant milestone toward full operationalization of the mechanism[18]. The Supervisory Body also adopted procedures to launch an interim registry system that enables the issuance and tracking of A6.4ERs[15]. Crucially, the first CDM project transitions into PACM have also been approved, marking an operational milestone in leveraging existing project pipelines[15].

However, critical infrastructure and guidance for Article 6.4 remain under development. Key priorities include finalizing the Article 6.4 rulebook and establishing an official, fully functional registry that is interoperable with national systems and full issuance workflows. Specifically, the Article 6.4 Draft Standard on Non-Permanence and Reversals drew criticism for being overly rigid and potentially misaligned with the climate policy on the need for nature-based solutions (NbS)[39]. Its draft provisions on post-crediting monitoring (PCM) imposed an indefinite period for monitoring of projects following issuance, practically excluding all land-based projects[35]. Following stakeholder feedback, the Supervisory Body approved the standard with significant technical amendments in October 2025. PCM remains, but the reference to an 'indefinite' monitoring period was removed; the monitoring duration will instead be determined at the methodology level using a risk-based approach[35]. An activity may conclude its PCM where reversal risk is negligible, future reversals are addressed through measures such as cancellation of Article 6.4 emission reductions, or an insurance solution approved by the Supervisory Body is in place[35]. This allows nature-based and land-use projects to participate while safeguarding permanence. With the PCM regime still to be determined per project/sector type, further technical effort and consultation is needed to review the separate methodology drafts[40]. Further methodology development, particularly for removal activities, and the revision of methodologies and tools stemming from the CDM, are also under way[15]. The Supervisory Body's 2025 work plan emphasizes these ongoing tasks.

Figure 2 above outlines these key Article 6 developments in a timeline.

3.1.1.3. Market rules

Currently, credits traded under Article 6.2 face different quality criteria from those traded through Article 6.4. Article 6.2 ITMOs are subject to quality criteria set out in the bilateral agreements between the two cooperating countries, determined at the discretion of policymakers, and guided by their respective sustainability policy regimes and priorities[41,42].

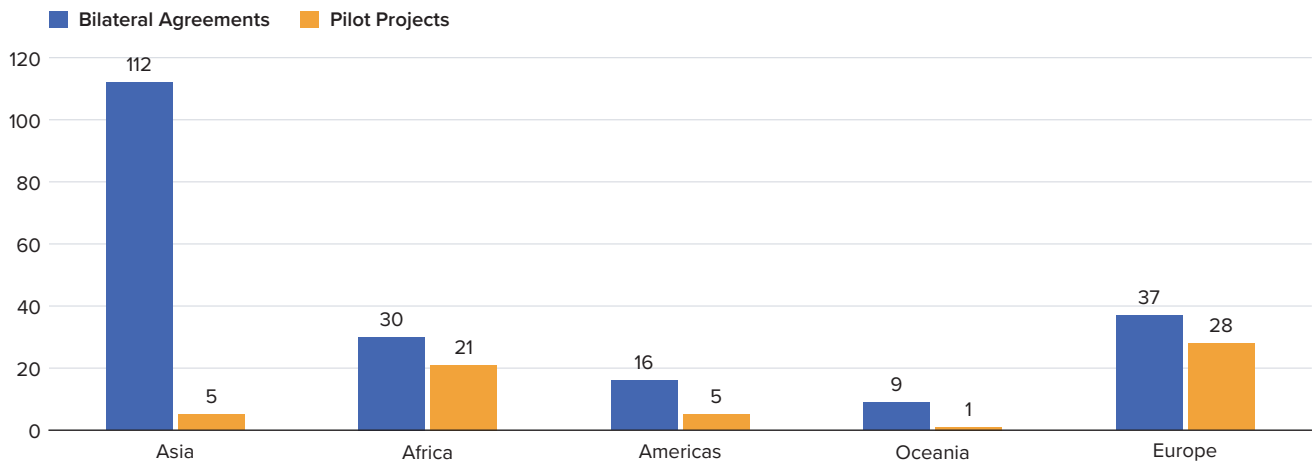
Credits eligible as ITMOs under Article 6.2 are[43]:

- Real, verified and additional;
- Emissions reductions or removals, including mitigation co-benefits resulting from adaptation actions and/or economic diversification;
- Measured in tons of carbon dioxide equivalent (tCO_2e) using Intergovernmental Panel on Climate Change (IPCC)-approved methodologies and metrics or other agreed non-GHG metrics aligned with participating Parties' NDCs;
- Traded under a cooperative approach under Article 6.2, authorized by the host country for NDC use;
- Generated from mitigation activities from 2021 onwards;
- Mitigation outcomes authorized for other international mitigation purposes;
- Emission reductions issued under Article 6.4 if authorized for NDCs or other international purposes.

The designation of mitigation outcomes for 'other international mitigation purposes' enables their use beyond sovereign NDC compliance. This includes eligibility for use under international mechanisms such as CORSIA, where airlines offset international aviation emissions using approved credits[44]. In such cases, host-country authorization must specify the intended use and ensure appropriate accounting treatment, including corresponding adjustments where required, to prevent double claiming between national inventories and international obligations[45].

In practice, ITMO transactions have used credits issued by independent crediting programmes (ICPs) such as Verra and Gold Standard, which certify verified carbon credits for use in the VCM. Adherence to compliance requirements is achieved through undertaking corresponding adjustments, which remove the ITMOs from attribution to the host country's NDC compliance.

Figure 3. Number of bilateral agreements and projects by host regions.



Source: UNEP-CCC[140]

This ensures the integrity of global GHG accounting: ITMOs cannot be double counted, and a clear designation of purpose is required upon authorization[46]. Accordingly, countries need to establish clear authorization and tracking arrangements to meet participation requirements under Article 6.2 guidance[44]. Clear authorization frameworks and registry transparency are therefore critical not only for sovereign transactions but also for enabling participation in emerging private compliance markets. Where authorization procedures remain ambiguous, buyers face increased regulatory risk, which can delay transactions and reduce price competitiveness.

In contrast, credits issued under Article 6.4 are subject to meeting the requirements of the Article 6.4 Sustainable Development Tool[47].

3.1.1.4. Market trends

Under Article 6.2, transactions to date have been exclusively bilateral cooperative approaches. Data on the number of ITMOs expected to be issued in the coming years is still scarce. Notably, a bilateral agreement between Ghana and Switzerland led to the issuance in mid-2025 of nearly 12,000 ITMOs from an improved cookstove project – the first such transfer by an African country under Article 6[48]. While symbolic in volume, it demonstrates the market is operational. At the time of writing, the United Nations Environment Programme Copenhagen Climate Centre (UNEP-CCC) Article 6 Pipeline lists approximately 112 bilateral agreements involving 65 countries and 60 activities (including pilot projects), with Asian countries hosting more than half of all bilateral agreements. While a single agreement can encompass multiple activities, the existence of a bilateral agreement does not necessarily indicate that any project or activity is under way. Further, the 60 activities are distributed across 35 bilateral agreements; many are Memoranda of Understanding (MoU) or pilot projects. There are currently 15 signed implementing/framework agreements, with African countries as host nations[43]. **Table 1** specifies the number of bilateral agreements by status, both globally and specifically, where Africa is the host continent.

This nascent market is currently driven by only six buyer countries: Japan, Norway, Singapore, Sweden, Switzerland and the Republic of Korea. Japan is the leading buyer country, with 30 bilateral agreements and 133 projects. Japan aims to secure emission reductions and removals of 100 million tCO_2 by 2030, and 200 million tCO_2 by 2040[49]. Since Japan is the most experienced buyer country, this indicates the potential scale as more projects materialize. In Africa, Switzerland leads with six agreements (a third of its overall 17), followed by Sweden (3) and Singapore (2). **Figure 3** below shows that while Asia dominates with 112 bilateral agreements, Europe and Africa follow with 37 and 30, respectively. However, Europe and Africa host most pilot projects (28 and 21, respectively), indicating that project implementation activity is more concentrated outside Asia.

Table 1. Status of Article 6.2 bilateral agreements

Agreement status	Global	Africa
Signed agreement (Implementing agreement, framework agreement)	35	15
Negotiated agreement (conclusion of substantive negotiations after signing an MoU)	1	0
Signed MoU	55	11
Other (statement of intent, joint declaration, formal negotiations/discussions between countries)	9	4

Source: UNEP-CCC[140]

Globally, readiness to participate in Article 6.2 remains limited. As bilateral agreements do not necessarily result in active projects, institutional and technical readiness to issue and transfer ITMOs more accurately reflects the market outlook[50]. The Article 6 Implementation Partnership analyses the progress of 90 Parties in developing and implementing authorization, tracking and reporting arrangements, and finds that the global readiness to implement cooperative approaches remains low by this measure, as seen in **Table 2** below.

Table 2. Parties' capacity to transact under Article 6.2–analysis of 90 Parties by the Article 6 Implementation Partnership (A6IP) (as of July 2025)

Capacity to transact	Description	Number of parties (global)	Number of parties (Africa)	African countries listed
Authorization arrangements	Parties with authorization arrangements in place	15 parties	6 parties	Ghana, Malawi, Rwanda, Tanzania, Uganda and Zimbabwe
	Parties with authorization documents uploaded to UNFCCC	14 parties	4 parties	Ghana, Malawi, Rwanda and Zimbabwe
	Parties with authorization entities/authorities	62 parties	16 parties	Burundi, Côte d'Ivoire, Ghana, Guinea, Kenya, Madagascar, Malawi, Morocco, Nigeria, Rwanda, Tanzania, The Gambia, Togo, Tunisia, Zambia and Zimbabwe
Reporting status	Initial reports submitted under Article 6.2	14 parties	4 parties	Ghana, Malawi, Rwanda and Zimbabwe
	Annual information reports submitted	4 parties	1 party	Ghana
Tracking arrangements	Parties with tracking arrangements in place	14 parties	4 parties	Côte d'Ivoire, Ghana, Tanzania and Zimbabwe
	Parties for which a registry has been identified	14 parties	4 parties	Côte d'Ivoire, Ghana, Tanzania and Zimbabwe

Source: The Paris Agreement Article 6 Implementation Partnership[44], UNFCCC[51]

The outlook for Article 6.2 is positive, with a transactional volume of 220 million tCO_2e expected by 2030[1]. It provides a strategic policy solution to deliver low-cost climate action, industrial competitiveness, energy security and credible partnerships in a multipolar and increasingly volatile world. Value derives from five features:

- Alignment to new climate diplomacy: Article 6.2 reframes climate cooperation as mutual benefit with bilateral agreements functioning as climate cooperation treaties: politically valuable instruments for foreign climate policy. Governments can show quantifiable international cooperation results in their NDC reports, while sovereignty is respected;
- Serving as an international energy transition partnership framework: Article 6 is increasingly viewed as a framework to monetize emissions reductions embedded in trade-linked activities, creating demand in host countries for the Organization for Economic Co-operation and Development (OECD) technologies (per Japan, Singapore, Republic of Korea policy objectives), and underpinning host country decarbonization strategies to adapt to the introduction of carbon border adjustment mechanisms. This trend is reflected in recent bilateral agreements, such as the Switzerland–Ghana and Singapore–Paraguay MoUs, both of which incorporate provisions on sustainable commodity production and supply-chain integrity, signalling growing buyer preference for high-integrity, transparency-oriented cooperation frameworks. Of particular relevance to Africa, this could include critical minerals;
- Promoting geopolitical stability: Article 6.2 reduces reliance on traditional multilateral channels (like the Green Climate Fund), giving countries more autonomy in forming bilateral alliances and tailored partnerships. Regional blocs, including the African Union (AU), are exploring joint Article 6.2 frameworks to strengthen regional energy security, market access and climate investment positioning;
- Enabling economic efficiency: International Emissions Trading Association (IETA)/University of Maryland modelling shows that Article 6 cooperation could reduce the global cost of meeting current NDCs by up to $250 billion per year by 2030[52], delivering savings at a time of high macroeconomic volatility and uncertain growth. Further, it is an example of results-based finance, which makes it attractive to OECD governments with prior experience of less robust governance or inefficiency using traditional grant models;
- Mobilization of private finance: Article 6.2 provides the first scalable, government-backed framework that links the VCM with national NDC systems. This attracts institutional investors and corporates seeking government-authorized credits, with government authorization and host country reporting strengthening market confidence.

Compliance demand is expected to broaden beyond early sovereign buyers[53]. In addition to bilateral government purchases, sectoral compliance systems such as international aviation obligations under CORSIA are likely to increase demand for high-integrity credits authorized for international use[54]. Over time, compliance frameworks in advanced economies may also permit limited use of international offsets toward long-term climate targets, expanding the potential buyer pool. These developments reinforce the importance of authorization systems, registry transparency and robust accounting frameworks in host countries.

Article 6.2 provides robust growth potential, with early deals priced around $30 to $60. However, demand has been slow to materialize, leaving more prospective sellers than buyers. Where authorization procedures remain unclear or registry systems are not fully operational, buyers

are exposed to regulatory and accounting risk, which can delay transactions and suppress pricing[55]. Strengthening institutional clarity and transparency is therefore central to improving liquidity, attracting buyers and enabling project financing.

3.1.1.5. Buyer profile

Given the limited availability of data points, this report has analysed the top five active buyer countries – Japan, Switzerland, Sweden, Singapore and the Republic of Korea – to explore ITMO procurement motivations, modalities and buyer preferences. Executed Article 6 transactions remain few, with constrained market activity providing limited potential for inference of general trends and preferences. **Table 3** provides an overview, including activity, preferences and African transactions.

The primary buyers in Article 6 markets are national governments (or their authorized agencies). In some cases, the private sector can also participate, typically with government authorization. For example, the KliK Foundation acts on behalf of Switzerland to finance Article 6 projects abroad and receive ITMOs[56]. In this way, the KliK Foundation fulfils the legal obligation of Swiss motor fuel importers to offset part of the industry's carbon emissions[48]. Similarly, in Singapore, industries exposed to the country's carbon tax are allowed to buy Article 6-compliant credits to offset up to five percent of their tax-liable emissions[57]. These examples illustrate how governments can engage the private sector through regulation to become buyers of ITMOs.

The content and ambition of buyer countries' climate strategies heavily influence their motivations. Early buyers see Article 6 not merely as a compliance mechanism but as a vehicle for climate ambition and strategic influence. **Table 4** maps out drivers for early buyers.

For many countries, NDC compliance is the primary driver of ITMO demand. However, countries differ in how they intend to use ITMOs to meet their climate targets. It is generally considered that ITMOs are supplementary to domestic efforts to meet NDCs, except for Japan, which treats procurement of overseas credits as a core abatement strategy[58]. In general, the use of ITMOs to meet country NDCs is driven by domestic limitations arising from emission intensity in hard-to-abate sectors or geographic constraints, as in Japan or Singapore[59].

Table 3. Article 6.2 top five buyers: country analysis

	JAPAN	SWITZERLAND	SINGAPORE	SWEDEN	REPUBLIC OF KOREA
Representative	JCM Promotion and Utilization Council	KliK Foundation	Ministry of Trade and Industry or National Climate Change Secretariat	Swedish Energy Agency	Ministry of Environment
Procurement: Pilot projects and agreements	• 133 pilot projects • 30 bilateral agreements (30% share)	• 22 pilot projects • 17 bilateral agreements (17% share)	• 0 pilot projects • 24 bilateral agreements (24%)	• 3 pilot projects • 6 bilateral agreements (6%)	• 2 pilot projects • 11 bilateral agreements (11%)
Primary host regions and countries	Mostly transacts with Asian countries. Many projects in Indonesia, Thailand and Vietnam.	Geographically diverse in agreements, but most projects are in African countries. 11 projects in Ghana.	Geographically diverse agreements, but most agreements (10 of 24) are with Asian countries.	4 of 6 agreements are with African countries (67%), and the 3 pilot projects are with Ghana.	8 of 11 agreements are with Asian countries. 1 pilot project is in Uzbekistan and the other is in Cambodia.
Preferred project types	Energy efficiency, renewable energy, energy technologies. Nature-based credits are a new strategic priority.	Transport, renewable energy, clean cookstoves and waste. Carbon removal technologies are also promoted.	Seems to be quite varied: diverse project methodologies approved per host country agreement.	Likely to favour clean-technology projects.	Landfill gas and electric vehicle pilot projects.
Africa's representation	5 bilateral agreements: Ethiopia, Kenya, Tanzania, Tunisia, Senegal. 2 pilot projects: • Kenya: 2	6 bilateral agreements: Kenya, Malawi, Morocco, Tunisia, Ghana, Senegal. 16 pilot projects: • Ghana: 11 • Senegal: 3 • Malawi: 1 • Morocco: 1	6 bilateral agreements: Kenya, Rwanda, Zambia, Morocco, Ghana, Senegal. 0 pilot projects	4 bilateral agreements: Kenya, Rwanda, Zambia, Ghana. 3 pilot projects: • Ghana: 3	2 bilateral agreements: Gabon, Ghana. 0 pilot projects

Source: UNEP-CCC[140], Quantum Commodity Intelligence[60], Clifford Chance[61], KliK[62], NEFCO[63], ICAP[64]

Box 2. Japan as a major international offset buyer

Japan regards international offsetting as central to its decarbonization strategy, for several reasons:

1. **Geographical context:** Japan has a scarcity of land on which to develop carbon projects, favouring imports of credits as a cost-effective decarbonization strategy;

2. **Strategic trade context:** The JCM is a pillar of diplomatic and industrial policy, supporting Japanese technology exports (renewables, energy efficiency, hydrogen, waste-to-energy);
3. **Institutional context:** The JCM was established as a national successor to the Kyoto Protocol CDM, built on similar principles while allowing the Japanese government more regulatory influence.

Europe's purchases of ITMOs are driven by climate ambition beyond NDC commitments. The European Union (EU) currently prohibits the use of international offsets for NDC and domestic compliance schemes, including the EU Emissions Trading System (ETS)[65]. This follows a decision in 2021, at the commencement of Phase 4 of the EU ETS, to disallow international offsetting, given wide-ranging integrity concerns[66]. As a result, near-term EU demand is likely to remain limited. Major EU buyer Sweden has made provision for the use of ITMOs in pursuit of its own, more ambitious national net-zero targets[67]. As Sweden will use ITMOs for its own national target (and not the EU's NDCs), only the host country will make the corresponding adjustment, while Sweden will not undertake corresponding adjustments for purchased credits. By contrast, the other major European buyer, Switzerland, has legislation allowing offsets using ITMOs for NDC commitments, as it is outside the EU, and will apply the full Article 6 accounting[68]. However, in late 2025, the European Commission amended the EU Climate Law to allow ITMOs to count toward the 2040 emissions target, introducing a five percent offsetting allowance[69]. This is expected to add demand for 220 $MtCO_2e$ of compliance-grade credits from 2036 to 2040[70], increasing demand for high-integrity credits over the long term.

Article 6 activity also enables the achievement of strategic policy objectives. Japan aims to lead discussions on the development of market rules[50], Switzerland aims to lead in testing practical implementation, and Singapore aims to establish itself as a carbon services and trading hub. For example, Singapore aims to source carbon credits from African countries as part of its plan to drive trade with the continent. Early buyers tend to have supportive domestic regulations and institutional readiness. Similarly, Japan's JCM infrastructure allowed for a seamless transition into the Article 6 regime.

Early cooperation between developed nations signals that Article 6.2 may also foster technological innovation. The deal between Norway and Switzerland is the first of its type between two developed countries under Article 6.2. It aims to strengthen cross-border cooperation on carbon capture and storage (CCS) and carbon dioxide removal (CDR)[71]. While this may not become the primary application of the Article 6.2 mechanism, it does reflect an alternative reason for buyers engaging in this compliance market.

Table 4. Transaction drivers for early buyers

COUNTRY	DRIVERS
Japan	• NDC compliance via overseas credits: Japan's climate strategy explicitly relies on international credits to meet its targets, aiming to secure 100 $MtCO_2$ in reduction and removal credits by 2030[50]; • Institutional readiness and JCM continuity: Japan's early Article 6.2 involvement is a natural progression of its extensive experience with carbon markets through its JCM efforts, promoting its low-carbon technologies abroad while securing cost-effective credits; • Rule-shaping motivations: Japan engaged early in Article 6 to leverage its JCM experience to lead international discussions and influence market mechanism rules[50].
Switzerland	• Addressing abatement costs: Switzerland, while prioritizing domestic action for NDCs, needs to address hard-to-abate sectors through carbon markets until cheaper solutions emerge; • Pioneering disposition: Switzerland aims to lead on practical implementation, emphasizing early action to surface challenges and refine market rules and approaches through learning; • Domestic law mandating offsets: The CO_2 Act mandates emission offsets for the transport sector, aligned with Paris Agreement rules for international attestations. This policy positions Switzerland as an early Article 6.2 buyer.
Singapore	• Limited domestic mitigation options: As a small city-state with limited capacity for large-scale renewable energy, Singapore turned to international carbon markets to meet its climate goals; • Carbon hub strategy: Singapore's carbon services and trading hub ambition likely drove its early entry, as it aims to leverage its position as a professional services, trading and financial hub near Southeast Asia's major carbon credit sources; • Domestic carbon tax scheme: Since 2024, carbon tax regulation allows Singaporean companies to offset five percent of their emissions through ITMOs from various countries.
Sweden	• Ambitious net-zero goal: While the EU currently excludes Article 6 credits from NDC compliance, Sweden's national net-zero target permits use of ITMOs toward domestic goals, showcasing a climate policy ambition to lead by example[59]; • Extension of climate finance leadership: Sweden's early Article 6.2 involvement reflects its long-standing climate aid approach (e.g. via Green Climate Fund, Swedish International Development Cooperation Agency [SIDA], Swedish development finance institution [Swedfund], and the Nordic Development Fund [NDF]) of combining emission cuts with sustainable development.
Republic of Korea	• Closing the NDC gap: The Republic of Korea cannot meet its 2030 targets without substantial emission reductions or extensive international offsetting, prompting the development of an intergovernmental Article 6 cooperation model to secure the needed credits[72]; • Cost containment: With its coal-heavy power and industrial sectors, the Republic of Korea faces prohibitive costs and technical barriers to deeper domestic emission reductions in the near term[73].

Recent Article 6.2 activity shows several Asian buyer countries entering bilateral agreements with partner countries across multiple regions, reflecting diverse cooperation pathways rather than a single dominant

preference. Japan's JCM, originally launched in 2013 and now evolving to align with Article 6 rules, was designed to promote the diffusion of low-carbon technologies to developing countries. While not regionally restricted, in practice, most of Japan's partnerships have been with other Asian countries[74]. The Republic of Korea shows a similar pattern, with most of its bilateral agreements involving Asian host countries. Singapore's agreements are more geographically diverse, but the predominance of Asian partners reflects its ambition to become a carbon services and trading hub, drawing on its proximity to Southeast Asia's growing pool of carbon credit supply.

For African countries seeking to attract Article 6.2 partnerships, Sweden's approach provides a useful reference for understanding the selection and assessment criteria that buyer countries apply when identifying host nations. As one of the most structured and transparent early buyers, Sweden has defined clear requirements for host-country eligibility, institutional capacity, and sustainable-development safeguards, outlined in **Box 3** below. These include expectations for political commitment, national Article 6 frameworks and credible MRV systems to ensure environmental integrity and prevent double counting. Sweden's example also highlights how partnerships with technical institutions such as the United Nations Development Programme (UNDP), Asian Development Bank (ADB), and Global Green Growth Institute (GGGI) can strengthen credibility and accelerate project aggregation, thereby positioning host countries more competitively in the emerging Article 6 market.

Box 3. Country and project methodology criteria in Sweden

The Swedish Energy Agency provides a structured model for selecting host countries and activities under its Article 6 programme. The framework combines political, institutional, environmental and developmental considerations to ensure environmental integrity and sustainable outcomes.

Host-country selection criteria

- **Political interest and NDC alignment:** Host governments must demonstrate clear political will and explicit reference to Article 6 cooperation in their NDCs. Commitments should exceed unconditional NDC targets and be supported at the ministerial level;
- **Institutional capacity:** Countries must have (or be developing) national Article 6 frameworks with designated authorizing entities, MRV systems and the ability to avoid double counting. Support for capacity building can be provided where institutional maturity exists;
- **Sustainable development:** Projects must contribute positively to local economic, social and environmental outcomes, in line with the Sustainable Development Goals (SDGs), while minimizing risks related to human rights, corruption and local environmental harm;
- **Economic stability and partnerships:** Preference is given to low- and middle-income countries with growing emissions but stable financial systems, and where Sweden maintains diplomatic or development presence (e.g. embassies, Sida, Business Sweden).

Activity and methodology criteria

- **Environmental integrity:** Activities must be additional, conservative in baseline setting, avoid double counting/claiming, and demonstrate emission reductions beyond host-country NDCs;
- **Transformative potential:** Projects should catalyse systemic change, such as policy reform, technology adoption or market transformation that advances long-term decarbonization;
- **Sustainable development outcomes:** Activities should advance gender equality, job creation and social inclusion, ensuring no negative environmental or economic trade-offs;
- **Feasibility and price efficiency:** Technical and economic assessments must demonstrate credible delivery of agreed mitigation volumes at a reasonable cost per ton of CO_2 equivalent;
- **Technology neutrality:** Sweden maintains a neutral stance on technologies, with a preference for mature, scalable energy-related interventions (these include renewable energy, energy efficiency, transport and grid infrastructure).

3.1.2. The voluntary carbon market

3.1.2.1. Status

The VCM was established in the early 2000s alongside the operation of the Kyoto Protocol. The emergence of the Verified Carbon Standard (VCS) functioned as an enabler for VCM activity[75]. Unlike Article 6 markets, the VCM is driven by private entities with climate policies or strategies. Companies, organizations or individuals purchase carbon credits voluntarily, outside of any legal requirement, typically to offset their own emissions as part of climate commitments or 'carbon neutral' market claims. These markets operate in parallel to compliance markets, using credits from projects that are certified by independent standards (e.g. Verra, Gold Standard). The VCM has expanded rapidly as a result of corporate environmental, social and governance (ESG) goals and net-zero pledges.

Over the last decade, international carbon offset transactions have been predominantly facilitated through the VCM[76]. VCM credits may also be eligible as offsets within national carbon tax and emission trading schemes, appealing to buyers seeking tax efficiency. In Colombia, for example, Primax, a fossil fuel company, reduced its carbon tax liability by up to 50 percent through the purchase of eligible Colombian credits, featuring in the top 10 international VCM buyer list[77].

Globally, the VCS by Verra is the largest ICP by transacted volumes, permitting a wider range of project types than its key counterpart, Gold Standard[78]. Notably, Gold Standard excludes Reducing Emissions from Deforestation and Forest Degradation (plus conservation and sustainable forest management) projects (REDD+ projects), giving it a narrower land-use scope than Verra. Both Gold Standard and Verra use accredited third-party validation and verification bodies (VVBs) to enable issuance of verified carbon credits. A key difference lies in the treatment of

contributions to sustainable development more broadly. While the Gold Standard adds mandatory SDG measurement, verification and reporting[79], the VCS has more flexible core requirements with optional co-benefit labels[80].

3.1.2.2. Milestones and developments

In 2005, the VCS, now Verra VCS, was established to address the need for verification of carbon credits[66]. The initial period of market formation in the 2000s and early 2010s was characterized by an expansion of project types, geographies and methodologies, and increasing private sector engagement[66].

Guiding the demand side of the market, the Science Based Targets initiative (SBTi) was launched in 2015 to help companies set and achieve emissions reduction targets[81]. By providing standardized frameworks, sector-specific pathways and validation processes, the SBTi ensures that corporate climate commitments are consistent with the Paris Agreement's goal of limiting global warming to 1.5°C[82]. The creation of the SBTi's corporate net-zero standard in 2021 placed emphasis on achieving deep emission reductions first and using carbon removal credits for final residual emissions in the net-zero target, thus limiting the scope for offsetting practices in the market[83].

In the last few years, the VCM has been subject to an integrity transition. The market peaked at $2.1 billion in 2021[84], before critical integrity issues came to light in 2022. Reported intermediary margins of 30–80 percent of the value of carbon revenue streams have undermined confidence in carbon finance as a mechanism for promoting sustainable development, prompting policymakers to recently develop regulations on benefit sharing[85].

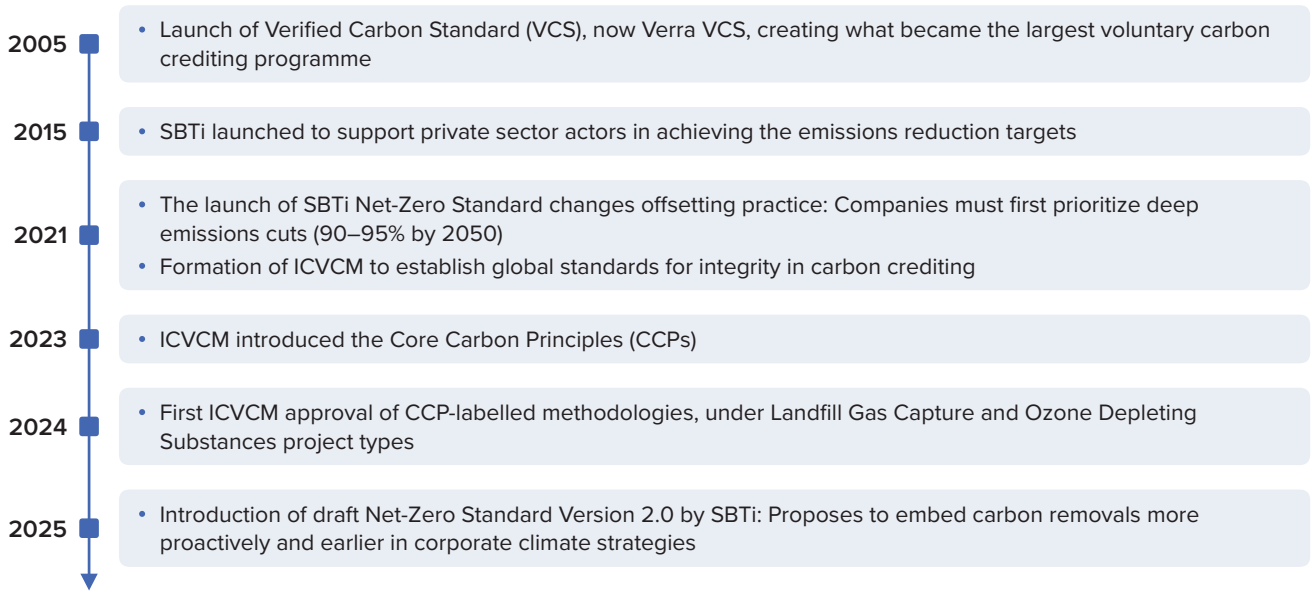
In 2023, the Integrity Council for the Voluntary Carbon Market (ICVCM) introduced the Core Carbon Principles (CCPs), establishing consistent, science-based benchmarks for what counts as a credible, high-integrity carbon credit[86]. The 10 CCPs ensure both carbon crediting programmes and specific project methodologies meet strict standards of transparency, robust quantification and sustainable impact, aligning approaches to crediting in the VCM more closely with compliance markets[87]. Apart from addressing climate integrity, the CCPs require projects to deliver positive sustainable development impacts while adhering to industry best practice environmental and social safeguards. This helps address concerns over the adequacy of past benefit-sharing arrangements. The first CCP-labelled methodologies were approved in June 2024 for two project types[88]. At the time of writing, methodologies under 11 project types – including land-use types such as REDD+, improved forest management and efficient cookstoves – had been CCP-approved[89]. The launch of the CCP is restoring VCM confidence, with demand increasing in affected market segments (e.g. waste, with CCP-approved landfill gas carbon prices increasing by 18 percent[88]). Nonetheless, integrity concerns persist, particularly regarding agriculture, forestry and other land use (AFOLU) projects and the risk of double counting[90].

The SBTi is moving towards a more permissive stance on removal credits. In March 2025, it released a draft corporate net-zero standard version 2.0 that embeds carbon removals more proactively and earlier in corporate climate strategies[91]. Notably, the SBTi recently announced proposals that would enable companies to use removal credits in the interim to meet their net-zero goals[81]. This reflects an emerging consensus around permitting credit use for interim milestones, not only the net-zero target year, as reflected in positions from IETA[92], the Nature Conservancy[93] and the Government of Singapore[94]. This is likely to increase the retirement of CDR credits, widely considered to be of higher quality, given a greater impact on the atmosphere. **Figure 4** below shows these key VCM developments in a timeline.

3.1.2.3. Market rules

The ICVCM's CCPs are redefining integrity and credibility in carbon markets. The CCP label was created to certify that carbon credits adhere to the principles to raise the standard of credits in the market[95]. CCP-labelled credits

Figure 4. Timeline of key developments influencing VCM activity.



make it easier for buyers to assess the integrity of credits, which is increasingly sought after[86]. The 10 CCPs fall under three dimensions of governance, emissions impact and sustainable impact[96]:

Governance:

- **Effective governance:** Programmes must have strong governance to ensure transparency, accountability, continuous improvement and overall credit quality;
- **Tracking**: A registry must uniquely identify, record and track mitigation activities and credits to avoid confusion or duplication;
- **Transparency**: Comprehensive information on all mitigation activities must be publicly available in accessible formats to allow scrutiny;
- **Robust independent third-party validation and verification**: Programmes must require independent validation and verification of mitigation activities to guarantee credibility.

Emissions impact:

- **Additionality**: Emission reductions and removals must be additional, i.e. they would not have occurred without the incentive of carbon credit revenues;
- **Permanence**: Emission reductions and removals must be permanent and safeguarded against risks of reversal through risk mitigation measures, such as buffer reserves;
- **Robust quantification of emission reductions and removals**: Emission reductions and removals must be measured and quantified using conservative, complete and science-based methodologies;
- **No double counting**: Credits can only be used once toward mitigation targets or goals. This avoids double issuance, double claiming or double use.

Sustainable impact

- **Sustainable development benefits and safeguards**: Programmes must follow best practices on social and environmental safeguards, ensuring projects do no harm and deliver positive sustainable development impacts;
- **Contribution towards the net-zero transition**: Mitigation activities must avoid locking in technologies and practices incompatible with reaching net-zero GHG emissions by 2050.

Notably, the ICVCM has not yet approved any renewable energy methodologies[97]. This decision rests on long-standing concerns that such projects often lack additionality (i.e. the project might have gone ahead without carbon revenue), a concern that affects nearly a third of credits available in the VCM[87]. The ICVCM has not ruled out renewable energy entirely, but any future methodologies will need to convincingly demonstrate that carbon revenues are truly decisive in driving project deployment[87].

Importantly, the Gold Standard has recently aligned with Article 6.4 standards, with far-reaching consequences for African carbon developers. It announced that from vintages 2026 and beyond, all new activities under its Gold Standard for the Global Goals (GS4GG) framework will be required to align with the PACM framework[98]. This restriction may make it considerably more challenging for certain project types, such as cookstoves, to qualify for issuance under the Gold Standard in the future.

3.1.2.4. Market trends

In 2024, the VCM contracted for the third consecutive year to $535 million[99], as a tightening of market rules affected both supply and demand. The legacy market based on older methodologies is being phased out as a new integrity-focused VCM phase scales up. Alongside a volume decrease of 25 percent[100], the average price fell by 5.5 percent to $6.34 per credit; carbon credits were re-evaluated following reports undermining the credibility of market standards and methodologies.

Despite reduced trading volumes, demand remains steady, evidenced by stable volumes of credit retirements[89]. Companies with climate or net-zero targets form the core of VCM demand. This includes firms in sectors with hard-to-abate emissions, which are aiming to strengthen their environmental credentials. The energy, financial services, professional services, airlines and consumer brands sectors dominate in the VCM[101]. These sectors are heavily represented in offset purchasing because of both high emissions profiles and stakeholder pressure to act on climate change. The growing focus on integrity is evident in the increased demand for high-integrity credits, as well as producers improving the quality of the carbon credit supply to align with the CCP[89]. This shift reflects a broader convergence between voluntary and compliance markets, as buyers increasingly seek credits that meet compliance-grade accounting, permanence and transparency requirements. High-integrity voluntary credits are therefore becoming more closely aligned with sovereign and compliance buyer expectations, strengthening their strategic relevance in a maturing carbon market[102].

VCM buyers are increasingly prioritizing higher-integrity credits. While nascent, demand for available credits from CCP-approved project types grew in 2024. As seen in **Table 5**, the volume of credit transactions for waste disposal credits increased threefold following the CCP approval of landfill gas methodologies in mid-2024[89]. While waste disposal credits faced an overall 10 percent price decrease from 2023, the average price of landfill gas credits increased by 35 percent from the first half to the second half of 2024[89]. This is an early example of how decisions by VCM integrity initiatives can influence market demand and pricing.

Aligned to this shift, VCM buyers increasingly discriminate between carbon removals and avoidance credits. AFOLU credits with credible carbon sequestration attributes, such as afforestation, reforestation and revegetation (ARR) and agroforestry, outperformed the market in 2024, with average credit prices reaching $20 and $14, respectively[90]. On the other hand, renewable energy and REDD+ credits underperformed in the market due to questionable additionality. This bifurcation has been strongly shaped by the SBTi guidance on eligible net-zero strategies**.** While new technological removal methodologies are emerging, nature-based ARR projects remain the dominant source of removals, accounting for over 90 percent of removal transaction volume over the past year[89]. ARR credits are significantly cheaper than those from novel engineered approaches[89]. At the time of writing, market data revealed an average price of biochar credits at $165/t$CO_2$e, compared with approximately $20/t$CO_2$e[89] for ARR. This is related to the perceived lower integrity of ARR credits, which present permanence challenges.

The growing emphasis on permanence, durability and long-term monitoring is leading to increasing scrutiny of NbS credits[103], but recent methodological reforms and risk-based monitoring approaches are improving confidence in high-quality land-use projects[104]. Where permanence risks are appropriately managed, NbS credits remain central to global mitigation pathways and continue to attract demand due to their scalability, cost-effectiveness, and biodiversity and livelihood co-benefits.

Within the category of carbon avoidance credits, household and community devices project types are favoured due to high social impact. Retirements in this category saw the greatest growth in 2024, with 27 million credits retired[105]. This is positive for Africa: the largest share of household/community device credits traded in 2024 (more than 40 percent) came from the continent[92]. The abundance of credits with direct community benefits has reduced the co-benefit premium that these credits command[106]. In fact, the demand shift toward high-integrity project types means that many of the objectives of co-benefit certification are increasingly standard, considering the requirements of the CCP, for example[89]. This means that, rather than earning a co-benefit premium, these community-type credits should command higher value when aligned with recognized integrity standards.

Apart from credit and project types, buyer sentiment is further characterized by a range of factors. United States (USA) corporates are engaging in the VCM less publicly while they reassess reputational exposure following the USA withdrawal from the Paris Agreement. It appears USA buyers regard carbon offsetting as a prudent risk-management tool, but they are opting to do so with limited public visibility.

Table 5. Volume, value and price of removals, reductions and CCP-labelled credits in the VCM[89]

	2023			2024		
Type	Volume ($MtCO_2e$)	Value ($)	Price ($)	Volume ($MtCO_2e$)	Value ($)	Price ($)
Removals	4.9	84 million	17.28	4.2	82.2 million	19.50
Reductions	58.6	271.5 million	4.64	38.8	157.5 million	4.05
CCP-labelled waste disposal credits	1.5	10.9 million	7.46	4.8	32 million	6.72

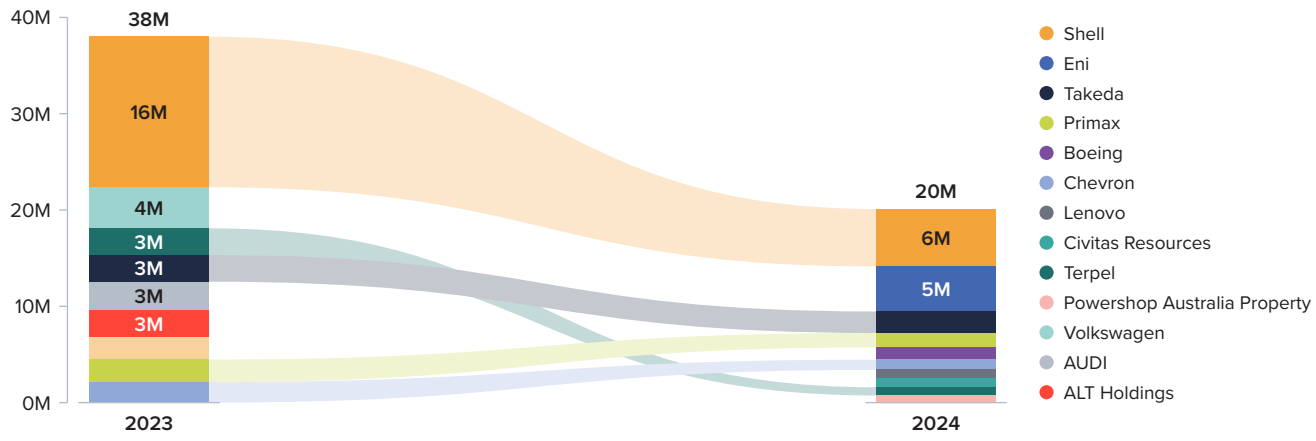
Source: Sylvera[38]

In aggregate, the VCM growth outlook is relatively stable. Proponents refer to its long track record and diverse buyer base, as well as the enduring business benefits of corporate climate commitments, despite geopolitical shifts. They note that many USA corporates continue to engage in the market, although less publicly, following the USA withdrawal statement from the Paris Agreement. The rollout of the CCP, together with ICVCM's continuous improvement work on methodologies[107], provides a quality benchmark that aligns well with many African community project types.

In the near term, robust demand is expected for quality AFOLU and community clean technology projects delivering credible emission reductions. Engineered carbon removal, for example, from biochar or enhanced rock weathering, will command the highest prices, although this is still a limited market segment[90]. However, the character of demand will continue to be volatile. The fulfilment of corporate commitments depends on profits, and corporate sustainability priorities vary, making it challenging for VCM carbon developers to secure long-term offtake agreements at competitive prices. Further, reputational issues have caused buyer risk aversion, resulting in less demand for mainstream carbon avoidance project types like cookstoves and REDD+ projects.

This volatility highlights the growing importance of compliance-linked demand and long-term offtake agreements in improving price certainty and project bankability. Developers increasingly seek diversified buyer portfolios and structured

Figure 5. Top 10 VCM buyers by retirement, 2023–2024.



Source: Allied Offsets

purchasing agreements to reduce revenue risk and support project financing.

3.1.2.5. Buyer profile

The major driver of demand in the VCM is corporate sustainability strategy and branding, notably corporations with net-zero strategies or those providing carbon-neutral products and services**.**

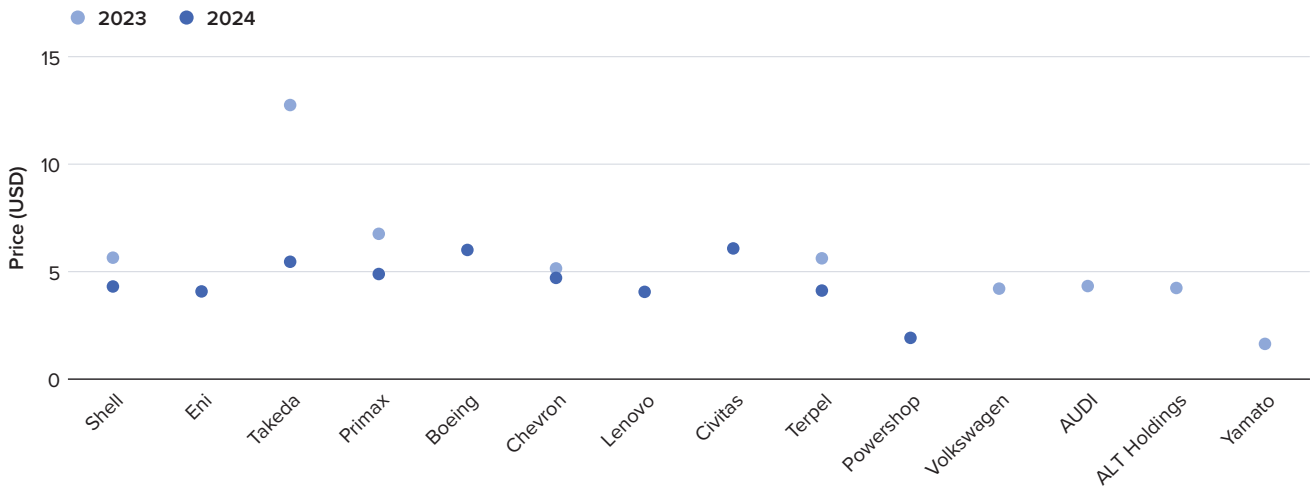
A small group of large buyers dominates the market, accounting for 23 percent of total market activity in 2023[95]. Trading activity fluctuates significantly from year to year. Of the top 10 carbon credit retiring entities (by volume) in 2023, only five remained on the list for 2024, as seen in **Figure 5**, highlighting how dynamic the market can be[108,109]. Notably, many of the largest end users are fossil fuel companies that tend to favour high-volume, low-cost credits[110]. This is evident in their preference for credits from closely scrutinized REDD+ projects, several of which have been linked to controversies and allegations of environmental or governance shortcomings. Most of the top 10 purchasers of 2024 are not SBTi members. Notable exceptions include Takeda and Lenovo, clearly motivated by climate ambition, leading to credible decarbonization strategies.

The average price paid by the top 10 corporate buyers fell by 20 percent in 2024 – almost four times the market-wide decline of 5.5 percent – to $4.53 per ton (on a weighted basis). The highest average price observed was $12.75 per ton, paid by Takeda in 2023, followed by $6.08 per ton paid by Civitas in 2024[112]. **Figure 6 captures** the price estimates paid by the top 10 VCM buyers.

Large technology companies have become key drivers of demand for removal credits. Rapidly growing emissions from data centres have heightened the reliance of tech companies on high-quality credits, which they assess with increasingly stringent standards[90]. Recent landmark deals underscore this momentum: Microsoft secured one of the largest direct air capture purchases to date with a purchase of 500,000 tons of removals from 1PointFive, while Google followed with a major agreement to acquire 100,000 tons of direct air capture removals from Holocene[111].

Table 6 provides an overview of the top VCM buyers in 2024, mapping out their climate mitigation goals, SBTi involvement, African presence and preferred project types[112,99].

Figure 6. Average offset unit price paid by the top 10 VCM buyers.



Source: Allied Offsets

Table 6. Top carbon credit buyers in 2024

Company	Climate mitigation goals	SBTi/key pledges	African presence	Preferred offset types
Shell	Net-zero by 2050; 50% scope 1 and 2 by 2030[113]	No	Yes. Major operations in multiple African countries[114]	Nature-based (REDD+) accounted for over 80% of retirements; afforestation accounted for 9%[115]
Eni	Net-zero by 2050 (all scopes); reduction of 35% by 2030; reduction of 80% by 2040[116]	No	Yes. Operations in 14 African countries[117]	Nature-based (REDD+) and renewable energy[118]
Takeda	Net-zero operations (scope 1 and 2) by 2035, net-zero across the value chain (scope 3) by 2040[119]	Yes. SBTi validated net-zero 1.5°C; committed to 90% cuts by 2040. Corporate renewable energy 100% commitment initiative (RE100) member; UN Global Compact[120]	Low. Some sales offices and partnerships	Nature-based (REDD+) 80% and renewables 9%[121]
Primax	No public net-zero goal; offsets are used to meet Colombia's carbon tax compliance[122]	No. Compliance-driven only	No	Nature-based (REDD+)[122]
Boeing	Net-zero operations from 2020 onward (scope 1+2 neutral via offsets), targeting 55% cut by 2030. Industry goal net-zero 2050 for aviation[123]	No SBTi. Race to Zero (via ATAG); adheres to CORSIA for aviation.	Low (sales offices)	Renewable energy (44.57%), agriculture and forestry (27.03%), and fugitive emissions and mining (10.44%)–Verra registry[121]
Chevron	Aspires net-zero upstream by 2050 (scope 1+2); no full scope 3 net-zero[124]	No	Yes. Upstream in Nigeria, Angola, and more[125]	Nature-based (REDD+)[152]
Lenovo	Net-zero by 2050 (SBTi validated); 50% scope 1+2 by 2030; 25% supply chain by 2030[126]	Yes. First PC maker with SBTi net-zero approval[115]	Low. Sales presence only (South Africa, Egypt, etc.)	Renewable energy and some nature-based solutions (REDD+)[121]
Civitas Resources	Net-zero scope 1+2 from 2021 (operational emissions fully offset)[127]	No	No	Methane-eliminating projects and nature-based (REDD+)[128]
Powershop Australia Property	Carbon-neutral electricity retail (all operations and customer emissions). 100% renewable supply ambition (Shell[129])	No. Certified Climate Active carbon neutral for their electricity product. Green energy awards winner	No	Renewable energy and cookstoves[121]

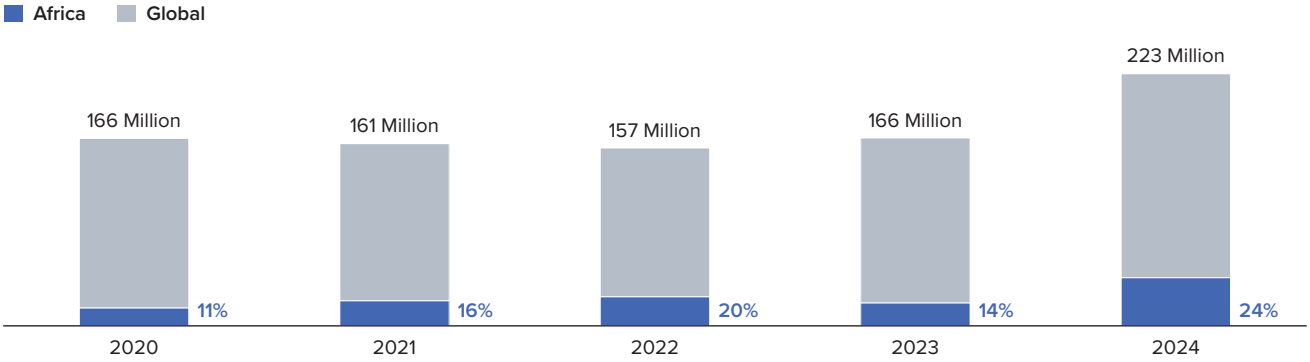
3.2. African participation in carbon markets

This section will assess Africa's ability to access VCM and Article 6 carbon markets to deliver on climate and broader sustainable development policy objectives.

3.2.1. Context: Role of carbon financing in sustainable development

Africa holds substantial climate mitigation potential, which can serve global climate policy ambitions. Many African economies have low historical emissions but large marginal abatement potential, especially in renewable

Figure 7. Africa's share of retirements in the global carbon market.



% Africa's Share

Source: Berkeley Voluntary Offset Registry[193]

energy, waste, forestry and agriculture. The continent also offers many low-cost abatement opportunities, such as improved forest management and clean cookstoves. This makes African ITMOs highly competitive in global carbon markets, attracting buyers seeking cost-effective mitigation that meets Article 6 standards.

Currently, Africa is only realizing a small share of its carbon financing potential. Climate mitigation finance flows totalled $22 billion to Sub-Saharan Africa in 2023[130]. In comparison, Ecosystem Marketplace reports the value of VCM transactions in Africa to be $82.5 million in that year[89], accounting for only 0.4 percent of climate mitigation finance received[89]. Therefore, carbon markets remain marginal in Africa's climate finance landscape. However, the Africa Carbon Markets Initiative (ACMI) noted that the continent still generates around only two percent of its annual potential for nature-based carbon credits, implying considerable untapped potential[131].

Unlocking this potential requires mobilizing private capital alongside public and development finance. Carbon markets operate through a value chain that includes project developers, technology providers, financiers, intermediaries, verification bodies and end buyers[132]. Where authorization processes, revenue-sharing rules and regulatory frameworks remain unclear, perceived investment risk increases, limiting access to upfront financing and constraining project scale[133]. Strengthening institutional clarity and transparency is therefore essential to improving bankability and enabling greater domestic participation in carbon project development.

To date, carbon markets have shown mixed results in delivering benefits to African communities. In some cases, such as the Buffelsdraai Community Reforestation Project in South Africa, carbon finance supported the planting of over half a million indigenous trees, creating jobs, restoring ecosystems and building climate resilience for local communities[134]. In contrast, the Lake Kariba project in Zimbabwe revealed the shortcomings of poorly governed schemes: while the project generated more than €100 million in carbon credit revenues, only a fraction reached surrounding communities, with most proceeds absorbed by developers and intermediaries[135]. This underscores the critical need for robust benefit-sharing mechanisms, ensuring that carbon finance equitably supports livelihoods, adaptation and development in vulnerable communities. Without improvements in benefit-sharing mechanisms, the carbon markets in Africa are likely to remain constrained.

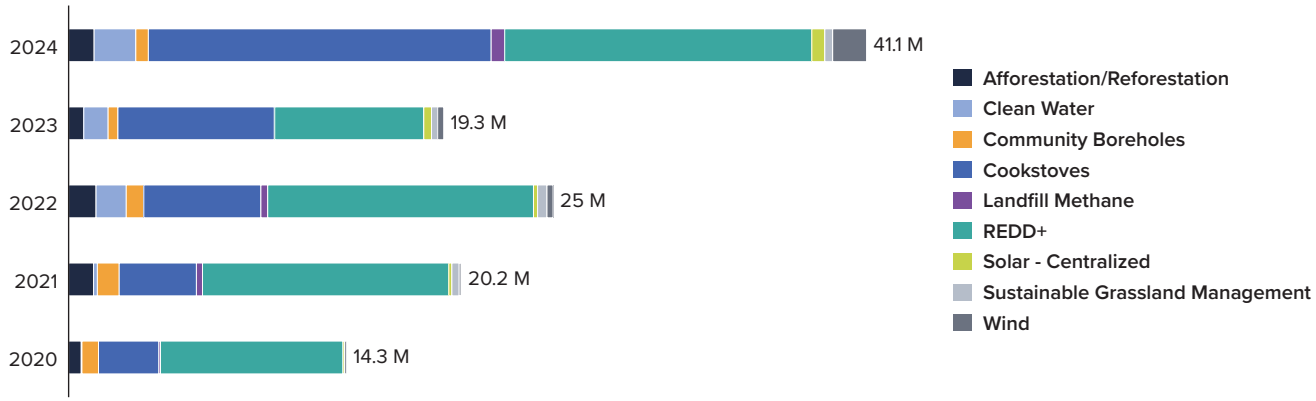
Countries are introducing benefit-sharing requirements to strengthen alignment with sustainable development. In Kenya, for example, the government has taken prompt action to address this issue with the 2024 Climate Change (Carbon Markets) Regulations mandating annual social contributions: at least 40 percent of revenues from land-based projects and 25 percent from non-land-based projects must be returned to communities[136]. Clear benefit-sharing frameworks not only improve social outcomes but also strengthen project credibility, reduce reputational risk and enhance investor confidence, all of which are increasingly important as buyers apply stricter integrity and due diligence standards.

3.3. African carbon policy

Africa's focus on carbon market development can be viewed through the lens of economic policy linked to the just energy transition. The AU, through its African Union Climate Change and Resilient Development Strategy and Action Plan (2022–2032), outlines a continent-wide framework for low-emission, climate-resilient growth. In September 2025, the AU published the Africa Action Plan on Carbon Markets, which provides guidance for African states on governance, readiness, policy alignment, capacity-building and coordinated approaches to carbon market participation[137]. Emerging policy links the development of carbon projects to a broader industrialization strategy underpinned by energy, infrastructure, green hydrogen and aviation fuels[138]. The social justice element is considered through a focus on inclusion, delivering high-integrity credits that go beyond climate mitigation to produce social and environmental benefits. This continent-wide focus is also reflected in the nationally determined contributions (NDCs) of many African countries, which identify carbon-market finance as a key mechanism to support implementation.

To deliver on policy objectives, AUDA-NEPAD is advancing carbon market reform to support countries across the continent. It recently announced three major initiatives to strengthen Africa's engagement in global carbon markets:

Figure 8. African credit retirements in the VCM (projects that cover over 90% of retirements).



Source: Berkeley Voluntary Offset Registry[193]

- The **'African Integrity and Equity Principles for Carbon Markets'** – a draft framework to promote high-integrity and socially inclusive carbon markets in Africa;
- A **Continental Coordinating Mechanism** – a coordination platform to bring together technical experts/focal points from all 55 AU Member States and regional alliances, to reduce fragmentation and strengthen Africa's collective voice in carbon markets;
- A **Digital Tracking Platform for Article 6 Readiness** – designed to monitor country-level progress under Article 6.2 of the Paris Agreement and support consistent terminology and data across the continent.

Together, these initiatives aim to place Africa in a more proactive role in carbon markets, not merely as a project host but as a shaper of rules, governance systems and financial accountability mechanisms. Strengthening regulatory certainty can be supported by aligning carbon-market legislation with relevant public-finance laws[139], ensuring that authorization decisions, revenue-sharing arrangements and carbon-rights allocations are reflected, where appropriate, in national budgeting and accounting systems. Engaging ministries of finance in regulatory coordination, in line with national institutional mandates, can enhance fiscal oversight and reduce the risk of off-budget flows. Integrating MRV outputs into national statistics and climate budget-tagging systems can also support the coordinated tracking of mitigation outcomes and public expenditure, strengthening transparency and investor confidence.

3.4. Article 6 markets

As per Section 3.1.1.1, Article 6 of the Paris Agreement was adopted at COP21 in 2015 as a framework for countries to cooperate in achieving their climate targets. It provides for international cooperation, including market-based approaches involving the transfer of mitigation outcomes, to support greater emissions reductions and direct investment towards cost-effective mitigation opportunities.

Alongside Article 6, the global compliance landscape includes sector-specific mechanisms such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which requires airlines to meet applicable offsetting requirements using eligible emissions units. While CORSIA operates outside the Paris Agreement framework, it incorporates requirements related to host-country authorization and accounting to address the risk of double counting. This creates an additional source of compliance demand that may interact with Article 6 transactions.

Article 6.2 covers decentralized cooperative approaches, including bilateral or multilateral arrangements involving internationally transferred mitigation outcomes (ITMOs) for use towards NDCs or other authorized international mitigation purposes. Participating countries must apply corresponding adjustments in accordance with Article 6 guidance to avoid double counting. This decentralized structure contrasts with Article 6.4, which establishes a centralized UN-supervised crediting mechanism with standardized requirements and issuance processes.

Africa has significant potential for Article 6.2 transactions, owing to its mitigation opportunities, sustainable development co-benefits and its strategic position in low-carbon value chains: hydrogen, green ammonia, sustainable agriculture and critical minerals.

Africa is actively embracing Article 6.2 opportunities, accounting for one third of bilateral agreements and two thirds of pilot projects at the time of writing[140]. In 2023, Ghana became the first country in Africa to authorize an ITMO transfer, subsequently issuing 11,733 credits to Switzerland (July 2025)[42]. It demonstrated how national authorization and accounting arrangements can translate cooperative approaches into completed, high-integrity transactions. The mitigation outcomes were generated from a clean cookstove programme designed to reduce emissions from traditional biomass use in rural households. The buyer, Switzerland's KliK Foundation, intends to count these units toward Switzerland's national emissions targets. Transaction values remain undisclosed, but the deal is important as a proof of concept for African participation in Article 6.2 markets, paving the way for further bilateral cooperation.

In the near term, Africa's receipts under Article 6 are expected to be limited. The Article 6.2 pipeline reveals an estimated 6.7 $MtCO_2e$ expected to be sold bilaterally by 2030, with an implied value of $180 million to $360 million[141]. The tendency of Asian buyers to partner regionally, combined with the EU's decision not to use ITMOs for NDC compliance in the near term, limits immediate demand for African-origin credits. With regard to Article 6.4, the PACM is not yet active, making it challenging to forecast volume in this market. However, approximately 195 $MtCO_2e$ from African CDM activities may be eligible under the CDM transition rules; transition requests to migrate these to PACM have been made for two thirds. Assuming these transition credits will be priced below new projects – considering that they were issued historically and so may be perceived to have lower additionality – this could generate an additional $2 to $4 billion[142] for the continent by 2030 – presupposing adequate demand. In the context of annual climate finance flows of approximately $50 billion, and an NDC need of $300 billion[2], these figures appear modest.

3.5. The VCM

3.5.1. Market trends

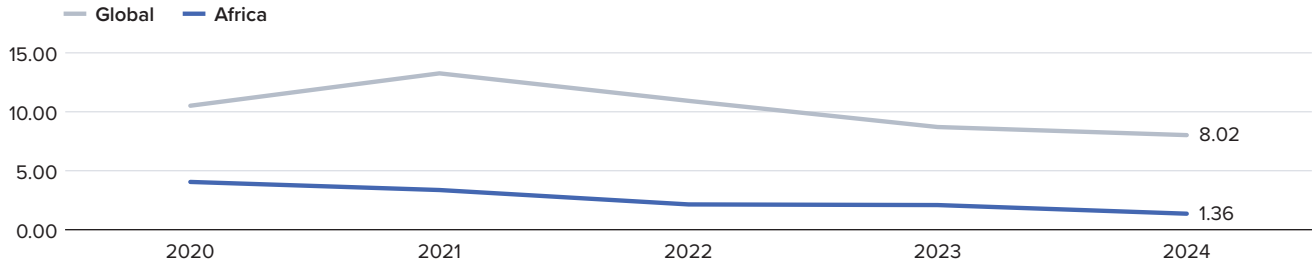
Africa's share of retirements in the VCM has grown significantly over recent years. Notably, as seen in **Figure 7**, based on volumes of 2024, Africa accounts for a quarter of total retirements in the market. This trajectory highlights Africa's rising prominence in the VCM.

The AFOLU sector, particularly REDD+, has dominated retirements of African credits, as indicated in **Figure 8**. Over the past five years, these activities accounted for 47 percent of Africa's retired credit volume, followed by clean cookstoves at 30 percent. Together, these categories accounted for nearly 80 percent of retirements, predominantly from projects that avoid emissions. The tightening of market rules aimed at improving market integrity will restrict market access for some existing projects. The shift towards higher integrity carbon credits is reflected in issuance trends, with clean cookstoves emerging as the dominant type over the period (55 percent of total issuance). See **Figure 10**.

In Africa, there is currently little diversity in project type. This diversity has further declined as cookstove projects account for a growing share of carbon credit generation. While the global carbon market is more diverse, it has become increasingly concentrated in recent years. In 2024, the effective number of project types was about 8 globally versus 1.4 in Africa (see **Figure 9** below). This concentration exacerbates sensitivity to changes in market rules and buyer preferences, particularly concerning carbon credits arising from REDD+ and other land-use projects and from cookstoves. However, this landscape is expected to evolve over the next five years. Commitments under 'Mission 300' (World Bank–AfDB) and several nations' energy compacts are explicitly aimed at expanding project diversity[143]. These initiatives prioritize large-scale renewable energy, clean cooking, agroforestry, regenerative agriculture and engineered removals, which will gradually broaden Africa's methodological base. As investment mobilizes toward meeting Mission 300 targets, Africa is likely to see a shift toward more balanced portfolios with higher-integrity methodologies aligned with Article 6 and ICVCM requirements, reducing concentration risk and improving long-term market resilience.

As demand shifts toward durable carbon removals, African developers will need to diversify project mix to capture both demand and the high value placed on these removal credits. Relevant project types include direct air capture, biochar and ARR. Without expanding into removal-focused methodologies, African projects risk being marginalized in the VCM.

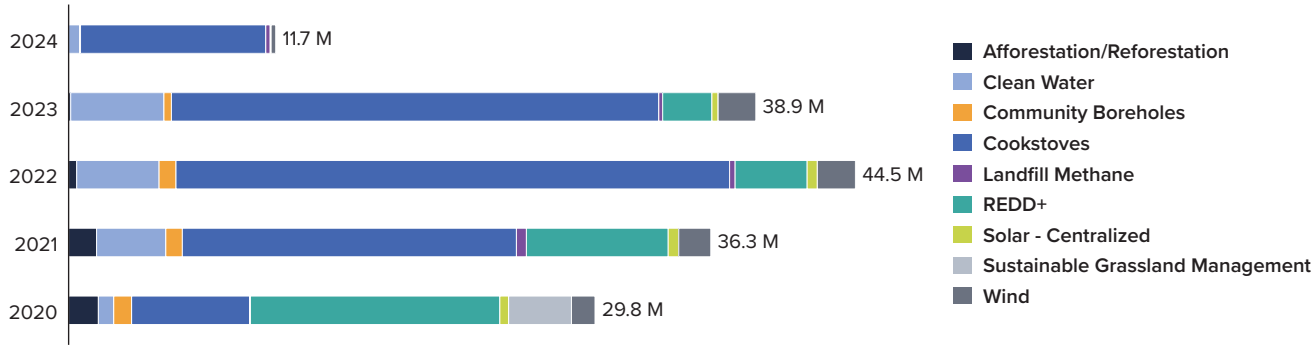
Figure 9. Effective number of project types (based on issuances).



Source: Berkeley Voluntary Offset Registry[193]

Note: The effective number of project types is calculated as the inverse of the Herfindahl-Hirschman Index (HHI).

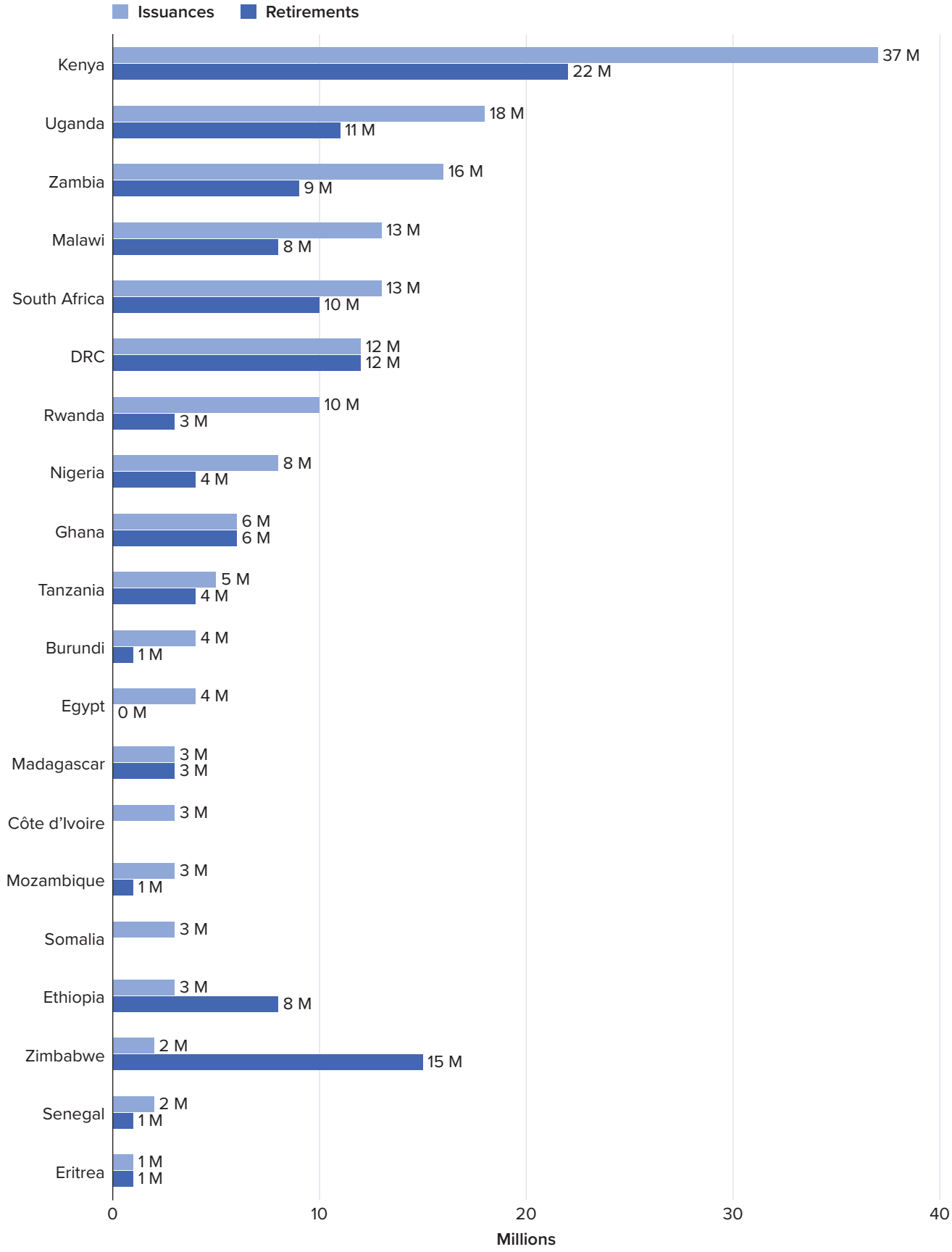
Figure 10. African credit issuances in the VCM from projects that cover over 90% of the issuance.



Source: Berkeley Voluntary Offset Registry[193]

Geographically, Eastern and Southern Africa have historically driven Africa's carbon credit sales. East Africa accounts for more than 40 percent of retirement volume, led by Kenya (top share on the continent at 18 percent). Southern Africa represents a 35 percent share, with Zimbabwe and South Africa being the major sellers. Western and Central Africa have equal representation, with approximately 10 percent share, with the Democratic Republic of the Congo (DRC) being the largest seller. The dominance of these regions is likely to continue. From 2020 to 2024, the top five issuing countries in Africa generated 56 percent of all credits, with Kenya, Uganda, Zambia, Malawi and South Africa accounting for 47 percent of all retirements from Africa. Notably, the five leading countries for credit retirements (Zimbabwe, DRC, Kenya, Uganda and South Africa) made up around 55 percent of total retirements on the continent. It is likely that the difference between issuance and retirement – i.e. DRC and Zimbabwe's dominance in the latter – can be explained by cheaper, lower-integrity credits (e.g. REDD+) being retired rapidly as market rules shift. The number of credits issued and retired by the top producers can be seen in **Figure 11** below. Ghana does not feature among the top five countries by issuance or retirement volume, reflecting its smaller absolute credit volumes relative to leading producers. However, Ghana remains strategically significant as one of the earliest African countries to operationalize high-integrity carbon market frameworks and to execute an Article 6.2 transaction. This illustrates that institutional readiness and market leadership are not necessarily correlated with the scale of issuance.

Figure 11. Credits issued and retired by the top 20 issuing African countries (2020–2024).



Source: Berkeley Voluntary Offset Registry[193]

The integrity transition is particularly impactful for African markets. While the increased focus on co-benefits and safeguards aligns with its sustainable development agenda, the overall trend is restrictive. Methodological challenges in quantifying the additionality of renewable energy credits have raised questions regarding the future of these credit types in the VCM, while Gold Standard's adoption of Article 6.4 standards creates challenges for the future of AFOLU and cookstove projects.

3.5.2. Market barriers

African participation in carbon markets continues to be constrained by a range of structural barriers. Political risk is a significant concern, with shifting regulatory environments and concerns over policy reversals undermining investor confidence. In many countries, permitting processes are slow and fragmented, delaying project development and increasing transaction costs. Perhaps most critically, access to developer financing remains limited: local developers often lack the upfront capital to cover feasibility studies, validation and verification expenses, which can be prohibitive in low-income contexts. As a result, African projects frequently depend on external financiers, reinforcing concerns about equity and benefit sharing.

Beyond structural issues, Africa also faces integrity-related barriers that limit both market growth and credibility. Historical controversies around methodologies, such as the over-crediting of clean cookstove projects, have cast doubt on the environmental integrity of African credits, creating reputational risks for both host countries and buyers[144]. Data and monitoring gaps further exacerbate these concerns, as many governments and project developers lack robust MRV systems capable of tracking mitigation outcomes to international standards. This has raised fears of double counting and inconsistent baselines, delaying project approval processes. However, the trajectory is not entirely negative: the introduction of the CCPs and the related integrity guardrails, including UNDP's focus on these issues through its High-Integrity Carbon Markets Initiative (HICMI), is beginning to address these weaknesses, providing a pathway for Africa to demonstrate high-integrity credits that meet global standards. If paired with targeted capacity-building, these reforms could help African countries ensure that carbon markets deliver holistic benefits.

3.5.3. Terms of trade

An 'African premium' emerges for key project types in the VCM, suggesting that African projects benefit from higher demand. Pricing data for five key project types was analysed over the past year, ending in July 2024. Among these, as seen in **Figure 12**, four commanded an African premium, averaging about 80 percent[145]. By contrast, REDD+ projects from Africa traded at a discount compared to the global average, reflecting concerns about the integrity of REDD+ methodologies and political risk[89].

3.6. Country case studies

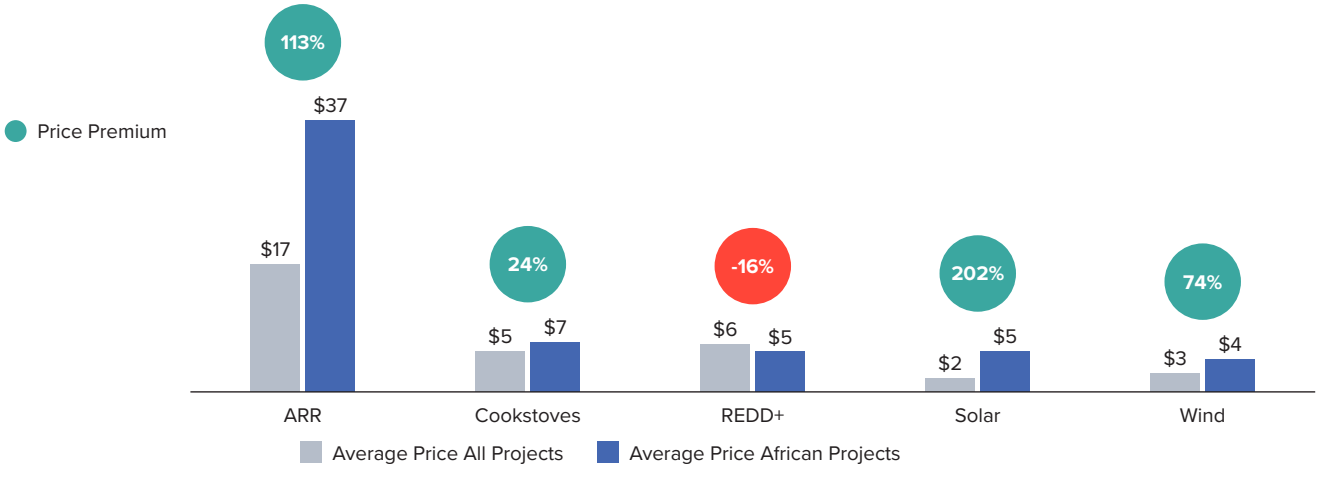
To facilitate a deeper investigation of country readiness to engage in international carbon credit transactions, this report adopted a case study approach. This enabled a more detailed analysis of policy, institutional and market ecosystem factors, considered alongside countries' track records of carbon trading activity.

3.6.1. Country selection

Five case study countries were selected from the top 20 list of African carbon producers to reflect different geographic regions, institutional contexts and levels of market maturity, as well as the requisite scale for carbon market development. Where relevant, experience in the CDM was covered. CDM experience laid the groundwork for carbon market readiness under the Paris Agreement. Results are presented in dashboard format. Using a methodology more fully described in Appendix 1, five countries were selected: South Africa, Egypt, Kenya, Ghana and the DRC.

The country case studies provide a representative view of Africa's carbon market landscape, yielding findings and lessons for other countries on the continent. This selection

Figure 12. Premiums and discounts on African credits by project type.



Source: Sylvera[38]

reflects **sectoral diversity**, ranging from industrial emitters like South Africa and Egypt to forestry-dominated economies such as the DRC, alongside diversified project bases in Kenya and Ghana. It also spans the spectrum of **policy maturity**, from well-developed market-ready systems in South Africa, Ghana and Kenya, to partially ready contexts like Egypt, and early-stage readiness in the DRC. **Market experience** is equally broad, covering VCM leaders (Kenya, South Africa), and early Article 6 movers (Ghana), countries with strong CDM legacies (Egypt, South Africa) and emerging players (DRC). Importantly, the group also captures differences in **domestic demand and institutions**: South Africa with a formalized carbon tax system, and Egypt, Ghana and Kenya building infrastructure such as registries and platforms that can support domestic demand.

3.6.2. Methodology and rankings

The country deep dives considered both macro and micro factors. Macro factors describe country performance at the level of the broader economy and carbon market (top-down view), while micro factors determine readiness to participate (bottom-up view).

Firstly, to provide proper context for country readiness assessments, macro indicators are provided to describe the scale of the producer, the recent carbon track record and the current carbon risk. These describe the size of the economy and level of economic development, as well as the national carbon footprint. In terms of carbon market track record, a summary of issuance over the past five years is provided, with ratings of carbon risk per Sylvera's framework. This describes the environment within which carbon transactions take place, with a track record. Sylvera's four carbon risk categories are as follows:

- Delivery risk: the risk of delay or disruption in issuance arising from the host country;
- Utility risk: the impact of host country factors on the fungibility or eligibility of credits;
- Reputational risk: the risk of failure to meet stakeholder expectations, deriving from national factors;
- Cost risk: the risk of project budget overruns associated with host country-level factors.

To highlight each country's relative performance, 'excess carbon risk' is reported as the difference from country averages for each of these categories.

The macro-level indicators draw on a range of internationally recognized datasets to ensure comparability and reliability. The macro indicators, carbon risk ratings and project type distributions presented in each country deep dive draw from a combination of globally recognized and publicly accessible data sources to ensure comparability across all countries. Economic indicators such as gross domestic product (GDP) ($ billion, 2024)[146] and GDP per capita ($, 2024)[147] are sourced from the World Bank's World Development Indicators (WDI) database. Historical GHG emissions (2018–2022, $MtCO_2e$) are drawn from Climate Watch[131] and the World Resources Institute's climate data explorer (CAIT)[132], reflecting national inventories of GHG emissions. VCM issuance data for the period 2020–2024 ($MtCO_2e$) are derived from the Berkeley Carbon Trading Project dataset[193], which consolidates registry data across Verra, Gold Standard and other major standards. Country-level carbon risk ratings covering delivery, utility, reputational and cost risks are drawn from Sylvera's[38] 2024 country carbon credit risk framework. Together, these sources underpin the macro indicators and country risk panels presented in each country's dashboard, including GDP, GDP per capita, VCM issuance, historical GHG emissions, carbon risk profiles, top carbon project types, and relative political risk levels. This integrated data approach ensures analytical consistency across countries and eliminates the need to list sources separately under each dashboard.

To systematically evaluate the readiness of African countries to participate in international carbon markets, a structured assessment framework was applied. The framework comprises four key pillars – legal and regulatory capacity, institutional capacity, technical capacity, and market and finance capacity – each with specific indicators that capture critical aspects of carbon market preparedness.

Legal and regulatory capacity is concerned with the integration of carbon in national policy and regulations, from incorporating it in the NDC to send clear signals to international buyers, to enacting Article 6 and benefit-sharing regulations that guide the implementation of carbon projects. These elements create the clarity required for international carbon trading.

Institutional capacity refers to the governance structures and other institutions required to trade smoothly and with credibility. It concerns not only the authority to make decisions, particularly concerning host country approval for export into compliance markets (Article 6 and CORSIA), but also platforms and reports to create visibility that are essential for building trust in the market.

Technical capacity refers to the skill set available in-country to develop projects and issue credits: a central determinant of national ability to convert abatement potential into robust revenue streams. This includes MRV systems, the existence of VVBs and methodology support.

Market and finance capacity combines the scale and quality of the project pipeline with the existence of domestic actors involved in carbon project development, financing or trading to monetize this for national benefit. A country with strong scores on other measures of readiness, but underdeveloped local commercial and financing ecosystems, may see a large share of value exported, rather than invested in local sustainable development.

The countries were assigned scores according to the level of readiness demonstrated. Appendix 2 at the end of this document outlines the metrics considered for each indicator.

Each indicator was scored on a three-point scale reflecting the degree of readiness:

- Red (0): No or poor evidence of the required element; absence of systems, laws or institutions;
- Orange (1): Partial readiness; draft frameworks, pilot initiatives or limited institutional capacity;
- Green (2): Full readiness; established, operational and functional systems or frameworks.

An overall readiness rating for each country was then derived by aggregating scores across all indicators. Scores were summed up to produce a total, expressed as a percentage of the maximum possible score. This overall rating provides an overview of readiness highlighting strengths and gaps and allows countries to be benchmarked against one another with regard to their capacity to engage in both

the VCM and Article 6 carbon market activities. **Figure 13** below presents the five-country ratings, followed by commentary on each, and implications for the carbon trading outlook. Detailed results are available in Appendix 3.

A key limitation was the availability and accessibility of country-level information across the various readiness criteria. In many instances, relevant policies, regulatory frameworks and institutional developments were either not publicly available or not regularly published, creating notable data gaps. This limited the extent to which a comprehensive, desk-based review alone could capture the full readiness picture. This challenge was compounded by the inability of the research team to secure interviews with official representatives from most of these countries to validate the assessment. Accordingly, the results of the readiness assessment reflect a desk-based analysis undertaken on a best-effort basis.

Figure 13 presents country readiness ratings across four capacity dimensions: legal and regulatory, institutional, technical, and market and finance. These ratings assess readiness for both Article 6 participation (with a primary focus on Article 6.2 systems such as authorization processes, MRV, corresponding adjustments, national registries and governance structures) and for VCM engagement. While the assessment is anchored primarily in Article 6.2 institutional requirements, several indicators, such as benefit-sharing frameworks, private-sector readiness and methodology support, also capture broader VCM readiness. The ratings, therefore, reflect a combined view of countries' preparedness to participate in high-integrity carbon markets across both compliance and voluntary pathways. These readiness dynamics are within the mandate of UNDP's HICMI, which supports African governments in strengthening governance frameworks, registry systems and institutional architecture required for effective participation in Article 6 and voluntary markets.

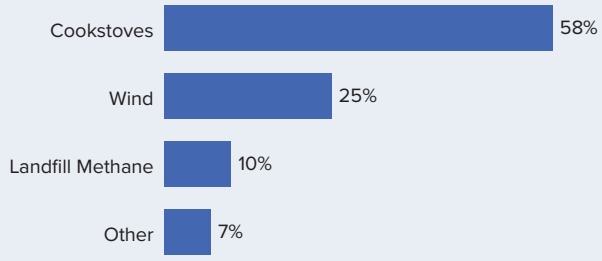
3.6.3. Deep dives

3.6.3.1. South Africa

Macro indicators

GDP 2024 ($ billion)	400
GDP per capita 2024 ($)	6,253
VCM issuance 2020–2024 ($MtCO_2e$)	13
GHG emissions 2022 ($MtCO_2e$)	499
Emissions intensity ($MtCO_2e$ per $ billion)	1.25
Emissions per capita 2022 (tCO_2e per capita)	8

Top carbon project types



Excess carbon risk



Figure 13. Country analysis readiness ratings.

Capacity dimension	South Africa	DRC	Kenya	Ghana	Egypt
Legal and regulatory					
Institutional					
Technical					
Market and finance					
Overall	Medium	Low	Medium-high	High	Low-medium

Low · Low-medium · Medium · Medium-high · High

State of play

The largest African economy, South Africa, is among the top 15 global emitters, producing about 499 $MtCO_2e$ in 2022[148,149], largely from the energy sector, which accounts for about 80 percent of emissions[135]. South Africa's emissions profile reflects both high emissions intensity (1.25 $MtCO_2e$ per $ billion) and high per-capita emissions (8 tCO_2e per person[150]), among the highest on the continent, indicating the centrality of the power sector to its mitigation challenge. Carbon finance has long been used to support mitigation and development objectives. Under the CDM, South Africa issued about 25 million credits from 25 projects, mostly in N_2O abatement, followed by landfill gas and renewables[151]. This experience built institutional capacity and familiarized local stakeholders with international carbon standards.

South Africa is steadily positioning itself as one of Africa's major carbon market players. The country's climate and development strategy is anchored in the principle of a just transition: reducing emissions while addressing poverty, energy access and job creation[152]. The 2024 Climate Change Act provides the first comprehensive legal basis for a low-carbon economy[153], reinforcing the 2019 Carbon Tax Act. This legal foundation ensures carbon finance is integrated into national climate policy and aligned with the NDC, which commits to cutting emissions to 398–510 $MtCO_2e$ by 2025 and 350–420 $MtCO_2e$ by 2030, with an ambition of net zero by 2050[135]. A second draft NDC, released for consultation, proposes a target of 350–420 $MtCO_2e$ by 2030 (implementation period 2026–2030) and a target of 320–380 $MtCO_2e$ by 2035 (implementation period 2031–2035[154]). While these draft targets are not yet adopted, they indicate the direction of South Africa's evolving mitigation ambition. South Africa's updated NDCs focus on AFOLU, energy, industrial processes and product use (IPPU), and waste sectors[135].

Carbon market development has been supported by the country's carbon tax system, the most established compliance carbon pricing system on the continent. The Carbon Tax Act allows companies to reduce their carbon tax liability by 5–10 percent using approved offsets, thereby creating demand for local offset projects since 2019[121]. To date, around 21.6 $MtCO_2e$ have been retired under the tax, which drives annual demand for at least 4 $MtCO_2e$[155]. Approximately 12.6 million credits have been issued from VCM methodologies over 2020–2024, primarily from cookstove projects, followed by wind, and then landfill methane. Interviews indicate that the tax system has stimulated domestic carbon market development, providing carbon developers with demand certainty (price and volume), and bankers with the offtake assurance required to extend project financing. Further, the system has given South African negotiators credibility in international climate negotiations, providing evidence of firm commitments to decarbonization in Africa's most carbon-intensive economy. While short-term supply constraints exist, land-based opportunities suggest strong issuance potential[148]. Further, consultations are under way to explore the potential for sourcing offsets from neighbouring countries, which would require assurance of high-integrity and aligned policy and institutions in host countries to avoid double counting.

Carbon risk is rated as medium by Sylvera, with particularly high cost risk, given the lack of regulation around benefit sharing, carbon-project fees and expected LoA and corresponding adjustment fees[145]. South Africa will soon gazette a framework to govern carbon markets. This will include benefit-sharing arrangements, authorization processes and associated fees[156].

South Africa's negative reputational risk score reflects heightened scrutiny associated with legacy offset use under the domestic carbon tax, ongoing policy transitions related to Article 6 participation, and increased investor and civil-society requirements for regulatory clarity in respect of benefit-sharing and authorization processes. While these factors do not preclude market participation, they increase sensitivity to integrity and governance considerations relative to peers.

Readiness to engage

- **Legal and regulatory foundations: South Africa has a solid legal foundation, with emerging Article 6 readiness and gaps in benefit sharing.** The Climate Change Act (2024), Carbon Tax Act (2019) and related Carbon Offset Regulations together provide a mandate for carbon budgets, carbon pricing and the use of offsets, embedding market mechanisms within national policy[150]. The draft Article 6 framework links existing regulations to Article 6 and requires projects to align with the country's NDCs for approval, highlighting policy alignment[150]. On Article 6.2, draft authorization procedures and a plan to expand the carbon offset administration system (COAS) into a full registry are in place[150]. The draft Article 6 framework notes that an SOP will be developed to guide participating entities under the Article 6.4 mechanism[150]. A key gap remains in benefit sharing, as no guidelines or national framework exist, though voluntary standards and just transition policies provide safeguards;
- **Institutional capacity: The country's institutional readiness is moderate.** The designated national authority (DNA), currently located within the Department of Electricity and Energy (DEE), has been active since 2005 to support the development and implementation of CDM projects[157]. Capacity will need to grow. Further, the revision of regulations needs to establish the Department of Forestry, Fisheries and the Environment (DFFE) as Article 6 Designated Focal Point[150]. Coordination across ministries is supported by the Presidential Climate Commission: a multistakeholder body that includes key ministries to advise on climate policy, creating reasonable coherence[158]. Registry infrastructure is a relative strength: the COAS platform already tracks credits used for the carbon tax and will be upgraded for Article 6 compatibility, putting South Africa ahead of many peers[150];
- **Technical readiness: South Africa's technical readiness is strong in comparison to other African countries.** South Africa has a well-established MRV system for GHG accounting[159], while project-level MRV relies on international standards such as Verra and Gold Standard. While the country aims to develop a domestic standard through which projects will be accepted under the Carbon Offset Regulations, visibility on its progress is limited[160]. Some

local VVB capacity exists through local offices of international VVBs such as SGS[161];

- **Market and finance ecosystem: Private sector participation is well-established.** The Johannesburg Stock Exchange (JSE) Ventures' voluntary carbon market, launched in 2023 with Xpansiv, provides liquidity and price discovery linked to international systems[162]. On the project development side, South Africa has several domestic project developers and consultants (e.g. Anthesis Group South Africa, Promethium Carbon, Khanyisa Projects) that originate projects and navigate the certification process, often in partnership with communities or municipalities. The project pipeline is currently dominated by renewable energy credits. Sylvera reports a catalogue of 200 projects, with over two-fifths (82) being renewable energy projects, and an estimated supply of 16.3 million credits[145]. Many of these project types will fail to meet VCM integrity standard requirements and so have difficulty attracting competitive prices from VCM buyers, although they may still qualify for Article 6.2 transactions and carbon tax offsetting.

Overall, South Africa has a medium level of readiness to engage in international carbon markets. It benefits from a clear legal mandate, established institutions, strong MRV systems and active private sector engagement. Key areas for further strengthening include advancing Article 6 implementation arrangements, developing benefit-sharing guidelines and diversifying the project pipeline beyond renewable energy.

Outlook

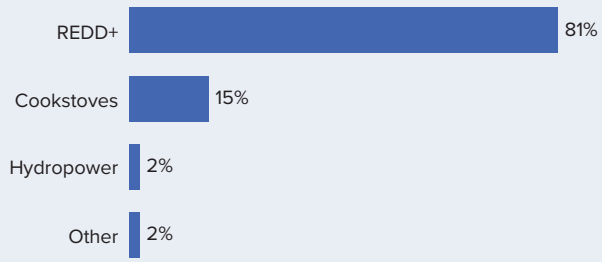
With its just transition agenda and advanced policy base, South Africa is well positioned to scale carbon markets to support climate targets and sustainable development. Concrete opportunities include:

- Proposed doubling of the offset allowance of Phase 2 of the carbon tax from 2026[163] and progressive increases in the scope of the tax net and carbon price (from current $13/tCO2e to over $20), strengthening market signals;
- PACM transition credits: approximately 20 $MtCO_2e$ of CDM credits await approval, possibly generating an additional $400 million to $800 million in revenue for the country[140];
- Article 6.2: The government has signalled interest in selling credits abroad[164], but no deals have been finalized to date.

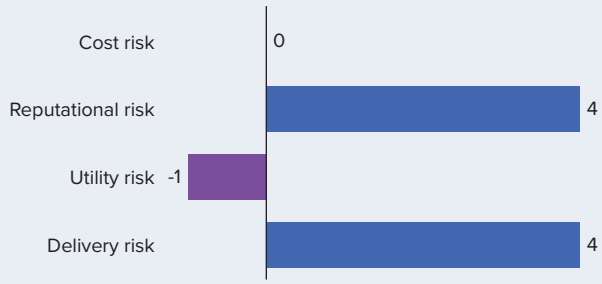
3.6.3.2. Democratic Republic of the Congo

Macro indicators	
GDP 2024 ($ billion)	70
GDP per capita 2024 ($)	647
VCM issuance 2020–2024 ($MtCO_2e$)	12
GHG emissions 2022 ($MtCO_2e$)	708
Emissions intensity ($MtCO_2e$ per $ billion)	10.11
Emissions per capita 2022 (tCO_2e per capita)	6.91

Top carbon project types



Excess carbon risk



State of play

The Democratic Republic of the Congo is a large emitter by African standards, despite being a modestly sized economy**.** In 2022, its GHG emissions were 708 $MtCO_2e$, with more than 90 percent attributed to deforestation and land-use change, including forest loss associated with small-scale agriculture[131,165]. The country's emissions profile translates into very high emissions intensity (10.11 $MtCO_2e$ per $ billion) and emissions per capita of 6.91 tCO_2e[133], indicating the scale of land-use pressures relative to the size of its economy. Accordingly, the updated NDC prioritizes reducing deforestation, energy (including transport), agriculture and waste sectors[166]. It explicitly signals interest in carbon markets to finance NDC measures, urging a fair price for forest-based credits[167]. President Félix Tshisekedi highlighted the need for fairer pricing, noting the disparity

between low payments for forest conservation and the far higher costs of technological carbon removal[168].

The DRC has the potential to rapidly scale up the carbon finance it accrues from carbon markets due to its extensive tropical forests, covering two thirds of its territory (152 million hectares) and storing about eight percent of the world's forest carbon[169]. Protecting these forests is central to national development policy, with objectives focused on biodiversity conservation, poverty reduction and generating revenues that can be reinvested in sustainable development, particularly in rural areas[170].

To date, engagement in international carbon markets has evolved unevenly. Under the Kyoto Protocol's CDM, the DRC has had very little experience, with only three projects, and only one of these (the afforestation project) has issued credits to date[134]. By contrast, the DRC's participation in the VCM has been substantially greater. In 2020 and 2021, most issuances were from REDD+ projects, reaching nearly 10 million credits. From 2022 to 2024, however, most issuances came from cookstove projects (about 1.7 million credits). VCM transactions have centred on REDD+ projects, aligning with the SDGs of forest conservation. Yet, concerns persist around regulation, integrity and equitable benefit sharing for local communities[156]. Notably, regional conflict further poses a critical risk to REDD+ projects in the DRC. Ongoing instability, from rebel activity to intergovernmental disputes over resource governance, heightens the threat of project disruption and carbon leakage[151,171].

Sylvera assesses country risk as extremely high, citing elevated levels of political risk, which amplifies delivery risk, limited governance, a weak human rights record, low climate ambition and negative media coverage as contributing factors.

Readiness to engage

- **Legal and regulatory foundations**: Capacity remains limited, although the DRC has taken meaningful steps to formalize carbon market participation. The Ministry of Environment now serves as the national focal point for international mechanisms, positioning the country to participate in Article 6 once operational rules are finalized[153]. The government is also exploring broader fiscal and policy tools. A domestic carbon tax is planned for 2026, with revenues potentially flowing into a national climate fund[172]. In 2023, the *Government laid the groundwork for the Aut*orité de Régulation du Marché du Carbone (ARMCA) to regulate and manage the country's emerging carbon market[173]. Officials have signalled that Article 6 regulations would be published in 2025[174]. While benefit-sharing rules exist, per an interministerial order (15 September 2023) setting the State's share and revenue-sharing modalities for credits from REDD+ projects, implementation is evolving. The Mai Ndombe project has the only completed and validated benefit-sharing plan, likely to be used as a model for future REDD+ projects[175]. However, persistent political instability and governance fragility increase implementation risk. Frequent changes in political leadership, security challenges in several regions and capacity constraints across public institutions affect policy continuity, enforcement and coordination. These factors heighten regulatory and delivery risk, particularly for long-term carbon market arrangements that rely on stable institutions and predictable oversight. In short, the DRC's legal framework for carbon market participation is emerging, with sporadic application;
- **Institutional capacity: Progress is visible but still fragile.** Currently, no formal authorization or tracking system is publicly operational[153]. The Carbon Market Regulatory Authority is still at an early stage of development, with recent leadership appointments signalling operationalization. The Authority is expected to create a centralized registry, provide reliable data on forest assets and enable the government to define market parameters[99]. There is also an interministerial Carbon Committee (between the environment and finance ministries) for coordinating policy, as evidenced by the joint order on benefit sharing[161]. This suggests growing coordination between economic and environmental arms of government; yet the institutional architecture is far from mature. Notably, data on the DRC's project pipeline is fragmented. There is very little transparency on project data, with researchers finding that carbon projects involving the private sector, non-governmental organizations (NGOs) and logging companies have proliferated, yet there is very little information about these projects available publicly[161]. In short, institutional readiness is nascent: the basic institutions have been formally established, but need to be operationalized with trained staff, budget support and clear procedures;
- **Technical readiness: Technical capabilities are limited.** While a national GHG inventory system exists, its MRV systems are limited, as evidenced by the country's participation in capacity-building initiatives, such as the Initiative for Climate Action Transparency[176]. Carbon projects rely heavily on international standards like Verra for methodologies, and validation and verification are conducted almost exclusively by international auditors, as no accredited domestic bodies exist. This reliance raises costs and limits local ownership;
- **Market and finance ecosystem: To date, most projects have been driven by international developers** and NGOs, while the DRC private sector participation remains limited[183]. Currently, the pipeline is diversifying to mitigate dependence on REDD+ methodologies. Sylvera notes a catalogue of 55 projects: primarily from cookstoves (30 projects), followed by forestry projects (9 REDD+, 9 ARR, 1 improved forest management [IFM])[42]. CCP-approved methodologies cover jurisdictional REDD+, ARR and cookstove projects, providing an opportunity to build a resilient carbon mix.

The DRC's overall readiness is low compared with the other four African countries studied in depth for the purposes of this report. Its forests represent one of the world's largest natural carbon sinks and the country has already demonstrated its capacity to generate substantial carbon credit volumes. But to move from promise to long-term credibility, it must finalize Article 6 regulations, operationalize a national registry, strengthen institutional and technical systems, and ensure that communities benefit meaningfully. In this way, the DRC could position itself as one of the largest suppliers of high-integrity jurisdictional REDD+ credits globally, attracting hundreds of millions of dollars to support sustainable development and forest conservation.

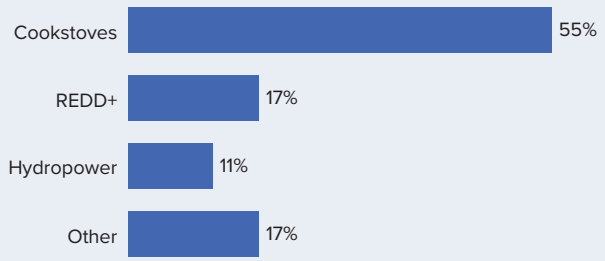
Outlook

Mitigation potential is substantial if deforestation is curbed. By one estimate, stopping the DRC's deforestation could avoid over half a gigaton of CO_2 emissions annually[177]. Based on historical credit supply and available forest space, the DRC could supply tens of millions of high-integrity credits per year by 2030 if it implements robust programmes under emerging higher-integrity jurisdictional REDD+ standards. The medium-term outlook is strengthened by results-based finance initiatives (such as the Central African Forest Initiative) and potential Lowering Emissions by Accelerating Forest Finance (LEAF) Coalition programmes, which provide upfront payments for verified emission reductions.

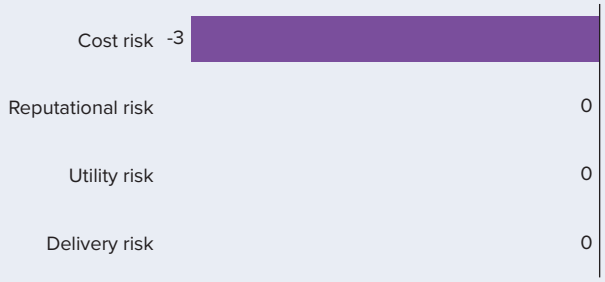
3.6.3.3. Kenya

Macro indicators	
GDP 2024 ($ billion)	124
GDP per capita 2024 ($)	2,206
VCM issuance 2020–2024 ($MtCO_2e$)	37
GHG emissions 2022 ($MtCO_2e$)	83
Emissions intensity ($MtCO_2e$ per $ billion)	0.67
Emissions per capita 2022 (tCO_2e per capita)	1.53

Top carbon project types



Excess carbon risk



State of play

Kenya has a growing, lower-middle-income economy with a comparatively low carbon intensity but rising absolute emissions, positioning it as one of Africa's emerging emitters. Kenya contributes just 0.15 percent of global GHG emissions at 83 $MtCO_2e$[131]. Kenya's emissions intensity stands at 0.67 $MtCO_2e$ per $ billion of GDP, while its per-capita emissions remain relatively low at 1.53 tCO_2e[133], reflecting both the country's clean power mix and its development status. Its electricity grid is among the cleanest globally[178], relying substantially on hydropower and geothermal technology[179]. Agriculture accounts for roughly half of total emissions, with land-use change and forestry contributing to a further third, largely driven by deforestation, while industrial emissions remain relatively small[180]. Kenya's updated NDC commits to a 32 percent reduction in emissions below business-as-usual (143 $MtCO_2e$) by 2030, aiming to achieve an absolute emissions reduction of 75 $MtCO_2e$[181]. Key target sectors include energy, transportation, industrial processes, AFOLU and waste.

Kenya is Africa's leading carbon producer, far surpassing South Africa in respect of the scale of issuance over the past five years. Under the CDM, Kenya developed diverse project types, including geothermal which accounted for almost half of the 13.5 million credits issued, alongside wind, reforestation, cookstove projects and water purification[134]. In the voluntary market, Kenya has since become Africa's largest source of credits. Most credits are from cookstoves (over 50 percent), with secondary types being REDD+, clean water and sustainable grassland management. Many of these credits have attracted large corporate buyers, including airlines and tech companies[182]. In terms of Article 6.2, the country has signed bilateral agreements with Switzerland and Sweden, and an MoU with Singapore. It also holds an MoU with Japan covering two active projects under the JCM[43]. No ITMOs have been authorized yet, but Kenya is regarded as a leading country in East Africa for Article 6 readiness.

Overall, Sylvera reports a medium country carbon risk[183], like South Africa. Concerns arise from a lack of clarity over carbon ownership rights, institutional capacity and reliance on government to approve all projects and human rights issues.

Readiness to engage

- **Legal and regulatory foundations: Kenya has high levels of capacity with an advanced legal framework** anchored in the Climate Change Act (amended in 2023) and strengthened by the 2024 Climate Change (Carbon Markets) Regulations. These align with the updated NDCs, in which the government actively promotes carbon markets as a channel to mobilize capital for sustainable development, using both market and non-market mechanisms[184]. Rules guide participation in both voluntary and compliance markets, establishing clear procedures for project authorization, benefit sharing with communities, and authority to approve Article 6 transfers[121]. In 2025, Kenya unveiled its draft regulation for a national carbon registry, which will be used to transfer ITMOs and through which templates for LoAs can be

accessed[185]. Legal architecture is widely considered one of the most advanced in Africa, embedding integrity and sustainable development into market governance. One significant gap is undefined carbon ownership rights, which worsen delivery risk due to competing claims[163];

- **Institutional capacity: Institutions are relatively mature, with the addition of a registry closing the remaining gap.** The Ministry of Environment serves as the authority to approve authorizations, supported by the National Environment Management Authority (NEMA) as the DNA for Article 6.4[171]. The formation of a National Climate Change Council will be enabled through the Draft Climate Change (Carbon Trading) Regulations (2025) to determine the carbon budget for trading[121]. Additionally, a multisectoral technical committee will be established under the Carbon Markets (2024) regulations to review carbon projects in alignment with the national climate framework. Similarly, *ad hoc* committees will be formed from members of the technical committee to assess project proposals based on sectoral expertise[121];
- **Technical readiness: Recent improvements are gradually closing gaps in capacity**. Kenya has established a national GHG inventory system, which – while being used for reporting to the UNFCCC – is still being fully institutionalized. Notably, the government is developing an MRV tool for its adaptation and mitigation action, which will also be used to track climate finance and cooperative approaches under Article 6.2[186]. In terms of VVB presence, some international VVBs have opened offices in Nairobi. Kenya is also finalizing its national carbon registry to integrate voluntary and compliance projects into a unified system, ensuring transparency and avoiding double counting[170]. Capacity is sound, with trained staff, strong private-sector involvement through the Kenya Private Sector Alliance (KEPSA) and support from partners such as the World Bank and UNEP;
- **Market and finance ecosystem: Kenya has strong private-sector capacity, servicing robust international demand.** It hosts a number of well-regarded local project developers, e.g. BURN Manufacturing and KOKO, which produce efficient cookstoves; Wildlife Works, which manages REDD+ projects; and KenGen, which has monetized geothermal emissions reductions. This explains Kenya's mature project pipeline. Sylvera notes a project catalogue of 366 projects in the country and an estimated supply of 41.9 million credits[163]. Half of Kenya's issued credits come from cookstove projects, a project type with CCP-approved methodologies. Flourishing activity is attracting international finance. For instance, in 2023, a Kenya-based cookstove firm received a $5 million investment to scale up its programme via anticipated carbon revenues[187]. In 2023, CYNK launched one of the first Africa-based carbon market platforms in Kenya[188], facilitating early-stage financing for carbon projects. Investor confidence is strong thanks to Kenya's governance, project track record and benefit-sharing provisions.

Kenya's overall level of readiness is medium-high. It combines long-standing carbon market experience with an established legal and institutional framework. Its regulatory arrangements, diverse project pipeline and pursuit of Article 6 cooperation position it favourably to scale up high-integrity credit supply. Kenya's greatest gaps in readiness lie in establishing MRV protocols and enhancing the presence of VVBs.

Outlook

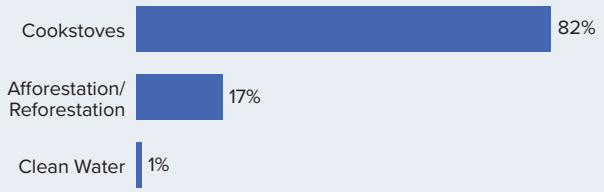
Kenya is well placed to attract substantial climate finance for high-integrity project types with co-benefits, including AFOLU and clean cookstoves. It is also currently developing high-value engineered removal projects, including direct air capture in the Rift Valley. Studies suggest Kenya could unlock up to 300 million credits by 2030, worth as much as $8 billion, by using its mitigation potential[189].

3.6.3.4. Ghana

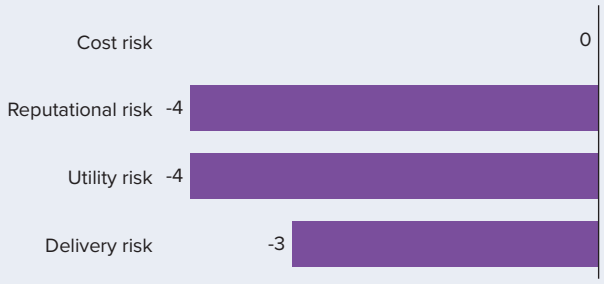
Macro indicators

GDP 2024 ($ billion)	82
GDP per capita 2024 ($)	2,406
VCM issuance 2020–2024 ($MtCO_2e$)	6
GHG emissions 2022 ($MtCO_2e$)	18
Emissions intensity ($MtCO_2e$ per $ billion)	0.22
Emissions per capita 2022 (tCO_2e per capita)	0.54

Top carbon project types



Excess carbon risk



State of play

Ghana has a history of low emissions intensity[190]. Its global emissions share is small (about 0.03 percent)[191], about a fifth of Kenya's. The country's total GHG emissions were 18 $MtCO_2e$ in 2022[131]. Ghana's profile reflects very low carbon intensity, with emissions of 0.22 $MtCO_2e$ per $ billion of GDP, and low per-capita emissions of 0.54 tCO_2e[133], underscoring its limited contribution to global emissions despite ongoing economic growth. Ghana aims to reduce emissions by at least 24 $MtCO_2e$ by 2030[176]. Sustainable development co-benefits, such as job creation, health and gender inclusion, are explicitly integrated in NDC measures. Energy, IPPU, land use change and waste are the country's NDC sectoral priorities[42]. Ghana's NDCs emphasize the use of carbon markets to attract finance for conditional programmes[192].

Like Kenya, Ghana's carbon market strategy is tied to a policy commitment to inclusive growth. As many of the country's rural livelihoods depend on a natural resource base, climate change is a priority area in Ghana[42]. NDC objectives include promoting climate-smart agriculture for jobs and sustainable land use, advancing eco-tourism and reforestation through NbS, expanding the Green Ghana tree-planting initiative and strengthening disease surveillance and early warning systems[42]. This has facilitated a proactive approach to international transactions, which sets the standard for the continent.

Ghana is Africa's Article 6 leader. It was the first African country, and among the first globally, to authorize ITMO transfers[42]. Article 6 activity continues to intensify. A significant 2020 bilateral agreement with Switzerland, ratified in 2022, has already delivered results, nearly 12,000 ITMOs from a cookstove project which have been issued and transferred[42]. Ghana has 14 projects active under Article 6.2 across a variety of project types, including waste composting, solar photovoltaic, and electric vehicles (EVs), while additional signed cooperation agreements with Sweden and Singapore broaden Ghana's buyer base[177].

Ghana also has experience in the CDM and VCM. Under the CDM, Ghana had four registered projects, in waste management and cookstoves[134]. In the voluntary market, the country issued nearly 6.3 million credits between 2020 and 2024, 5.1 million of which were from cookstoves, followed by 1 million ARR credits[193].

Sylvera reports Ghana's carbon risk as relatively low, with a large cost risk mainly because benefit sharing is not preset by regulation[163].

Readiness to engage

- **Legal and regulatory foundations: Capacity is high, with a legal framework among the most advanced in Africa.** The country's Article 6 cooperative approach framework publishes clear authorization procedures for Article 6.2, already applied in its Swiss projects, outlining each step in the mitigation activity development process[121]. Ghana has recently upgraded its legal foundation to explicitly support carbon markets, passing the Environmental Protection Act (2025), which incorporates climate change and carbon market provisions[194]. This designates the reconstituted Environmental Protection Authority (EPA) as the national authority, establishes a Ghana Carbon Registry, a Carbon Market Committee and a Mitigation Fund[178]. Notably, Ghana has an initial report and an annual information report published on the UNFCCC CARP[195]. However, as in Kenya, there is a lack of clarity around carbon ownership in the current legal framework, the establishment of which could also formalize a benefit-sharing framework or guidelines[178];
- **Institutional capacity: Strong institutional arrangements exist.** The EPA hosts a dedicated Ghana Carbon Market Office that serves as the authority that evaluates project proposals, issues LoAs and ensures corresponding adjustments, as well as reporting for transactions[121]. Furthermore, the regulatory framework establishes the Carbon Market Inter-Ministerial Committee that oversees Ghana's Article 6 engagements[121]. The EPA is also set as the DNA for Article 6.4[179]. Ghana has already developed a prototype of its national registry, which is now functional for both voluntary credits and ITMOs[196]. It is a leader in transparency: project documentation, statuses and volumes are publicly available online through the Registry's website;
- **Technical readiness: Ghana's technical systems are relatively well developed and improving.** The country has an operational MRV framework, evidenced by its national inventories and Biennial Transparency Reports, complemented by project-level protocols for Article 6 activities. The EPA will operationalize technical requirements under the Article 6.2 operational framework, including MRV and accounting[197]. Notably, Ghana has created a positive list of pre-authorized technologies considered additional to its NDC[121], and the Carbon Market Committee must establish existing approved methodologies under international crediting standards[181]. The absence of VVB capacity may, however, hinder projects;
- **Market and finance ecosystem: Ghana's capacity is high, with substantial funding secured.** Domestic firms like Jospong (waste composting) and local startups such as SolarTaxi (electric mobility) and international firms such as Sistema.Bio (biogas) are developing projects, showing growing private-sector engagement[198]. The new Mitigation Fund will reinvest revenues into further projects and community benefits[178]. While Ghana does not have an exchange for carbon credits yet, it uses international platforms such as global brokers and marketplaces. Ghana's pipeline is robust and diverse. Sylvera reports a pipeline of 69 projects and a related estimated supply of 4.7 million credits[163]. The majority are cookstove projects (37), followed by ARR (14)[163], with 7 high-value biochar projects[163]. Given Ghana's 14 current active projects under Article 6.2, cookstoves, waste composting, renewable energy and electric vehicle credits are expected. Most credits come from project types with CCP-approved methodologies.

Overall, Ghana's readiness is the highest among the five countries assessed. It has rapidly positioned itself as a global pioneer in carbon markets, moving from planning to delivery with early participation in Article 6 transactions, a comprehensive legal framework and transparency. Its technical systems and diverse project pipeline demonstrate readiness to scale, while careful market management can ensure both integrity and domestic benefit. By balancing NDC compliance with international transfers, Ghana is

showing how a developing country can translate climate ambition into tangible development outcomes through carbon markets.

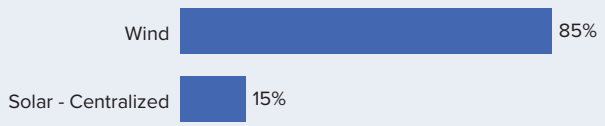
Outlook

While Ghana's pipeline is substantially smaller than that of its peer Kenya, its clear commitment to climate goals, high pipeline quality and the ease of carbon trading suggest that Ghana may be able to achieve superior prices on a like-for-like basis, likely in Article 6 and compliance markets.

3.6.3.5. Egypt

Macro indicators	
GDP 2024 ($ billion)	389
GDP per capita 2024 ($)	3,339
VCM issuance 2020–2024 ($MtCO_2e$)	4
GHG emissions 2022 ($MtCO_2e$)	346
Emissions intensity ($MtCO_2e$ per $ billion)	0.89
Emissions per capita 2022 (tCO_2e per capita)	3.07

Top carbon project types



Excess carbon risk

Not assessed by Sylvera

State of play

Egypt has a relatively large and carbon-intensive economy, similar to South Africa in this respect. The country contributes about 0.63 percent of global GHG emissions annually[199] and 346 $MtCO_2e$ in 2022[131]. Its emissions profile is characterized by high emissions intensity at approximately 0.89 $MtCO_2e$ per $ billion of GDP and relatively high emissions per capita at 3.07 tCO_2e[133], indicating the carbon-heavy nature of its growth model. Energy remains the dominant source of emissions, particularly natural gas[200]. Clean technology forms the core of its NDC strategy, targeting a transition from a fossil fuel economy to the generation of about 40 percent of electricity from renewables by 2035[185].

Egypt regards carbon markets as a strategic instrument to advance its sustainable development agenda and climate commitments. High-level officials present carbon markets as an innovative financing tool to mobilize private investment for green transformation[201]. Egypt's Vision 2030 development strategy, while not initially climate-centric, set sectoral mitigation targets, while the National Climate Change Strategy 2050 links climate action with economic growth and improved quality of life[202]. Alongside its private investment focus, the updated NDC also expresses interest in voluntary cooperation under Article 6[203].

Egypt's experience under the Kyoto Protocol's CDM provides a useful carbon market foundation. The country registered 21 projects under the CDM, issuing a total of 24 million credits: 19.7 million credits derived from a single N_2O abatement project, and a further 3.5 million credits from four wind projects[134]. Egypt issued 3.5 million credits in the VCM from 2020 to 2024, all through renewable energy projects, but primarily in wind[177]. Only half a million credits were retired in the same period, possibly suggesting low demand given renewable energy integrity concerns[177]. The prominence of renewable energy carbon projects in the country aligns with its NDC sectoral priorities. While Egypt has signalled interest in voluntary cooperation under Article 6, visibility is limited on the country's Article 6.2 and 6.4 readiness.

Sylvera does not currently provide an assessment of Egypt's carbon risk.

Readiness to engage

- **Legal and regulatory foundations: Egypt's capacity is relatively high, with most emphasis to date on carbon market trading rules**[94]. Following COP27, Prime Ministerial Decree No. 4664/2022 authorized the creation of a voluntary carbon marketplace on the Egyptian Exchange (EGX)[121]. Building on that, the Financial Regulatory Authority (FRA) issued comprehensive regulations in 2024 to govern the market. Notably, FRA Decree No. 31/2024 sets rules for listing, trading, and delisting carbon credits on the exchange, requiring rigorous oversight so that traded credits represent genuine reductions in GHG emissions[121]. This led to one of the first dedicated carbon trading frameworks on the continent. Finally, in terms of benefit sharing, ensuring local sustainable development benefits from carbon finance is an implicit policy goal, though there is no existing framework or guideline for benefit sharing;
- **Institutional capacity: Institutions are adequate for VCM purposes but fall short of compliance requirements.** The Egyptian Environmental Affairs Agency has been established as the Article 6.4 DNA[204], yet it is unclear to what extent the DNA is operational. Notably, the Prime Minister's Decree No. 4664/2022 sets the FRA as the market regulator[121]. The Carbon Credit Regulatory Committee was established under the FRA for the oversight and regulation of carbon credits, made up of representatives from the FRA, the Ministry of Environment, the EGX and experienced carbon market professionals[205].

This emphasizes the existence of a formal coordination body for the carbon market. Further, the Climate Projects Registry has been established as a voluntary registry, a database for carbon projects within Egypt[190]. Transparency is improving through databases of approved projects and public reporting of trades both on the Climate Projects Registry and the Egyptian Climate Exchange (EGCX)[206,207];

- **Technical readiness: Egypt's capacity is medium, progressing on its technical readiness.** Egypt has partial MRV activities in place and has drafted a proposed national climate MRV structure, the institutionalization of which is pending funding and other resources[192,193]. For carbon market purposes, each project must use a recognized methodology and undergo third-party validation and verification by accredited auditors. It is not clear whether local VVBs are present, but the FRA established criteria for approving VVBs in 2023, and by February 2024, the FRA registered three VVBs[208];
- **Market and finance ecosystem: Egypt has a strong capacity via its trading platform, with private sector engagement expected to increase.** As outlined above, the EGCX is Egypt's domestic trading mechanism that sets out a comprehensive, well-governed carbon market exchange platform[191]. The exchange-based platform allows for spot trading of issued credits, and FRA's regulations also permit forward contracts on future credits (enabling companies to agree on purchases from projects not yet issued)[209]. The Economy of Love (EOL) standard/registry was the first locally accredited, and 12 projects were approved for trading in 2024. In terms of public finance mobilization, Egypt has not yet signed Article 6.2 deals. In the project pipeline, Sylvera notes a catalogue of 44 projects, 25 of which are renewable energy projects[163]. This highlights how activity in carbon markets aligns with the country's sustainability trajectory but also emphasizes portfolio risk, since no renewable energy methodologies have been CCP-approved yet. Notably, the projects listed on the EGCX present a different profile: almost all of the 28 projects listed on the EGCX are in agriculture, with all but one developed by Carbon Footprint Center[210].

In conclusion, Egypt has low-medium carbon market readiness. It has rapidly established the foundations for a credible and integrated carbon trading platform, setting the standard for market development through capital markets transactions**.** Political commitment, regulatory clarity, institutional coordination and early private sector engagement create a strong enabling environment. However, challenges remain in Article 6 readiness, including fully institutionalizing MRV systems, broadening the project pipeline and attracting investment at scale. Egypt is well placed to use carbon markets as a key contributor to its climate and development goals, while strengthening its role as a leader in regional carbon finance.

The gaps identified across the five country case studies align with areas addressed by UNDP-supported readiness programming, which seeks to translate institutional reforms into operational market infrastructure and strengthen countries' capacity to undertake high-integrity carbon-market transactions.



People tending crops in a cultivated field.
Photo: licensed

4. Vulnerability and resilience



Photo by: UNDP

OVERVIEW

African policymakers are navigating a rapidly evolving carbon market landscape characterized by a range of inherent risks that could significantly influence the pace and direction of carbon market development on the continent. These risks stem from shifting global dynamics, including withdrawal or partial disengagement by major emitters from multilateral climate cooperation under the Paris Agreement, political transitions in key jurisdictions, changes in carbon market rules and integrity standards, shifting buyer preferences, and economic downturns in major credit-importing countries. Understanding these risk pathways is essential for African governments seeking to safeguard carbon market strategies, maintain stability and position their countries competitively. The purpose is to provide a diagnostic view of where Africa is most exposed to market shocks and how these same areas can serve as levers for resilience and long-term competitiveness.

At the same time, Africa's growing capability in climate governance, policy development and carbon market participation provides an important foundation for transforming risk into opportunity. This assessment outlines a range of potential responses, such as market strategies that enhance transaction outcomes, partnerships that deepen market engagement and international support mechanisms that strengthen resilience. It further emphasizes that countries with lower readiness levels can meaningfully expand their opportunity set by reinforcing policy and institutional frameworks, thereby improving their ability to interact with emerging markets and buyers.

To analyse the dynamics shaping vulnerability within both Article 6 and VCMs, this section applies a structured framework comprising three interlinked dimensions. Exposure measures how likely a country is to experience shocks from global market or regulatory changes. Sensitivity reflects the extent to which those shocks would affect domestic systems, institutions or carbon revenue streams. Adaptive capacity describes a country's ability to anticipate, absorb and adjust to these shifts to maintain or restore carbon finance flows – its resilience. This framework is used to assess the vulnerability of the five deep-dive countries, while a simplified assessment is undertaken for the remaining 15 countries among Africa's top 20 carbon credit issuers. Together, these analyses reveal not only the most significant risks but also the drivers of resilience across diverse African contexts.

The assessment finds that Africa's carbon markets are particularly vulnerable to demand-side uncertainty and integrity-driven changes in market rules. Although Article 6 is expected to become an important source of future demand, the pace of implementation remains uneven. To date, completed Article 6.2 transactions globally have been extremely limited, with only a handful of pilot transfers concluded and African deliveries accounting for a small share of expected future volumes. Current projections suggest that African ITMO supply by 2030 remains well below recent annual retirement volumes in the voluntary carbon market, underscoring the early stage of compliance market engagement and the risk of over-reliance on near-term expectations of Article 6 scale-up. At the same time, Africa's dominant credit types face heightened scrutiny. Methodologies for REDD+ and clean cookstove projects have been particularly affected by the recent shift towards higher-integrity standards, and face stricter requirements under the ICVCM Core Carbon Principles and evolving CORSIA eligibility criteria. As a result, demand has become more selective, prices more volatile, and access to premium markets more constrained for countries with highly concentrated project portfolios.

Within this landscape, countries with better developed institutions and diversified pipelines, such as Ghana and Kenya, exhibit comparatively lower exposure and higher adaptive capacity. In contrast, countries with highly concentrated supply profiles, weak institutions and limited access to compliance-grade markets, including the Democratic Republic of the Congo and several countries in Southern and Eastern Africa, face heightened vulnerability. Across the broader sample, sensitivity is the most widespread challenge: most countries rely on a narrow set of methodologies and buyer segments, leaving them exposed to sudden value erosion if rules or preferences shift.

Resilience can be strengthened. Countries with moderate or even high exposure can significantly reduce vulnerability by strengthening governance frameworks, improving MRV and registry systems, diversifying project pipelines toward high-integrity and removal-based credits, and expanding access to compliance markets. The section, therefore, concludes by translating risk diagnostics into a practical resilience framework, identifying policy, market and institutional levers that can help African countries convert current vulnerabilities into longer-term competitive advantages. These include strengthening policy and institutional foundations, improving market strategies to enhance transaction outcomes, fostering partnerships that promote more effective participation and leveraging international funding and technical support.

4.1. Risks to African carbon markets

African carbon markets operate in a rapidly changing environment, and countries need to navigate a range of exogenous forces impacting global carbon markets. Market development delays, shifting policy dynamics and tightening integrity standards together reshape where and how value can be scaled by Africa's carbon markets.

4.1.1. Delays in scaling Article 6 mechanisms

As a nascent mechanism, Article 6.2 has yielded few complete transactions so far, despite being seen as one of the major future drivers of climate action under the Paris Agreement. To date, there have been 30 active projects (excluding projects conducted through Japan's Joint Crediting Mechanism[211])[212]. The bilateral Thailand–Switzerland initiative under Article 6.2 began with a joint statement in May 2021, followed by the formal cooperation agreement in June 2022[213]. Notably, the first-ever issuance of ITMOs under Article 6.2 occurred in December 2023 and delivered 1,916 credits to Switzerland from a Thailand-based pilot project[214]. The second and most recent transaction under Article 6.2 occurred more than a year later in July 2025, as Ghana delivered 11,733 ITMOs to Switzerland[215]. This indicates that practical use of Article 6.2 remains at an early stage, with extremely limited transaction volumes despite promising negotiations. For African host countries and developers, this slow pace translates into heightened market risk because expected compliance demand has not yet materialized at scale, limiting the extent to which Article 6 can currently serve as a dependable revenue channel[216,217]. This reduces bankability for projects that are being developed in anticipation of Article 6 demand, and it can delay investment decisions where financiers require evidence of repeatable transactions, credible price signals and predictable authorization timelines.

To date, completed Article 6.2 transactions have occurred primarily in early-moving host countries that have already established cooperation agreements with buyer governments. Ghana and Switzerland, for example, have a long history of diplomatic and development cooperation, and their bilateral agreement has enabled them to advance rapidly into Article 6.2 pilot activities[196,218]. As more African countries develop the institutions required for Article 6.2 participation, the landscape of host-country engagement is likely to broaden over time. However, institutional readiness is not only about policy intent, but also about transaction execution capacity, including clear authorization procedures, registry and tracking functionality, and timely corresponding adjustments[219]. Weaknesses in any of these components can prolong deal cycles, increase transaction costs and reduce buyer confidence. Currently, 6.7 million ITMOs are expected from Africa by 2030, significantly below Africa's annual retirements in the VCM[196], illustrating both the early stage of implementation and the continent's untapped potential as readiness improves[196].

More generally, it is difficult to assess the demand for African carbon credits via Article 6 mechanisms. No credible forecasts have been published on expected ITMO purchasing volumes from Africa. A number of factors are discouraging and highlight how the demand for African ITMOs may be limited. For example, while the European Union has agreed to allow the limited use of high-integrity international carbon credits toward its 2040 climate target[220], this applies only from 2036, is capped at a small share of total emissions reductions and does not extend to compliance under the EU Emissions Trading System[221] (EU ETS). At the same time, some European buyer countries, including Sweden and Switzerland, are already piloting the use of ITMOs for other international mitigation purposes (OIMP)[222]. In parallel, several Asian buyer countries appear to favour regional partnerships for Article 6.2 agreements and projects[196]. These dynamics suggest that, in the short to medium term, African ITMO demand is likely to originate from a fairly narrow set of early-moving, climate-ambitious buyer countries rather than a broad range of major economies. This concentration of likely buyers increases demand-side uncertainty and can create buyer-side market power, where pricing and contract terms are shaped by a small group of purchasers[223]. For host countries, this raises the importance of credible market positioning, strong negotiation capacity and institutional reliability to avoid unfavourable pricing and high discount rates applied to perceived delivery risk.

Although Article 6.4 has been formally operationalized following COP29, through the adoption of the Paris Agreement Crediting Mechanism (PACM) standards, it is not yet fully implemented. Progress was delayed after COP28 in 2023, where Parties could not agree on the final operational rules for Article 6.4[224]. While the Supervisory Body operationalized key foundational elements of the Article 6.4 mechanism in early 2025, critical infrastructure and guidance remain under development[225]. The milestones still to be achieved include finalizing the registry, further methodology development for removal activities, and revising methodologies and tools originating from the CDM[205]. The issuance of credits under Article 6.4 (to be known as A6.4ERs) awaits the finalization of these elements. For market participants, these delays extend uncertainty over eligibility, issuance timelines and transaction infrastructure, which can postpone project pipelines and limit the ability to secure forward offtake agreements. This can be particularly constraining for higher-integrity activities, including removals, that require larger upfront investment and longer monitoring periods before issuance.

While Article 6.4 is often described as the successor to the Kyoto Protocol's CDM, it imposes stricter requirements than the former CDM[226]. First, the initial approved methodologies have been shown to be more stringent[206]. Second, Article 6.4 introduces additional activity design requirements that consider long-term climate benefits, social impacts and the risk of non-permanence across all activity types to be addressed through risk analysis, planned monitoring and countermeasures[227]. While these requirements strengthen integrity, they can increase implementation complexity and transaction costs, particularly in contexts with weaker baseline data, limited local verification capacity and constrained public-sector coordination.

4.1.2. Withdrawal of major emitters from the Paris Agreement

The United States initiated its withdrawal from the Paris Agreement in early 2025[228]**.** The exit of a large emitter like the USA removes a substantial share of emissions from the Agreement's framework and may weaken momentum for cooperative mitigation efforts. The USA's NDC called for a reduction in its net GHG emissions by 61–66 percent below 2005 levels in 2035[229]. Based on the USA's 2022 net emissions[230], an additional 2.9–3.3 $GtCO_2e$ of reductions would have been required to meet the 2035 target. Since Article 6.2 is designed to facilitate international cooperation by allowing countries to transfer mitigation outcomes to help each other meet their NDCs, the USA withdrawal adds another layer of uncertainty surrounding multilateral climate cooperation and carbon-market confidence[231].

Indirectly, this could trigger major shifts in CORSIA, given the USA's centrality to the international aviation offsetting scheme. While USA airlines are expected to account for a substantial share of demand for CORSIA credits[232], the enforcement of compliance rests with the host government[233]. The USA's withdrawal from the Paris Agreement underscores the likelihood that it may choose not to legislate penalties for non-compliance under CORSIA, weakening the binding nature of its airlines' obligations[213]. To date, the USA has not confirmed its intention to enforce CORSIA[234]. Although major USA airlines have previously affirmed their commitment to CORSIA, this could mean demand is restricted to a significantly smaller share of emissions, undermining CORSIA carbon pricing[213].

4.1.3. Fragmented, stringent carbon market standards

The VCM is currently undergoing an integrity transition[235], posing challenges for Africa's historical carbon-project mix. The ICVCM CCPs, for example, establish a benchmark for identifying high-integrity credits[236]. This responds to an integrity crisis over the past three years. In 2023/2024, a wave of negative media investigations and academic critiques questioned the validity of many REDD+ forest offset credits. Sylvera performed an analysis on more than 85 percent of REDD+ credits on the market in 2022 and found that only 30 percent of credits met additionality requirements[237]. In Africa, the Kariba REDD+ project is often cited for having overstated its emissions reductions by between 5 and 30 times[238]. Similarly, cookstove projects have been criticized for over-crediting[239]. Accordingly, buyers are becoming more selective, searching for high-integrity credits that meet standards such as the ICVCM's CCPs and CORSIA eligibility criteria[215]. As REDD+ and clean cookstove project types account for 90 percent of Africa's carbon credit supply[218], stricter integrity standards may constrain near-term revenues, with improvements expected as the pipeline diversifies. This integrity transition is reshaping risk pricing in carbon markets as credits that are perceived as higher risk face significant discounting or exclusion from premium buyers[240], while projects aligned with emerging integrity benchmarks command price premiums and stronger offtake interest.

While Africa can generate high-integrity credits, these credit types are often more complex and costly to implement. For instance, under emerging market rules, REDD+ activities are increasingly expected to adopt jurisdictional approaches, which require government commitment, sophisticated monitoring and large-scale coordination to manage leakage, conditions that are difficult to meet in many African contexts. Stakeholder interviews conducted for this report highlighted how coordination challenges can create additional risks. In Zambia, for example, interviewees described a proposed jurisdictional REDD+ initiative that could unintentionally undermine existing registered cookstove projects located within the same boundaries, as these projects might no longer be able to issue credits following an agreement between the national government and a multilateral institution. Such coordination risks can undermine investor confidence where project eligibility, crediting rights or revenue streams become uncertain, increasing perceived policy and delivery risk.

Uncertainty also persists around the treatment of renewable energy projects, despite their vital role in Africa's energy transition, particularly for the millions of users who remain off-grid or rely on diesel backup where national grids are inadequate. Under major VCM standards such as Verra and Gold Standard, renewable energy projects are eligible only in least developed countries, conflict-affected areas or island states, with limited exceptions for off-grid, community-scale or energy-access projects[241]. No renewable energy methodologies have yet received CCP approval, further limiting access to high-integrity demand channels. By contrast, Article 6.4 provides greater flexibility. Renewable energy activities may qualify if developers demonstrate that they are not included in the host country's NDC baseline and can present financial, technological or policy barriers that justify carbon crediting. This divergence across standards highlights the need for clearer alignment to ensure that renewable energy remains a viable pathway within Africa's carbon market ecosystem. Without such alignment, developers face regulatory uncertainty and fragmented eligibility rules that increase transaction costs and deter investment in otherwise climate-critical energy access projects.

Land-based project types face additional threats under PACM rules. These include agriculture, afforestation/reforestation and revegetation – core African NDC project types – as well as technology project types claiming credits based on avoided deforestation, like cookstove credits. The threats come from both overly conservative baselines, which industry experts state are inaccurate, and the treatment of permanence. On the first point, the Project Developer Forum and IETA estimate that the PACM-mandated baseline adjustments would reduce cookstove issuances by 27 percent, effectively rendering these projects financially unviable[242]. On the second point, the Article 6.4 Supervisory Body reversals standard requires extensive PCM, set at the methodology level, reflecting sector-specific needs. This eases earlier indefinite monitoring constraints on nature-based projects, but it also defers key decisions to separate methodology processes, requiring further technical drafting, review and consultation. This prolongs uncertainty and slows full operationalization of Article 6.4. Extended methodological uncertainty delays investment decisions, complicates project finance structuring and may

discourage developers from pursuing activities with long development timelines or complex permanence requirements[243].

4.1.4. Restrictive offsetting standards

The Corporate Net-Zero Standard from the SBTi has reduced corporate demand for carbon offsets, restricting use and type for members, which include multinational corporates with progressive climate strategies**.** The SBTi guides companies in setting and achieving net zero goals through its Corporate Net-Zero Standard. Version 1 of this standard, launched in 2021, emphasized deep emission reductions first and using only carbon removal credits for final residual emissions in the net-zero target year[244]. In this regard, the SBTi has restricted offsetting for companies with net zero strategies, only allowing removal credits to be used in the final stages of achieving net zero. In March 2025, the SBTi published a draft version 2 of the standard that permits the use of carbon removal offsets more proactively and earlier in corporate climate strategies[245]. This mirrors the growing buyer preference for removal credits in carbon markets. Notably, although the draft SBTi standard signals a relaxation of rules on offsetting practices, it also underscores the broader market shift that undermines the demand for avoidance credits. Because SBTi-aligned companies represent a significant share of voluntary market demand, these standards effectively reshape procurement policies, narrowing the buyer pool for avoidance-based credits and reinforcing the premium placed on high-integrity removals[246].

The International Organization for Standardization (ISO) guidance on carbon offsetting claims affects demand for NbS. The standard is known as ISO 14068-1:2023 (Climate Change Management: Carbon Neutrality*)*, requiring offsets to be of high integrity: real, measurable, additional and permanent emission reductions and removals. While this is consistent with moves to strengthen the carbon market, it makes using nature-based offsets more challenging, as buyers must account for reversal risks (fires, deforestation) and maintain buffer reserves or replacement obligations. These additional liability and monitoring requirements increase transaction costs and long-term risk exposure for buyers, potentially reducing demand for project types perceived to carry permanence risks unless robust risk-management mechanisms are in place.

Emerging corporate marketing and disclosure regulations challenge conventional offsetting practices. In the EU, a directive approved in 2024 prohibits companies from using terms such as ‘climate neutral’ or ‘climate positive’ that are based on carbon offsetting[247]. Similarly, the USA Federal Trade Commission (FTC) began revising its Green Guides for environmental marketing in 2022[248]. The FTC has signalled concern that consumers are misled by carbon offset claims and began considering new guidance on ‘carbon neutral’ vs ‘net-zero’ claims, including possibly requiring disclosure of whether offsets are removal or avoidance-based[224]. Notably, the exact updates by the FTC are still pending. Overall, these rules diminish the incentive to purchase offsets for voluntary corporate commitments, since the associated marketing value is lost. As reputational and litigation risks increase, companies are shifting from claim-based offsetting toward internal decarbonization and high-credibility climate contributions, further tightening demand for conventional voluntary offsets[249]. This evolving disclosure environment increases scrutiny of corporate climate claims and may redirect demand toward credits that can withstand regulatory, investor and public scrutiny.

4.1.5. Volatile and unpredictable demand

In the near term, carbon credit demand is expected to remain modest, with transactional activity concentrated in the VCM. Transaction volumes in international compliance markets such as Article 6 and CORSIA remain low[250], reflecting early-stage implementation and the gradual pace of operationalization of these international compliance markets. The VCM, as a more mature market, is still characterized by limited liquidity and volatile prices owing to the recent integrity transition[215]. Ecosystem Marketplace traces the slowdown and uneven recovery of the VCM, noting that the global voluntary market contracted for the third consecutive year in 2024 to a value of $535 million, down from the peak of $2.1 billion in 2021[215]. Oversupply in the VCM also reduces the likelihood of buyers entering forward offtake agreements at scale, creating uncertainty for project developers who must invest under opaque and illiquid trading conditions, with substantial price differentiation across project attributes. This environment presents challenges for raising project finance, as financial institutions are often unable to absorb the offtake and price risks associated with such unpredictability. Thin liquidity and fragmented secondary markets further complicate price discovery, increasing revenue uncertainty and raising the cost of capital for project developers.

In the VCM, buyers increasingly prefer carbon removal credits – particularly durable engineered removals – which remain limited in Africa. In the VCM, managing reputational risk is a major procurement consideration; hence the guidance from bodies like the SBTi carries significant weight. Notably, large technology companies have become key drivers of demand for removal offsets, as data centre operations represent a growing source of emissions[215]. While removal credits still constitute a minority of supply, in 2024, they were 381 percent more expensive than avoidance credits, up from 245 percent in 2023[215]. This is in contrast with prices for large-scale renewable energy projects, especially solar photovoltaic (PV), where VCM prices have fallen to below $3/t$CO_2$e[251]. Africa’s dominant project types are avoidance credits[215], meaning that the continent may face a more challenging sales environment due to changing buyer preferences. This structural demand shift risks widening the price gap between legacy avoidance credits and high-integrity removals, potentially eroding revenues in countries whose pipelines remain concentrated in lower-priced credit types.

Reliance on a small number of major emitters exposes the continent to geopolitical shifts, regulatory changes and evolving corporate priorities in those markets. Demand concentration also creates asymmetric market power, where a small group of sovereign buyers and multinational corporates exert significant influence over pricing, contract terms and integrity requirements[252]. In such conditions, host countries and developers may face weaker negotiating leverage, shorter contract tenors and stricter

delivery risk provisions. This concentration risk reinforces the importance of diversifying demand channels and strengthening access to compliance-grade markets to stabilize revenue streams.

4.2. Vulnerability assessment

African countries face varying levels of vulnerability to carbon market shifts. To assess vulnerability, the following factors are considered: how likely a country is to experience a market shock, how severely these shocks would affect the country, and the ability of the country to navigate these shifts.

4.2.1. Methodology

The vulnerability assessment evaluates country-level risks in carbon markets across three dimensions: exposure, sensitivity and adaptive capacity. Exposure and sensitivity capture the degree of risk faced by the country, while adaptive capacity captures how resilient the country is.

Exposure reflects the likelihood that countries will be affected by carbon market shocks. Key risks arise from tightening integrity requirements, including assessments of Verra and Gold Standard methodologies against the Core Carbon Principles; evolving offsetting rules; changes in participation by major players, including large corporate buyers; and uncertainty surrounding the pace and scale of Article 6 implementation. These pressures imply more restrictive eligibility criteria for additionality, permanence and leakage, placing widely used project types, including REDD+, industrial gas and large-scale renewables, at elevated risk. At the same time, demand-side constraints are emerging. The use of carbon credits is increasingly limited by guidance that does not favour avoidance credits in the VCM, as well as by policy decisions such as the EU's current prohibition on the use of international offsets for NDC compliance. Collectively, these trends indicate that the pool of potential buyers, both sovereign and corporate, could narrow, reducing options for offtake under Article 6 and exerting downward pressure on prices in the VCM. Therefore, the following indicators of exposure are examined for the deep dives:

- **Concentration of issuance in vulnerable sectors:** This is an indicator of the integrity at the portfolio level, with lower-integrity credits experiencing declining demand and pricing across the carbon trading system;
- **Reliance on avoidance credits:** In the VCM, buyer preferences are increasingly shifting towards removal-based credits, given their less ambiguous climate impact, and the fact that the Science Based Targets initiative (SBTi) does not allow avoidance credits for offsetting[253]. As a result, countries that rely heavily on avoidance credits may face demand constraints in the VCM. However, under Article 6 mechanisms, high-integrity avoidance credits continue to attract interest, particularly where they are authorized, aligned with NDCs and supported by robust MRV and benefit-sharing arrangements. Countries with portfolios dominated by lower-integrity avoidance credits, therefore, face greater exposure risk than those able to demonstrate high integrity across avoidance-based activities;
- **Political risk:** Countries with higher levels of political risk attract a smaller pool of investors, with heightened global risk more likely to result in lost investment.

Countries should focus on increasing the investment attractiveness of their carbon markets. This may be achieved at the project development level, where the integrity of carbon credits can be enhanced through selecting more stringent methodologies and prioritizing high-quality project types that match buyer preferences, and at the country level, where the risk perception is improved.

Sensitivity reflects the extent to which a country could be affected if these shocks materialize. The degree of impact depends largely on portfolio diversification and the strength of enabling institutions. Countries with highly concentrated project profiles may be more vulnerable to integrity-driven market shifts. Equally, institutional readiness plays a decisive role: where key institutions are present, countries can better transition to other markets if demand in one market declines. Since institutions typically take years to establish, inadequacies here exacerbate vulnerability and limit flexibility. The sensitivity dimension is captured by the following indicators for the deep dives:

- **Concentration by number of project types:** Countries with highly concentrated supply profiles will be more sensitive to integrity and methodology shifts affecting any one project type;
- **Institutional adequacy:** The absence of domestic and international-facing institutional systems required to enable participation in stringent compliance markets (including Article 6 and CORSIA) is expected to drive a substantial decline in carbon value when shocks occur, as these institutions take years to establish.

Addressing high sensitivity would involve creating buffers that protect carbon markets from any shocks. Improving the presence and functionality of institutions ensures more consistent performance under changing conditions, and diversifying the project portfolio spreads risk more evenly.

Adaptive capacity refers to the ability of countries to navigate, mitigate and adjust to market shifts, potentially reducing their impact on future carbon finance flows. On the supply side, countries with established domestic private-sector networks (market level) and established access to technical assistance (public-sector level) are better positioned to address policy and institutional gaps. On the demand side, those able to diversify beyond Article 6 and the VCM, by accessing opportunities such as CORSIA, demonstrate greater resilience. Therefore, adaptive capacity is assessed based on the following indicators for the deep dives:

- **Access to technical assistance:** Country participation in technical assistance programmes helps to address policy and institutional shortcomings through capacity building;
- **Supportive domestic market ecosystem:** The strength of domestic networks of relevant private-sector actors, such as local project developers and VVBs, helps to sustain market activity and pivot to alternative strategies if the profile of demand shifts;
- **Pipeline quality:** The readiness of the country's project pipeline for CORSIA will enable the country to pivot to an

alternative market should there be negative demand shifts in the two focus markets, VCM and Article 6.

An overall rating for each of the three dimensions was derived by averaging the indicator scores. The rating for each dimension provides an overview of relative vulnerability and resilience, highlighting both strengths and gaps in each country's ability to navigate market shifts.

Within this framework, the most vulnerable profile combines high exposure, high sensitivity and low adaptive capacity: such a country faces significant risk from market shifts, is likely to experience severe impacts and lacks the institutional or technical means to respond effectively. Conversely, a country in the strongest position will have low exposure, low sensitivity and high adaptive capacity. This means it is less likely to be affected by market shifts, any resulting impacts are likely to be minimal, and it possesses the institutional strength and flexibility to effectively manage and adapt to any changes that do occur.

Appendix 4 outlines the methodology used to calculate each indicator. All indicators were assessed for the five deep-dive countries. For the broader country-cluster vulnerability analysis, four key indicators were used: sectoral concentration in risky project types (exposure), political risk (exposure), concentration by number of project types (sensitivity), and pipeline quality (adaptive capacity).

To operationalize the 'sectoral concentration in risky project types' indicator, a defined set of project categories was classified as higher risk based on integrity, demand and eligibility considerations, drawing on the Berkeley VCM database[193]. The following list specifies the project types identified for this indicator and is applied consistently across all country assessments:

- REDD+;
- Nitrogen management;
- Waste gas recovery;
- Hydrofluorocarbon-23 (HFC-23) destruction;
- Landfill methane;
- Leak detection and repair in gas systems;
- Manure methane digester;
- Methane recovery in wastewater;
- N_2O destruction in adipic acid production;
- N_2O destruction in nitric acid production;
- Plugging oil and gas wells.

Wind and centralized solar projects were also included in the list of flagged project types for countries outside the least developed countries (LDC) group, where these technologies are expected to be commercially viable without carbon finance support.

4.2.2. Results overview

Table 7 below presents the overall vulnerability assessment results for the five deep-dive countries: South Africa, the Democratic Republic of the Congo (DRC), Kenya, Ghana and Egypt. In the evolving landscape, UNDP's emphasis on high-integrity carbon market participation and readiness for compliance market requirements directly addresses vulnerabilities associated with evolving global standards and the pace of Article 6 implementation. Ghana is the least exposed to current market shifts, while Kenya demonstrates the highest adaptive capacity. In contrast, the DRC has a comparatively more vulnerable profile, reflecting greater risk levels and limited capacity to absorb or respond to potential impacts. These findings are discussed in further detail in the following section.

Table 7. Vulnerability assessment results: Country deep dives

Country	Exposure	Sensitivity	Adaptive capacity
South Africa	Moderate	Moderate	Moderate
DRC	High	High	Low
Kenya	Moderate	Moderate	High
Ghana	Low–moderate	Moderate	Moderate
Egypt	High	Moderate	Low

A limited-scope assessment of 15 additional countries was conducted using four key indicators related to exposure, sensitivity and adaptive capacity. This analysis resulted in six distinct country groupings. A summary of the findings is presented in **Table 8** below:

- **Exposure:** Of the 15 countries assessed, 11 received a low exposure rating, reflecting relatively modest political risk and limited reliance on low-integrity project types. The remaining four were rated as moderately exposed. This suggests that, overall, African carbon credit producers may be less vulnerable to current market shifts than initially expected;
- **Sensitivity:** Fourteen of the 15 countries assessed received high sensitivity ratings, indicating a heavy concentration of carbon market activity in a narrow set of project types. This lack of diversification increases vulnerability to changes in methodologies, standards and carbon pricing for specific project categories, posing a significant risk and contributing to market uncertainty;
- **Adaptive capacity:** Adaptive capacity showed the greatest variation among the countries. Using the share of the project pipeline eligible for CORSIA Phase 1 as a proxy, four of the 15 countries demonstrated high adaptive capacity, while nine received low ratings, reflecting a limited share of CORSIA eligible projects in their pipelines. This highlights a limited ability to transition from the VCM to higher-value compliance markets, posing a challenge for long-term resilience.

Table 8. Country clusters based on vulnerability assessment

Group	Country	Exposure	Sensitivity	Adaptive capacity
Group 1: Protective buffer	Senegal	Low	Moderate	Low
Group 2: Sensitive adapters	Eritrea	Low	High	High
	Mozambique	Low	High	High
	Nigeria	Low	High	High
Group 3: Stretched adapters	Uganda	Low	High	Moderate
	Burundi	Low	High	Moderate
Group 4: Masked fragility	Zimbabwe	Low	High	Low
	Côte d'Ivoire	Low	High	Low
	Madagascar	Low	High	Low
	Rwanda	Low	High	Low
	Malawi	Low	High	Low
Group 5: Adaptive core	Somalia	Moderate	High	High
Group 6: Critical fragility	Ethiopia	Moderate	High	Low
	Tanzania	Moderate	High	Low
	Zambia	Moderate	High	Low

Source: Berkeley Database[255], Sylvera[256], S&P Global[254]

4.2.3. Analysis

4.2.3.1. Deep dive: South Africa

MODERATE EXPOSURE	
	Issuance from vulnerable sectors
	Reliance on avoidance credits
	Political risk
MODERATE SENSITIVITY	
	Project type diversity
	Institutional adequacy
MODERATE ADAPTIVE CAPACITY	
	Access to technical assistance
	Supportive domestic market ecosystem
	Pipeline quality

Risk indicators

South Africa faces a medium exposure risk to carbon market shifts, with several areas requiring closer attention. Its carbon credit portfolio is highly concentrated in the energy sector, a category increasingly vulnerable under tightening integrity standards and declining buyer demand. A third of the country's recent issuances come from 'at risk' project types, primarily landfill methane and wind projects, which face heightened scrutiny around additionality and market value[255]. All recent issuances are avoidance-based, further increasing exposure as global demand trends shift toward high-integrity removal credits[256]. While South Africa's political landscape is moderately stable and unlikely to significantly deter investment, lower government effectiveness contributes to coordination challenges in climate and carbon policy[257,258]. Emerging coalition dynamics may create uncertainty or delay needed reforms, potentially heightening the country's exposure to evolving global carbon market conditions.

South Africa similarly experiences medium sensitivity to global carbon market shifts, primarily due to the high concentration of its carbon credit supply. Recent issuances are dominated by only two project types, cookstoves and wind, which together make up most of South Africa's carbon credits[255], making the supply profile vulnerable to changes in buyer preferences and evolving integrity requirements, particularly in the VCM, where rules continue to tighten. However, this sensitivity is partially mitigated by South Africa's mature institutional ecosystem, which enhances its ability to respond to market shifts. The country has an operational DNA established under the CDM[259], and a national registry, COAS, which enables entities to use carbon credits to offset domestic carbon tax liabilities[233]. South Africa is recognized for having a robust national MRV system, which strengthens governance and credibility[260]. Although an Article 6.2 authorizing entity has not yet been formally

established, the government has released draft regulations outlining how existing institutions and regulatory frameworks could be adapted to support participation in Article 6 cooperative approaches[233]. These institutional foundations provide South Africa with meaningful capacity to adjust and navigate emerging compliance and market requirements.

Resilience indicators

South Africa exhibits moderate adaptive capacity. Its resilience lies primarily in its domestic networks and market ecosystem, underpinned by experience gained through the carbon tax regime and CDM. The country hosts several domestic developers and consultancies, alongside local VVB capacity through firms such as SGS[261], complemented by the in-country presence of global verifiers such as Carbon Check. Additionally, the JSE launched the JSE Ventures voluntary carbon market in 2023, providing a national trading platform that enhances liquidity and price discovery linked to international systems[262]. South Africa has benefitted from earlier technical assistance programmes, including the World Bank's Partnership for Market Readiness[263], and has engaged through initiatives such as the Carbon Pricing Leadership Coalition[264]. The country has also received targeted Article 6 readiness support from Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)[265], including assistance on institutional arrangements and regulatory alignment. Despite this, overall access to technical assistance remains limited, particularly when compared to other early-moving Article 6 host countries. Further, opportunities beyond the VCM in international compliance markets remain narrow: only around five percent of South Africa's carbon credit issuances since 2020 have been eligible under CORSIA Phase 1, highlighting the need for further capacity-building and diversification[256].

Potential resilience strategies

South Africa should diversify efforts to build resilience across the three dimensions assessed, given that the country exhibits a moderate rating across the board. The country should focus on strengthening resilience through:

- **Diversifying project portfolio:** A key concern is South Africa's issuance from 100 percent avoidance project types. To reduce this reliance, the registration of removal projects should be increased. In South Africa, the opportunity for removal credits lies in ARR and biochar. For example, Spekboom Net Zero is a large-scale carbon capture project based on planting spekboom (*Portulacaria afra*) on available and suitable land areas[266], while Renu Earth will convert sustainable wood residues from a major sawmill in KwaZulu-Natal into biochar. The country could also evaluate the use of pricing strategies and discounts to incentivize different project types;
- **Enhancing pipeline quality:** South Africa should aim to improve the quality of credits available. This involves the adoption of CCP-approved methodologies, as well as aligning project types and methodologies with those approved for CORSIA. In doing so, South Africa can expand market access;
- **Policy coordination, regulation and technical assistance:** Generally, South Africa should work towards improving interministerial alignment and expediting the implementation of its climate policies and regulations to achieve readiness for Article 6. This could be supplemented by proactively participating in technical assistance programmes to remain prepared. South Africa's mature carbon market ecosystem should be further supported through training programmes, public-private partnerships and, potentially, regulatory incentives for innovation (e.g. pilots in soil carbon projects).

4.2.3.2. Deep dive: Democratic Republic of the Congo

	HIGH EXPOSURE
	Issuance from vulnerable sectors
	Reliance on avoidance credits
	Political risk
	HIGH SENSITIVITY
	Project type diversity
	Institutional adequacy
	LOW ADAPTIVE CAPACITY
	Access to technical assistance
	Supportive domestic market ecosystem
	Pipeline quality

Risk indicators

The Democratic Republic of the Congo (DRC) faces an elevated exposure risk given both its carbon credit supply and elevated political risk profiles. A large majority of the DRC's recent carbon credits have been issued from REDD+, a project type identified as high risk[255,267]. Further, avoidance credits constitute 90 percent of the total volume[256,268]. Lastly, the DRC registers an elevated level of political risk, driven by ongoing conflict and constrained state authority in much of the country. These conditions raise integrity concerns and reduce investment, leaving the DRC's carbon

market highly exposed to shifts toward higher-integrity portfolios.

The DRC exhibits high sensitivity, emphasizing the vulnerability of the country to adverse shocks. A single large REDD+ project, namely the Mai Ndombe project[255], accounts for 80 percent of the credits issued by the country between 2020 and 2024. The second most common type, cookstove credits, makes up less than 20 percent of credits issued[255], underscoring the heavy reliance on a single project type, specifically one that has been subject to significant integrity scrutiny in recent years. Further, the DRC has significant institutional capacity gaps. It does not yet have a robust national framework for carbon market participation, nor an active national registry or tracking system[269], or an established Article 6 authorizing authority. While a designated national authority exists, institutional presence is less established in practice[270], and there is limited MRV infrastructure beyond basic greenhouse gas (GHG) inventory processes[271]. Many key institutions are yet to be operationalized by the newly founded Carbon Market Regulatory Authority. The combination of a vulnerable project mix and nascent institutions makes the DRC extremely sensitive to market shifts.

Resilience indicators

The DRC's adaptive capacity is currently low, implying limited resilience. Access to technical assistance has been limited thus far: the DRC has not been a major beneficiary of initiatives that address Article 6 capacity-building. This suggests a deficit in external support to date, although programmes focused on REDD+, such as the Central African Forest Initiative (CAFI)[272], have supported forest monitoring. Further, its domestic carbon market ecosystem is nascent: few local entities have experience in developing or verifying carbon projects, with most projects driven by international developers and NGOs[273]. Additionally, no accredited domestic VVBs exist. Finally, the country's share of CORSIA Phase 1 eligible credits accounts for only two percent of recent issuance[256]. This emphasizes the country's lack of options to pivot to other carbon markets.

Potential resilience strategies

The DRC's current institutional landscape presents several capacity gaps that heighten vulnerability to global carbon market shifts. Strengthening core institutions and systems will be essential to improving resilience and enabling the country to benefit more fully from carbon finance opportunities. The following resilience strategies are proposed:

- **Operationalize the Carbon Market Regulatory Authority:** Although the DRC has legally established the authority, it is not yet fully operational. Prioritizing its resourcing, staffing and mandate will be important to ensure robust governance of carbon projects, transparent authorization of Article 6 transactions and effective oversight of the national registry. A functional regulatory body provides the foundation for integrity, accountability and investor confidence;
- **Diversify into high-quality removal projects:** While the DRC has significant potential from forest-related activities and recent issuances are mainly from REDD+ projects, expanding into additional removal-focused project types, such as ARR and agroforestry, can help align the country's supply with shifting demand toward high-integrity removal credits and reduce reliance on a single project category;
- **Utilize technical assistance:** Given current institutional and technical constraints, targeted support from development partners can play a critical role. The African Development Bank's (AfDB) proposed carbon support facility, which provides both upstream policy/regulatory support and downstream assistance to developers, presents a valuable opportunity. Such assistance can help accelerate institutional strengthening, enhance MRV and registry readiness and stimulate domestic private-sector participation.

4.2.3.3. Deep dive: Kenya

	MODERATE EXPOSURE
	Issuance from vulnerable sectors
	Reliance on avoidance credits
	Political risk
	MODERATE SENSITIVITY
	Project type diversity
	Institutional adequacy
	HIGH ADAPTIVE CAPACITY
	Access to technical assistance
	Supportive domestic market ecosystem
	Pipeline quality

Risk indicators

Kenya faces a moderate level of exposure to carbon market shifts, with a number of key areas of vulnerability. The primary driver of exposure is the country's substantial reliance on avoidance credits, which comprise approximately 97 percent[255] of recent issuances, predominantly from cookstove projects. Avoidance activities can generate high-integrity credits under Article 6.2 where they are authorized and aligned with NDCs. Kenya's current portfolio remains

largely oriented toward VCM-dependent avoidance credits, increasing exposure to shifts in buyer preferences and integrity standards. While flagged project types constitute less than 20 percent of recent issuances, they are exclusively associated with REDD+ projects, with the last issuance recorded in 2022[255]. Kenya is exposed to a few areas of vulnerability and so faces a moderate exposure risk.

Kenya also experiences moderate political risk, driven largely by challenges relating to control of corruption and broader governance constraints. These factors may reduce investor confidence and heighten exposure to market and regulatory uncertainty. This is illustrated by the controversy surrounding the Northern Kenya Rangelands Carbon Project, where a Kenyan court determined that two conservancies associated with the project had been established unlawfully[274], raising concerns around project legitimacy and regulatory oversight.

Kenya also faces moderate sensitivity to carbon market shifts. Among the five case study countries, it has the most diversified project portfolio, which helps reduce sensitivity to changes in global market preferences. However, its institutional readiness to access emerging markets remains limited. While draft regulations for a national carbon registry were released in 2025, a functional registry does not yet appear to be operational[275]. Additionally, the absence of a comprehensive MRV system for Kenya's national greenhouse gas inventory[276] further constrains its capacity to engage in high-integrity markets and comply with evolving international standards.

Resilience indicators

Kenya's adaptive capacity is high, giving the country substantial resilience to navigate carbon market challenges. First, Kenya has access to extensive technical assistance and engagement in international initiatives. It was the first East African country to join the Africa Carbon Markets Initiative launched at COP27[277], which has since supported the government in implementing its carbon market activation plan[251]. The GGGI has also recently launched Article 6 readiness support in the country[278]. Second, Kenya has a dynamic domestic market ecosystem. The country has one of Africa's largest networks of carbon project developers and intermediaries, including large developers like BURN Manufacturing (a cookstove producer)[279]. Some international VVBs, for example Bureau Veritas, have also opened offices in Nairobi, signalling a growing domestic industry[280]. These factors underscore the presence of a sound market ecosystem. Finally, the pipeline quality in Kenya is high: approximately 50–60 percent of credits issued in recent years have been eligible for CORSIA Phase 1, according to Sylvera[256]. Kenya is well positioned to navigate demand shifts as it can sell credits in an alternative market.

Potential resilience strategies

Kenya's resilience priorities should lie in reducing exposure and sensitivity. The country should consider the following potential resilience strategies to reduce its vulnerability to carbon market shifts:

- **Increase the supply of removal and high-quality credits:** To mitigate exposure to the market trend favouring removals, Kenya should scale up the development of removal projects. Notably, Kenyan innovators are already moving in this direction. For example, local climate-tech start-up Bio-Logical raised $1.3 million to expand a biochar facility – one of the largest on the continent[281]. At the same time, Kenya should maintain the integrity of its popular avoidance projects (e.g. cookstoves) by applying rigorous monitoring and aligning with CCP-approved methodologies;
- **Fully operationalize regulations:** As the country has been proactive in creating both enacted and draft regulations governing the carbon market, efforts should now focus on full implementation. This includes launching the mandated national carbon registry (to record all projects and trades) and enforcing rules covering community benefit sharing and international standards alignment;
- **Strengthen governance and address land-rights controversies:** To enhance resilience, Kenya must strengthen oversight and transparency in carbon projects, ensuring that robust consultation and legal due diligence on land ownership are prerequisites for project approval. Authorities should tighten the enforcement of free, prior and informed consent (FPIC) in all offset initiatives. By doing so, Kenya can prevent ownership disputes or project cancellations due to governance failures. Anti-corruption efforts, such as clear accountability for carbon revenue flows, will further improve trust.

4.2.3.4. Deep dive: Ghana

	LOW-MODERATE EXPOSURE
	Issuance from vulnerable sectors
	Reliance on avoidance credits
	Political risk
	MODERATE SENSITIVITY
	Project type diversity
	Institutional adequacy
	MODERATE ADAPTIVE CAPACITY
	Access to technical assistance
	Supportive domestic market ecosystem
	Pipeline quality

Risk indicators

Ghana's exposure to carbon market shifts is low to moderate. None of its recent issuances have come from 'at risk' project types[255]. In particular, most credits come from cookstove projects primarily registered under Gold Standard[255]. This reflects a heavy reliance on avoidance credits, with 80 percent of the country's recent issuances originating from such project types[256]. Of the six cookstove projects that have issued credits between 2020 and 2024, only one uses a CCP-approved methodology: the Gyapa Cookstove Project[255]. This project accounts for a third of the country's cookstove issuances during the 2020–2024 period[255]. While the reliance on cookstove avoidance credits means that Ghana may be exposed to any broad devaluation of avoidance credits, a large share of its recent issuances meets new integrity standards, supporting value. With respect to political risk, Ghana is on the medium-low end of the spectrum. The country has not experienced major political disturbances that could trigger socio-economic unrest or disrupt carbon credit delivery[256], helping to maintain investor confidence.

Ghana experiences moderate sensitivity to carbon market shifts. The presence of a highly concentrated supply profile is mitigated by strong institutional readiness enabling multiple offtake channels. Ghana relies heavily on one project type, namely cookstoves: a controversial type which has come under scrutiny in the past for over-crediting. Nonetheless, Ghana has one of the most advanced policy environments for carbon markets in Africa. The country's Environmental Protection Act established the basis for the Ghana Carbon Registry, which is already active[282], and laid out clear authorization procedures for Article 6.2 ITMOs[256] which have already been applied in its Swiss projects, with an operational authorizing entity[283]. The country also has an operational MRV framework.

Resilience indicators

Ghana has moderate adaptive capacity. It has received targeted technical assistance and climate finance to strengthen its carbon market readiness, from the World Bank's Forest Carbon Partnership Facility (for a jurisdictional REDD+ programme[284]) and the UNDP NDC Support Programme, to establish the Ghana Carbon Registry[285]. The domestic carbon market ecosystem is growing, but with key gaps, such as in respect of local VVB capacity. Domestic firms such as Jospong (waste composting) and local start-ups such as SolarTaxi (electric mobility) and Sistema.Bio (biogas) are developing projects, showing growing private-sector engagement[286]. CORSIA eligibility is low – eligible credits account for 5–10 percent of recent carbon credit issuances[256]. This low eligibility reflects gaps in pipeline quality, as most recent issuances come from avoidance-based cookstove activities that do not meet CORSIA's integrity or methodological criteria. As a result, Ghana has fewer opportunities to access compliance-oriented buyers, and much of its current supply continues to rely on voluntary market channels rather than diversified demand segments.

Potential resilience strategies

In Ghana, measures to improve resilience should focus on reducing sensitivity and increasing adaptive capacity. To enhance resilience, Ghana should use its advanced policy environment to diversify project types and strengthen market infrastructure:

- **Diversify beyond cookstove projects:** Ghana should expand its carbon credit portfolio to include a wider range of sectors, with a particular emphasis on removal-based activities. Promising areas for diversification include biochar, waste management solutions such as composting and biogas production, led by firms like Jospong, as well as emerging sectors like electric mobility, exemplified by SolarTaxi's EV initiatives. Project variety is already increasing. Under Ghana's bilateral cooperation with Switzerland, pipeline projects now include solar PV, efficient rice cultivation, municipal waste composting, refrigeration and cooling technologies, and electric buses, signalling progress towards a more balanced and resilient project pipeline[287];
- **Address remaining regulatory gaps:** Despite strong progress, some gaps remain, constraining long-term resilience. One notable gap is the clarity of carbon ownership rights in its legal framework. Currently, it is not explicitly clear how carbon rights are assigned (early interpretations assume the project owner holds the carbon credit rights)[288]. Providing clear legislative or regulatory guidance on carbon rights and benefit sharing will reduce investor uncertainty and local disputes;
- **Expand domestic capacity and private-sector engagement:** Ghana's adaptive capacity was rated moderate, partly because its domestic carbon market ecosystem is still maturing. To build resilience, Ghana should develop local carbon market skills. This involves training programmes for local verifiers and project auditors and supporting Ghanaian companies and start-ups in developing projects. This could take the form of technical support or seed funding for active enterprises, exploring public-private partnerships, or using the new mitigation fund to invest in pilot projects led by local actors.



A woman prepares food using a gas stove.
Photo by: UNDP

4.2.3.5. Deep dive: Egypt

HIGH EXPOSURE	
	Issuance from vulnerable sectors
	Reliance on avoidance credits
	Political risk
MODERATE SENSITIVITY	
	Project type diversity
	Institutional adequacy
LOW ADAPTIVE CAPACITY	
	Access to technical assistance
	Supportive domestic market ecosystem
	Pipeline quality

Risk indicators

Egypt faces high exposure to carbon market shifts. Its carbon market is rooted in legacy CDM projects, exposing it to significant challenges under current market trends. All recently issued credits come from flagged low-integrity projects, namely utility-scale solar power plants and wind projects[255]. This complete reliance on flagged project types means that Egypt is exposed to the risk of exclusion from international carbon markets. Further, credits from Egypt are majority avoidance credits (about 80 percent)[256]. Egypt's political risk is moderate, but the country's governance indicators, specifically around accountability mechanisms and regulatory quality, are limited[289]. This increases uncertainty around regulatory stability and raises the potential that sudden policy shifts could affect market confidence and long-term project viability.

Egypt is moderately sensitive to shifts. The country relies heavily on renewable energy issuances, particularly from wind projects, which have accounted for 85 percent of issuances in the period 2020–2024[255], with the balance from utility-scale solar projects[255]. Such a high concentration of the carbon credit supply, especially from a low-integrity project category, makes the country sensitive to market shifts on both the demand and supply side. However, the country is developing institutions that provide alternative offtake options. The strongest aspect is the presence of an active national carbon registry, the Climate Projects Registry[290]. Further, Egypt has partial MRV activities with a draft proposed climate MRV structure[291], and the Egyptian Environmental Affairs Agency has been established as the designated national authority[292].

Resilience indicators

Egypt's adaptive capacity is poor. First, the country's participation in technical assistance is low. Egypt's position as an oil and gas supplier could reduce the chances of receiving carbon finance and related technical assistance, often associated with firm commitments to energy transition. Nonetheless, Egypt has engaged in some international initiatives; for example, it was the host country for COP27, where the ACMI was launched[293], which raised its profile. While the launch of the Egyptian Climate Exchange demonstrates a willingness to involve the private sector in climate finance, the country's local networks are still at an early stage of development. There is not yet a large group of local carbon developers, and it is unclear whether local VVBs are present. Finally, none of the credits issued between 2020 and 2025 to date are eligible for CORSIA Phase 1[256], underscoring how the country will have difficulty transitioning to an alternative market, should demand shifts take place.

Potential resilience strategies

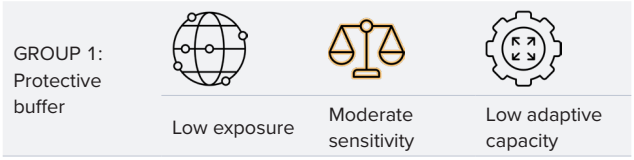
Egypt faces high exposure and low adaptive capacity, primarily due to an outdated credit portfolio. To build resilience against global market shifts, Egypt must modernize its carbon market on multiple fronts:

- **Diversify portfolio and upgrade credit integrity:** Egypt should move beyond large grid-connected renewables and develop projects with clearer additionality and permanence. For instance, NbS provide a promising avenue: Egypt has initiated mangrove restoration projects along the Red Sea coast as a climate strategy[294]. These could generate blue carbon or afforestation removal credits with significant co-benefits. Egypt can also explore new sectors, like sustainable transport (e.g. urban transit electrification), that align with its development needs and high-integrity methodologies;
- **Improve institutional capacity and coordination:** While Egypt has put initial frameworks in place (e.g. designating the Environmental Affairs Agency as DNA and drafting an MRV structure), the effectiveness of these institutions needs strengthening. A resilient carbon market will require fully operational institutions and clear coordination among them. Egypt should expedite finalizing its national MRV system. Accurate national GHG data and project-level MRV will enable Egypt to avoid discrepancies and align its carbon credits with its NDC accounting (important if it authorizes any credits under Article 6);
- **Expand access to technical assistance and climate finance:** Egypt should actively engage with international support programmes, for example, seeking an Article 6 readiness grant to gain experience in international credit transactions. Engaging multilateral development banks or bilateral partners to fund pilot projects (especially in new categories like agricultural carbon or industrial

decarbonization) would provide not only finance but also expertise.

4.2.3.6. African archetypes

In addition to the five deep-dive countries, 15 other African countries were included in this analysis based on their position among the top 20 carbon credit issuers on the continent between 2020 and 2024, as identified using the Berkeley Voluntary Carbon Market (VCM) database[255]. To facilitate comparative analysis and identify common lessons, these countries were grouped into six archetypes based on shared characteristics.



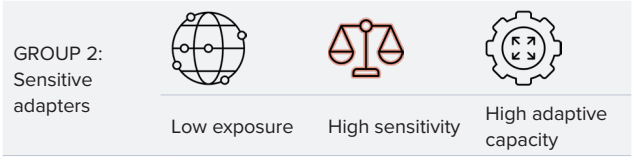
Group 1 constitutes countries with low exposure, moderate sensitivity and low adaptive capacity. These countries are less likely to be affected by current shifts, but if they are, they will have difficulty recovering.

Among the 15 countries assessed, the only one fitting this classification is Senegal. To improve resilience in Senegal, the country should focus on strengthening the private sector, building institutional readiness and diversifying market participation.

Capacity-building initiatives should target enabling high-integrity project types such as those that are ICVCM, CORSIA and/or Article 6 aligned, while also focusing on establishing infrastructure that will enable corresponding adjustments to be made. This will enable Senegal to have multiple routes to market for its carbon credits if the voluntary market does not prove viable, improving adaptive capacity.

Senegal should actively explore opportunities in compliance markets in the EU and Africa, as well as climate-aligned trade and investment initiatives that integrate carbon credits into broader economic agreements. By prioritizing these interventions, the country will not only strengthen its resilience (adaptive capacity) but also reduce overall sensitivity to shifts. Supporting high-integrity projects will diversify the market, while building institutional capacity will enable broader participation in more stringent compliance markets.

The country's long-term stability in this space will depend not only on institutional reforms but also on its ability to foster a robust domestic market ecosystem and to strategically diversify the sources of demand for its carbon credits.



Group 2 consists of countries with low exposure and high adaptive capacity ratings, with the key weakness being high sensitivity. This group comprises Eritrea, Mozambique and Nigeria.

This group is already relatively insulated from major market shocks, with low exposure to high-risk project types, and has adaptive capacity through a strong CORSIA-eligible project pipeline. Yet the group remains extremely sensitive because supply is concentrated in a narrow set of project types and market channels. The priority is to reduce sensitivity to shocks by diversifying project types and strengthening institutional capacity so that any shock to one methodology, buyer segment or standard does not translate into disproportionate value loss. These countries can consider increasing CCP-aligned removal project types, which will help to increase both the diversity of project types and the associated quality of credits.

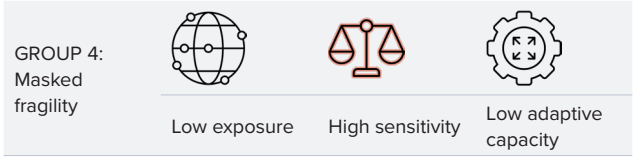
By deliberately broadening the credit mix, strengthening Article 6 and CORSIA participation mechanisms, and re-contracting risk across the value chain, these countries can materially reduce sensitivity while also improving exposure through higher perceived integrity and a broader pool of buyers. By investing in local capacity and establishing a more conducive market environment for carbon market participation, a more diversified market with access to more stringent markets can be developed.



Group 3 comprises countries with low exposure, high sensitivity and moderate adaptive capacity: Uganda and Burundi.

This country group already participates in global carbon markets, but is concentrated in a single supply track and lacks the institutions to adapt quickly when rules tighten, as few pipeline projects are CORSIA-eligible. The core need to reduce portfolio sensitivity is to diversify credit supply. Doing so will reduce the impact of integrity shocks and, as a secondary effect, improve perceived exposure by moving issuance towards high-integrity project types and buyers that value durability and traceability.

Although not a priority, establishing the institutional and technical capabilities to issue corresponding adjustments will further enhance resilience. This will be achieved by gaining access to compliance markets such as Article 6 and CORSIA, moving beyond reliance on the voluntary market alone. This creates alternative demand channels, stabilizes revenue streams and reduces vulnerability to shifting guidance in voluntary offsetting.



Group 4 comprises countries with low exposure but high sensitivity and low adaptive capacity, including Zimbabwe, Côte d'Ivoire, Madagascar, Rwanda and Malawi.

Despite their low exposure to the assessed risks, these countries face significant challenges due to high sensitivity and low adaptive capacity. The result is that adverse shocks are likely to have severe and prolonged impacts, as these markets lack both the diversification and institutional agility to navigate change effectively.

Sensitivity to shocks needs to be lowered through institutional development, which enables participation in more stringent markets such as CORSIA and Article 6. This can be achieved through operationalizing national registries and establishing authorization processes, for example. By equipping market participants with pathways to align with these compliance markets, countries can enable greater participation, leading to more diversified supply portfolios. This reduces the concentration risks that drive sensitivity while simultaneously improving resilience by accessing alternative buyer markets.

Alongside institutional capacity, building a more enabling environment is critical for market competitiveness and participation. Greater domestic participation encourages diversification, which directly lowers sensitivity, while also reinforcing the structures that support adaptive responses.

Ultimately, strengthening private-sector participation, institutional readiness and diversified market access will reinforce resilience. A stronger domestic private sector, operating within supportive institutions, is better positioned to generate market activity, transition between standards and sustain carbon flow despite external shocks, closing the gap on both sensitivity and adaptive capacity.



Group 5 consists only of Somalia, with moderate exposure stemming from high political risk. Somalia has a high sensitivity rating because supply is concentrated in a small set of project types. This is countered by strong adaptive capacity, driven primarily by a nascent CORSIA-ready pipeline. At present, Somalia has limited visibility of near-term pipelines oriented toward the VCM or Article 6 mechanisms, reflecting ongoing constraints in institutional readiness and market engagement.

The task, therefore, is to translate adaptive capacity into concrete shifts that lower sensitivity, principally by diversifying supply into high-quality project types, while creating positive spillovers that also reduce exposure to high-risk projects. However, foreign investors may still need risk mitigants like political risk insurance to consider carbon financing.

In practical terms, Somalia should move from reliance on at-risk avoidance methodologies toward a balanced mix of high-integrity removals and durable reductions. Achieving this will lower the impact of any single rule change and will also reduce the likelihood and severity of demand contractions.



Group 6 consists of Ethiopia, Tanzania and Zambia, with a moderate exposure, high sensitivity and low adaptive capacity.

This group is vulnerable due to being moderately exposed to shocks. If shocks materialize, the concentrated supply and few institutional paths to pivot make the group highly vulnerable.

The most effective path to lowering sensitivity and simultaneously reducing exposure will be to balance supply towards high-integrity, compliance-compatible credit types while developing the minimum institutional capabilities needed to transact in stricter markets. Doing both broadens the pool of buyers and reduces reliance on constrained avoidance credits.

Because these steps simultaneously broaden the buyer universe and improve perceived integrity, they also mitigate exposure. The outcome is a more shock-resistant carbon market position in the short term and a scalable foundation for adaptive capacity in the future.

Box 4 below provides an overview of the Maghreb region's exposure and vulnerability to evolving dynamics in the carbon market.

Box 4. Nascent African carbon markets: How vulnerable is the Maghreb region to global market shifts?

The Maghreb region (Morocco, Algeria, Tunisia, Libya and Mauritania) faces varied levels of vulnerability in its nascent carbon markets when exposed to global political and market shifts. Of the five countries, only three – Mauritania, Morocco and Tunisia – have registered carbon projects on the Berkeley VCM database[255].

Exposure is high. The Maghreb countries' two-million credit issuance to date comes entirely from renewable energy – a project type vulnerable to tightening standards and demand shifts, with vulnerability confirmed by relatively high country-income levels. The ICVCM has not approved any renewable energy methodologies to date, leaving the Maghreb countries with portfolios highly exposed to the integrity transition. Further, political risk is elevated. Maghreb nations with higher risks, like Libya, have minimal carbon-market activity due to their instability. Algeria, while more stable, has had limited engagement in carbon projects and is seen as a challenging market for private investment. Even Tunisia, which has pursued projects, faces political and economic uncertainties that might amplify investors' hesitancy if markets tighten. In contrast, Morocco has lower political risk and has actively sought carbon finance by launching a Casablanca carbon credit exchange cluster, which could mitigate exposure by attracting a larger share of the remaining investors[295]. Nonetheless, all the countries are exposed to rising standards and selective investment, meaning those that cannot meet the new threshold or assure investors of stability will feel the shocks more acutely.

The sensitivity of the Maghreb region is considered high,

with the region's project types highly concentrated in large renewable energy projects.

The region's adaptive capacity is improving. Morocco and Tunisia have made notable progress in building carbon market institutions and policies, which will improve their adaptive capacity to mitigate shocks. Morocco has established national carbon credit verification standards and is building a National Carbon Market framework[296]. It has also signed a bilateral Article 6 agreement with Switzerland, positioning itself to sell compliance-grade credits (ITMOs) for use in other countries' NDCs[297]. Tunisia, with support from partners like the GIZ and the Article 6 Implementation Partnership, has been establishing MRV systems and governance structures to participate in carbon markets. Tunisia has made Article 6 a priority and is preparing pilot activities to integrate into international markets. This means if VCM demand declines, Tunisia and Morocco have some capacity to shift towards more stringent compliance markets where demand might still exist. Their institutions and authorization procedures can support this shift, buffering the impact of a VCM downturn.

4.3. Resilience framework

Strengthening adaptive capacity through improved MRV systems, governance reform and market diversification aligns with UNDP's approach to building long-term resilience in carbon market participation. Building resilience in African carbon markets requires coordinated action across several interconnected areas. Although countries will need tailored measures depending on their specific vulnerabilities to carbon market shifts (as addressed above), the section below sets out cross-cutting recommendations to strengthen resilience across the continent.

4.3.1. Cross-cutting foundations for high-integrity market access

Accessing markets for high-integrity credits depends on national action. Governments are 'custodians of accounting integrity', ensuring that carbon credits align with national climate goals, avoiding double counting and maintaining transparency. In an era of heightened scrutiny over credit quality and environmental claims, national credibility and accounting integrity are increasingly decisive factors influencing buyer confidence and market access.

Accordingly, resilient African carbon markets must be built on robust national policy, regulatory and institutional foundations consistent with the objectives of the Paris Agreement**.** The stronger the foundation, the more optionality in-country developers have, supporting greater investment in high-quality carbon projects. To enable this, countries need to integrate carbon market mechanisms into their climate strategies to ensure NDC alignment; establish clear legal frameworks for carbon trading, safeguards and benefit sharing; and ensure that the necessary institutions and infrastructure are in place[298]. For international compliance markets (Article 6 and CORSIA), governments should enact regulations that define how ITMOs are authorized, tracked (to avoid double counting) and applied towards NDC targets[299]. Clear legal provisions regarding authorization for NDC use and existence of other international mitigation purposes (such as CORSIA) are essential to provide certainty to developers and buyers regarding permissible credit uses[300]. Therefore, establishing a designated national authority for Article 6 transactions, a national carbon registry or tracking tool and strong MRV systems are key steps. Clear rules and oversight not only ensure environmental integrity but also build investor confidence in African credits, strengthening resilience. Efficient approval procedures and digital registry systems can further reduce transaction friction, improving the speed and reliability of credit issuance and transfer.

Similarly, legal and regulatory frameworks should provide clarity and be developed in consultation with relevant stakeholders, including communities and market participants. The introduction of additional government approval processes, 'share of proceeds' levies or fixed benefit shares can have detrimental impacts on carbon project development in countries, through reducing ease of doing business and/or developer incentives. Predictable and proportionate regulatory requirements are critical to maintaining competitiveness relative to other host countries competing for carbon investment[301].

African policymakers should consult legal and policy toolkits when designing regulatory, policy and institutional foundations. Such toolkits and guides enable African policymakers to formulate informed carbon market strategies grounded in their development priorities and climate commitments. By prioritizing strong policy frameworks, countries create an enabling environment for carbon markets to deliver credible emission reductions and attract climate finance, reinforcing resilience. Regional coordination and harmonization of rules can further strengthen market credibility and reduce fragmentation, enabling African countries to negotiate more effectively with international buyers and support cross-border carbon market cooperation.

The following three toolkits have been identified as examples to support policy and institutional design for carbon market engagement:

- **NDC Partnership's Article 6 Readiness Toolkit:** This toolkit helps decision-makers and development partners map strategic choices for Article 6, assess existing and needed capacities, request support and understand links between Article 6 objectives and other NDC implementation areas such as MRV systems[302];
- **Voluntary Carbon Markets Integrity Initiative's Carbon Markets Access Toolkit:** This toolkit helps policymakers and stakeholders decide whether, why, when and how to integrate carbon markets into their climate and sustainable development agendas[303]. It takes an integrated approach by considering voluntary, compliance and Article 6 markets together;
- **Sylvera's Article 6 Readiness Blueprint:** This three-pillar framework combines foundational arrangements, market experience and integrity guardrails in a comprehensive checklist that governments can use to identify readiness gaps, prioritize capacity-building, develop Article 6 strategies and track progress over time[304].

4.3.2. Strengthening carbon project pipelines

African countries can position their carbon producers to capture emerging demand by fostering investment in high-integrity methodologies and high-quality projects (for example, engineered removals). This is akin to strategic trade and industrial policy, guiding investment activity towards the production of higher value-added exports. Supply-side measures should combine a drive towards project diversification with sustainable development policy priorities and needs, ensuring that carbon projects deliver lasting social, economic and environmental co-benefits. In an environment where buyers increasingly differentiate between compliance-grade and voluntary credits, strengthening pipeline integrity and alignment with emerging market rules is essential for accessing premium demand segments and improving price realization.

The first mechanism to achieve this outcome under Article 6.2 is the publication of a methodology positive list that clearly communicates which activities may qualify for government authorization for export into international compliance schemes. This sends a clear market signal to developers, providing the policy certainty required for investing in more expensive mitigation projects. It is important that approved methodologies are not removed to maintain confidence. It may be necessary for governments to develop marginal abatement cost curves (MACCs) first, to determine which emission reductions and removals they are willing to export, over and above NDC compliance obligations. Clear authorization guidance also reduces investor uncertainty by signalling which mitigation outcomes may be used for NDC compliance, CORSIA eligibility or other international mitigation purposes, thus strengthening project bankability.

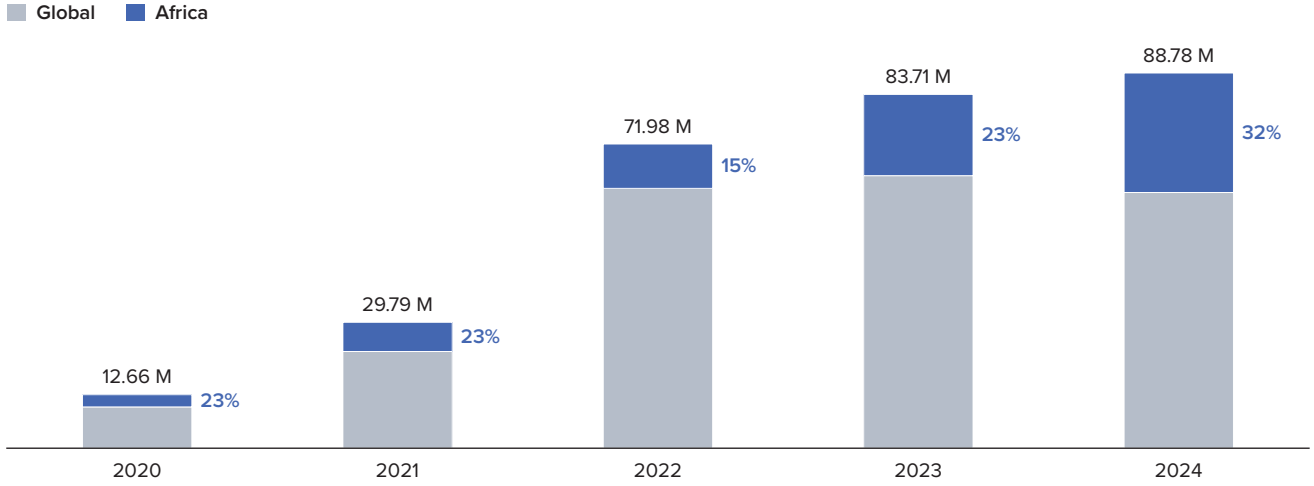
Second, governments should promote the adoption of high-integrity carbon methodologies to strengthen market access and resilience to demand volatility. Incentives could include streamlined approval procedures for projects meeting recognized integrity requirements, without reducing environmental and social safeguards, for example, with CCP labels or those that are CORSIA-eligible. Building on existing REDD+ and cookstove portfolios, countries can support updated methodologies, stronger quantification and effective safeguards. This is already under way: Africa's share of CORSIA Phase 1 eligible credits has been considerable, with a notable increase in 2024 covering nearly a third of eligible credits, even as the VCM contracted[256] (see **Figure 14** below). Upgrading legacy project types to meet evolving integrity benchmarks could preserve existing revenue streams while improving access to compliance markets and risk-averse corporate buyers.

Third, governments can foster the development of high-quality carbon removal credits at scale, considering direct and indirect measures suited to national circumstances. In Africa, this would involve opportunities in nature-based removal projects, such as ARR, agroforestry and blue carbon, as well as engineered removals such as biochar and direct air capture. Direct incentives could include tax breaks for developers to promote investment in technology and skills to produce engineered removals at scale. Indirectly, development of knowledge and databases relevant to these opportunities, for example, feasibility studies to assess potential for these project types in-country, could open new opportunities – particularly for domestic carbon developers with fewer resources than major international developers.

Developing removal supply can position African countries to meet growing corporate net-zero demand and emerging compliance preferences for durable removals, while also supporting long-term climate-resilience objectives[305].

Finally, governments and development finance institutions can assess instruments to reduce demand uncertainty for strategically important carbon project types. This can be achieved through instruments such as demand guarantees, with a publicly backed purchase facility acting as a buyer of last resort when a producer is unable to secure an offtaker. Provided that the guarantor is of sufficiently high credit quality, this guarantee can serve as the credit enhancement required to enable project financing to catalyse production at scale. Blended finance structures, advance-purchase commitments and results-based payment facilities can further improve liquidity, attract private capital and enable developers to scale projects that would otherwise be constrained by price and offtake risk[306]. This concept is further explored in **Box 5** below.

Figure 14. African portion of global credits eligible for CORSIA Phase 1 subject to authorization.



Source: Sylvera

Box 5. Making projects bankable: What role can demand guarantees play in scaling Africa's carbon markets?

Demand guarantees are one way to lock in future buyers and prices, turning uncertain credit sales into predictable revenue so projects can raise finance and scale.

How demand guarantees create price certainty

In compliance markets, governments set or steer the carbon price through a carbon tax or emissions trading system (ETS). This allows developers to predict carbon credit value. The VCM does not have that built-in certainty. **A demand guarantee fixes that gap: a buyer promises to purchase a set number of credits for an agreed price (or at least a clear floor price) over several years**[307]. This provides developers with revenue visibility, gives lenders confidence in future cash flows and enables projects to scale by removing uncertainty around sale volumes and pricing.

Where offtake deals currently lead

- The offtake market has historically been led by technological removal projects due to high capex requirements and significantly long development-to-issuance periods[308];
- Deal growth is now strongest among projects listed in the major registries. This signals that offtakes are spreading beyond nascent CDR projects to a broader range of project types, with developers increasingly choosing contracted sales over spot transactions;
- NbS removals increased in the VCM in 2024: the number of offtake agreements doubled to 18 deals representing over 20 million tons[309]. The average offtake price for these credits is over $20/ton, exceeding prices in the secondary market.

Scaling supply through demand guarantees

Advance market commitments (AMCs) function as strengthened demand guarantees that aggregate buyer interest and commit to future purchases at an agreed price. This provides a clear and credible demand signal that helps bring projects to bankability. In the carbon markets, the LEAF Coalition applies a public–private AMC model with floor prices of around $10/tCO$_2$e for jurisdictional REDD+, enabling large-scale supply by assuring participating jurisdictions that their emissions reductions will be purchased. Under this structure, donor governments guarantee the purchase of credits, while private companies have the option to buy them. Similarly, Frontier operates a multi-year AMC that commits $1 billion to advance carbon removal offtakes and has developed a standardized offtake agreement to accelerate financing[310]. Together, these AMC models demonstrate how price and volume certainty can attract investment, reduce risk for developers and catalyse the growth of high-quality carbon credit supply.

Conclusion

Demand guarantees work as a risk mitigation instrument that converts uncertain future sales into predictable revenue. This enables scale for VCM projects while aligning buyers and developers on high-integrity delivery.

4.3.3. Market strategies to improve transaction outcomes

Given the fragmented demand landscape for carbon credits, host countries should prioritize expanding market access for project developers. In practical terms, this requires aligning national policies, regulations and institutions to enable credit exports into higher-value markets such as CORSIA and Article 6, in line with national climate objectives. Stakeholder interviews indicated that the same African cookstove credit could sell for approximately $6 in the VCM, $22 under CORSIA (more than three times the VCM price) and up to $45 in Article 6 markets (seven times the VCM price), depending on its eligibility for each market, underscoring the strategic importance of securing access to multiple market pathways. Achieving this requires the foundational elements outlined in Section 4.3.1: clear guidance on eligible methodologies for compliance transfers and streamlined institutional processes that facilitate efficient transactions. In an environment where buyers increasingly prioritize integrity, authorization status and host-country alignment with NDC accounting, countries that can demonstrate transparent authorization procedures, corresponding adjustment readiness and robust MRV systems are better positioned to access premium compliance demand.

Second, host countries can cultivate strategic bilateral relationships with Article 6 buyers and key trading partners to secure long-term offtake agreements. These agreements, featuring defined volumes and indicative price ranges, provide the predictability needed for developers and financial institutions to invest in larger, more capital- and technology-intensive projects. This shift is essential for enabling African countries to move up the value chain and deliver the types of projects that large buyers prioritize. Interviews with carbon traders revealed that major corporate buyers typically seek projects capable of generating at least 100,000–200,000 credits annually, whereas most African community-based projects, such as cookstoves, low-carbon transport and small-scale renewable energy, produce fewer than 40,000 credits per year. Given that transaction costs do not vary much by project size, small-scale projects often struggle to attract large institutional buyers. Aggregation mechanisms, programmatic approaches and jurisdictional frameworks can help overcome scale barriers by bundling smaller activities into investment-grade portfolios that meet buyer volume requirements and reduce transaction costs[311]. Long-term offtake agreements with creditworthy buyers also reduce price risk and delivery risk, two key barriers to mobilizing institutional finance.

Third, African countries can enhance resilience by establishing domestic carbon pricing schemes or enabling participation in regional pricing mechanisms. South Africa's carbon tax, introduced in 2019, provides a compelling example of how domestic carbon pricing can support market development. Similar carbon pricing mechanisms have been introduced or are under active consideration in countries such as Senegal, Côte d'Ivoire, Morocco and Mauritius, albeit with varying scope, coverage and enforcement. South Africa's tax scheme incorporates an offsetting mechanism that allows entities to meet a portion of their tax obligations through carbon credits, effectively creating a domestic source of demand. With demand exceeding

supply, the tax rate, currently around $13 per ton[312], sets a price floor for project developers, who retain the flexibility to export credits if they can secure higher prices internationally. This domestic demand provides some protection against volatility in international markets and supports the development of local technical and commercial capacity. Domestic pricing mechanisms could also improve market credibility by embedding carbon value within national economic systems, signalling long-term policy commitment and reducing perceived regulatory risk for investors. However, such schemes are unlikely to substitute for international demand at scale, as further discussed in **Box 6**.

Box 6. Beyond foreign buyers: Prospects for intra-African carbon trading

Exploring the opportunity for intra-African carbon trading requires a candid assessment of where demand could arise on the African continent by examining who is currently buying African credits, where compliance demand could arise and the scale of existing domestic markets.

VCM is dominated by international buyers

Historically, most buyers of African carbon credits in the VCM have been large multinational corporations, rather than domestic or regional actors. Since 2019, the top 50 corporate beneficiaries have accounted for 45 percent of recorded African credit retirements[256]. Among these are nine Africa-based companies, all of which are headquartered in or originated in South Africa. These South African companies account for 20 percent of credits retired among the top 50 buyers of African credits. Africa's carbon markets remain outward facing, with minimal internal demand outside South Africa.

Limited compliance market demand across Africa

Compliance demand, whether using offsets under Article 6 to meet NDCs or via domestic carbon pricing mechanisms, remains highly constrained across the continent:

- With only a few major emitters on the continent, such as South Africa, Nigeria and Egypt, most African countries have low emissions and limited decarbonization needs. Given that Africa contributes only around four percent of global CO_2 emissions[313], the structural demand for offsets under Article 6 to meet NDCs within the continent is intrinsically limited;
- Critically, with South Africa currently the only African country operating a carbon tax with an offset mechanism, and a few others enforcing active carbon pricing instruments, the continent has limited policy-driven demand for offsets. In the absence of carbon taxes or emissions trading systems, firms across most of Africa face no regulatory incentive to offset emissions, leaving demand largely reliant on voluntary action or foreign markets. This highlights the potential role that the gradual expansion of domestic carbon pricing mechanisms, including carbon taxes, could play in supporting more stable, locally anchored demand for carbon credits over time.

Small scale of South Africa's compliance demand under the carbon tax

The market for offsets under South Africa's carbon tax remains modest in scale. To date, since the implementation of the country's carbon tax, 21.6 $MtCO_2e$ have been retired in compliance with the tax[314]. The amount of offsets retired under the carbon tax represents about a two percent share of all carbon credits retired from African projects over the active period of the tax (2019–2025)[256]. In effect, the mechanism generates some demand in Africa, but at a level too small to anchor meaningful pan-African carbon trading.

Key takeaway

While Africa possesses strong supply potential, the limited presence of large emitters, alongside limited regional compliance frameworks, constrains the demand side. Consequently, intra-African carbon trading currently remains a niche, with most momentum still driven by international voluntary market activity.

4.3.4. Regional partnerships for resilience

Pan-African partnerships are key to building robust and interoperable carbon market systems across Africa. Collaborative platforms help strengthen carbon market readiness among countries, reducing fragmented national approaches and amplifying Africa's voice in carbon-market rulemaking. Notably, the African Union Development Agency (AUDA) announced a continental coordinating mechanism, bringing together technical experts and focal points from the 55 AU Member States and across regional carbon market alliances[315]. This continent-wide initiative aims to strengthen Africa's voice in global carbon market participation and further includes the establishment of a set of integrity principles and a digital platform to track and support Article 6 readiness across African countries[284]. Harmonization driven by the AU or AUDA could help prevent fragmentation by ensuring that a central coordinating body oversees capacity-building and the development of shared systems, such as interoperable registries, across the continent. Furthermore, the long-standing African Group of Negotiators on Climate Change (AGN) has likewise championed Africa's interests, advocating fair rules under Article 6 that offer greater opportunities for African participation in carbon trading[316]. This enhances the resilience of African carbon markets against external shocks, helping the continent to secure a meaningful role in shaping the global carbon market. Beyond coordination, regional alignment strengthens Africa's credibility in global carbon markets. Harmonized integrity standards, shared authorization practices and interoperable registry systems reduce transaction friction and signal reliability to buyers and investors[317]. For compliance buyers in Article 6 and CORSIA markets, regional coherence lowers due diligence costs and enhances confidence in delivery, accounting integrity and regulatory predictability.

African countries can jointly address barriers to carbon market access and climate finance through regional alliances. For example, the West African Alliance on Carbon Markets and Climate Finance deepens regional cooperation through peer-to-peer learning and the exchange of best practices[318]. Similar networks emerged in East Africa and southern Africa, namely the East African Alliance on Carbon Markets and Climate Finance and the Southern African Carbon Markets Association. At the continental and global levels, initiatives such as the Africa Carbon Markets Initiative

and emerging coalitions announced ahead of COP30, including the Coalition to Grow Carbon Markets and Open Coalition on Compliance Carbon Markets, further support coordination, ambition and market development for African countries[319]. When these partnerships are used effectively, regional fragmentation in carbon market readiness and strategies is reduced. Beyond knowledge-sharing, regional alliances can be further maximized by pooling technical expertise, harmonizing policy frameworks, developing local standards and methodologies, and establishing shared infrastructure such as registries and MRV systems. These capacity-building and knowledge-sharing efforts work to cultivate a domestic pool of carbon market professionals, reducing reliance on foreign experts and ensuring that projects are locally managed. Such initiatives establish a foundation for more resilient, sustainable carbon markets over the long term. Regional cooperation could also support the development of pooled project pipelines and standardized documentation frameworks, enabling aggregation of smaller projects into transaction sizes attractive to institutional buyers. This aggregation function can help overcome scale constraints that currently limit African projects' access to large compliance buyers and climate finance.

4.3.5. Resources for readiness, capacity building and resilience

International support for carbon market readiness is envisioned by Article 6.8 of the Paris Agreement, which establishes a framework for NMAs. While Article 6.8 does not govern carbon markets or the transfer of mitigation outcomes, it enables countries to cooperate through finance, technology development and transfer, and capacity-building support[320]. Such support can indirectly strengthen carbon market outcomes by funnelling grants, technical expertise or equipment to African institutions and projects, helping to cover upfront costs and build local capacity. By strengthening domestic expertise and institutions, NMAs lower perceived risks and improve investor confidence, which strengthens resilience to carbon market volatility. Capacity support that strengthens MRV systems, authorization workflows and regulatory transparency directly improves project bankability by reducing delivery, policy and accounting risks[321]. For investors and insurers, whose involvement compliance markets increasingly require, strong institutional capacity signals that mitigation outcomes can be monitored, verified and transferred with integrity. While adoption of Article 6.8 has been slow[322], scaling up NMAs could play a pivotal role in strengthening the resilience of carbon markets across Africa.

The World Bank has released new guidance to help governments navigate carbon markets, including a harmonized approach to technical assistance[323]. Through the coordination of technical assistance and capacity-building from key organizations, the World Bank aims to streamline access to tailored support for countries[290]. This was done to overcome fragmented technical assistance to help countries maximize their carbon market potential[290]. Coordinated technical assistance also helps countries move from readiness planning to operational implementation. Transitioning from policy design to transaction execution requires practical capabilities, including registry operation, credit authorization procedures and data management systems that support corresponding adjustments and international reporting obligations.

Table 9 below outlines the key providers of technical assistance for carbon markets.

Table 9. Global partners in carbon market technical assistance and capacity building

Organization	Role	Target areas
Article 6 Implementation Partnership (A6IP)	Promotes collaboration, knowledge sharing and capacity-building for high-integrity Article 6 markets	• Article 6 • CORSIA • Voluntary market
GGGI	Supports buyer and seller countries (Member States and Partner Countries) to access carbon markets, attract finance and implement cooperative approaches	• Article 6 • Voluntary market
VCMI	Helps host countries unlock the benefits of carbon finance via high-integrity carbon markets via its Access Strategies Program	• Article 6 • Voluntary market
ICVCM	Sets quality standards for credits (Core Carbon Principles), engages governments and regulators to support harmonized transactions, fosters community-centred carbon markets and lowers barriers to market actors	• Article 6 • CORSIA • Voluntary market
UNDP	Supports the design of carbon market infrastructure rooted in environmental and social integrity, connecting global ambition with real results on the ground and unlocking private finance to accelerate climate action with co-benefits across the 2030 Agenda	• Article 6 • Domestic carbon markets and emissions trading schemes • Jurisdictional REDD+ and voluntary market • Thought leadership on carbon markets
UNFCCC	Supports countries to participate in Article 6 transactions through an Article 6 capacity-building programme	• Article 6 • CORSIA • Voluntary market
GIZ	Delivers technical cooperation and institutional capacity-building to help countries build robust frameworks for carbon-market implementation	• Article 6 • Voluntary market
World Bank Group	Provides technical assistance for finance mobilization, regulatory support and interoperable market infrastructure	• Article 6 • CORSIA • Voluntary market

The AfDB recently announced the Africa Carbon Support Facility, a new programme to help African countries strengthen climate finance through carbon markets[324]. This facility will assist governments in developing policies and regulations for carbon trading, and in increasing the supply of and demand for African carbon credits by building key market infrastructure[291]. About 70–80 percent of this facility will be used to improve project development across the continent, focusing on providing technical assistance for carbon project design and structuring, improving access to capital and reducing transaction costs. Complementing this, UNDP's HICMI supports countries in strengthening policy frameworks, institutional readiness and integrity safeguards to enable effective participation in carbon markets. Access to such funding and support improves the adaptive capacity of countries to navigate shifts that may potentially harm carbon market activity. Targeted project preparation support is particularly critical for mobilizing private capital. Early-stage feasibility assessments, MRV system design, legal structuring and offtake readiness reduce development risk and improve projects' ability to secure long-term purchase agreements and financing.

Africa should actively explore self-funding its key carbon market institutions to reduce dependence on external funding. These institutions include the bodies that govern, regulate, verify and facilitate participation in carbon markets, ranging from national MRV offices to regional coordination hubs. While countries may mobilize resources through authorization fees, levies or carbon revenues, care must be taken to ensure that such fees do not discourage project development or private investment. At the same time, self-financing approaches must be pragmatic and context-specific; for example, many African countries have low emissions profiles, limiting the potential for revenue generation through carbon taxes. The goal should be to build resilient, financially independent institutions capable of supporting Africa's long-term climate and carbon market ambitions. Over time, building financially sustainable institutions and domestic technical expertise will reduce reliance on external intermediaries, strengthen local value capture and support the development of a competitive African carbon market ecosystem capable of delivering high-integrity credits at scale.

5. Gaps and opportunities

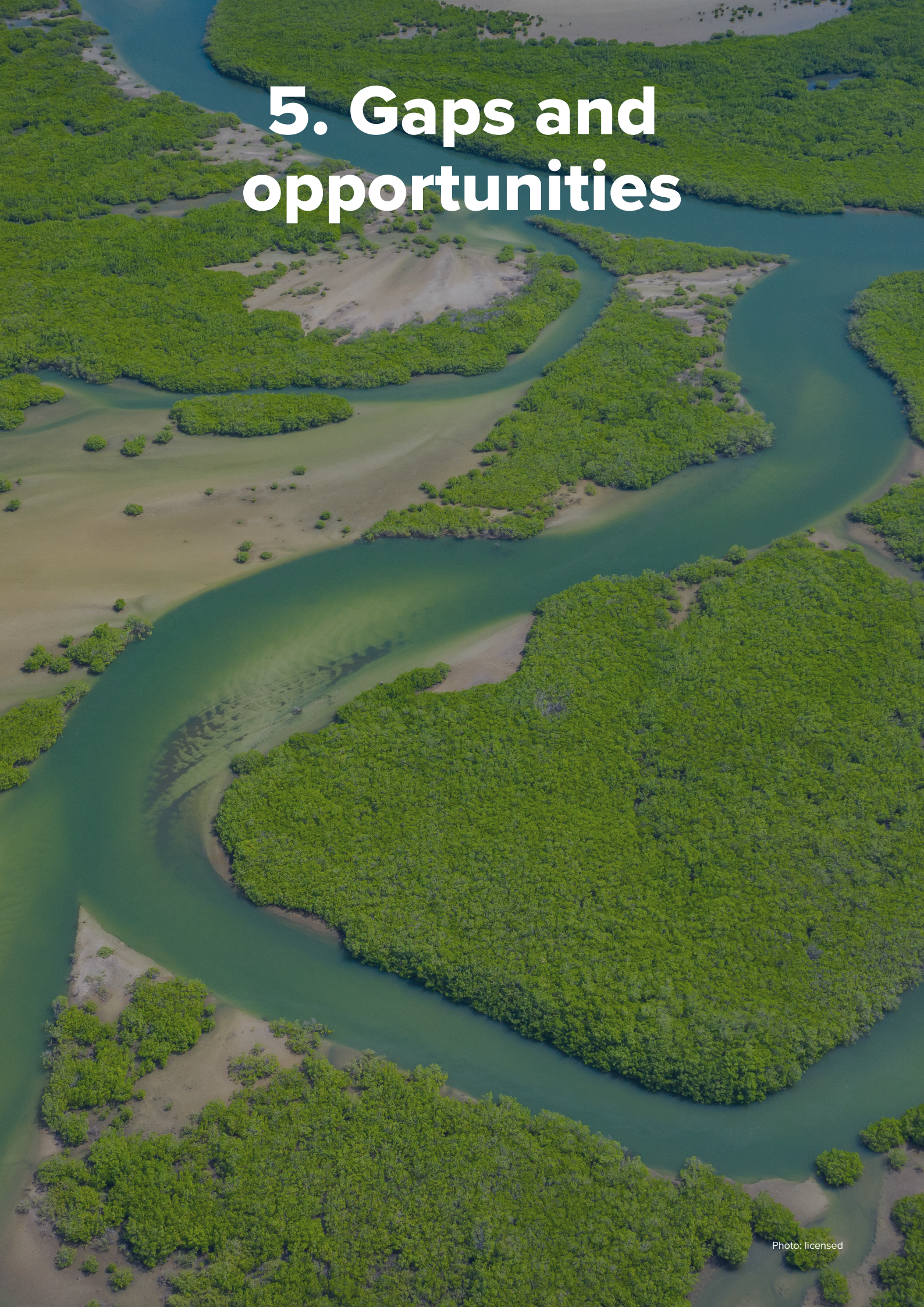


Photo: licensed

OVERVIEW

This section identifies actionable opportunities to address gaps and strengthen Africa's participation in Article 6 mechanisms and the VCM. While the continent currently receives modest finance through carbon markets, this could increase as global demand for compliance-aligned credits expands. Regulated markets under Article 6 and CORSIA are forecast to require up to 700 million ITMOs by 2030, implying potential climate finance inflows of $5 billion to $10 billion for Africa if supply constraints, authorization bottlenecks and integrity risks are addressed. The ACMI's estimate of 2,400 $MtCO_2e$ carbon supply potential underpins its ambition to unlock up to $6 billion in carbon finance for the continent by 2030.

This analysis is centred on the requirements for African carbon credits to become bankable revenue streams, enabling investment at the scale required to meet rising demand. The current barriers to this include legal certainty (policy and regulation governing ownership, enforceability and classification), standardization and quality assurance (MRV systems, project methodologies and governance), project scale (to manage transaction costs), risk mitigation (e.g. guarantees and insurance to limit downside) and illiquid markets due to gaps in demand. Human capital is foundational to achieving this goal, since production of carbon credits is a highly skill-intensive process.

Across policy and institutions, the analysis shows that strengthening governance both enables participation in new markets and enhances value capture. Clear authorization rules, interoperable registries and predictable benefit-sharing frameworks directly affect credit fungibility, buyer eligibility and price optimization. Early movers demonstrate that governance reform can unlock bilateral Article 6 transactions, longer-term offtake contracts and price premiums within a two- to five-year horizon. Similarly, investments in national and digital MRV systems reduce verification costs, shorten issuance timelines and open access to jurisdictional and compliance markets such as Architecture for REDD+ Transactions (ART) TREES and CORSIA.

Human capital and financial architecture emerge as foundations for scaling market participation. Expanding local verification and carbon services capacity can reduce lengthy issuance timelines (often 12–24 months), while improving project bankability and retaining more value locally. Financing measures including technical assistance facilities and credit enhancement instruments expand high-integrity supply through addressing high early-stage development costs (as high as $150,000 to $300,000 for standard projects) and crowding in private capital at scale. Derisking development actively transforms the African carbon pipeline into an investable base, reducing grant dependence.

At the same time, a strategic opportunity exists to rebalance Africa's project portfolio towards higher-integrity and compliance-aligned credit types. While avoidance-based REDD+ and cookstove credits currently dominate African issuance, carbon removal credits such as ARR, IFM and biochar provide greater resilience to integrity tightening and stronger long-term demand. This is also the case for projects generating measurable emission avoidance (rather than atmospheric removal), like renewable energy displacing fossil fuels and methane abatement. Conservative estimates suggest that selected high-integrity pathways alone could generate approximately $2 billion in annual revenue as markets develop, provided that enabling conditions around policy, MRV and finance are in place.

Demand analysis shows that Africa's opportunity lies not only in exporting credits but also in shaping demand through compliance markets, premium buyers and domestic carbon pricing. Scaling access to Article 6 and CORSIA markets, deepening engagement with high-quality buyers and piloting domestic and regional compliance mechanisms can reduce reliance on volatile voluntary demand while creating predictable price signals. Taken together, the opportunities outlined in this section demonstrate how Africa can move from a position of vulnerability driven by external rule-setting to one of strategic participation, using targeted reforms and investments to convert current gaps into durable competitive advantages in global carbon markets.

Recommendations draw from the Africa Action Plan on Carbon Markets (AAPCM), reflecting a unified commitment among Member States to establish high-integrity carbon market systems that attract investment into low-carbon technologies, accelerate sustainable development and advance the continent's transition toward a green economy. These insights are further enriched by interviews with private-sector actors, public institutions and civil society organizations, providing a grounded view of the practical constraints and opportunities shaping the African carbon market landscape.

5.1. Carbon credits as bankable revenue

For carbon markets to mobilize private capital at scale, carbon credits must evolve from niche environmental instruments into bankable revenue streams. In this context, bankability refers to the potential of carbon credits to secure debt financing, attract institutional investment and serve as reliable revenue-generating instruments within structured financial products. Bankable carbon revenue streams rely on high-integrity credits to produce predictable cash flows, enabled by robust demand and risk mitigants protected by enforceable contracts within stable policy environments. Accordingly, bankability is a function of the policy and regulatory environment, MRV and governance institutions, financial architecture and the profile of projects (scale and revenue predictability). Where these enabling conditions are present, carbon credits can support projects in mobilizing long-term private capital.

5.1.1. Legal certainty

The foundation of bankability is legal clarity. Financial institutions require certainty regarding carbon credit ownership, transferability and enforceability. Key policy enablers include:

- Clear legal definition of carbon rights, including allocation between the state, landholders, communities and project developers;
- Recognition of carbon credits as tradable property or financial assets under national law;
- Enforceability of forward sales agreements and emissions reduction purchase agreements (ERPAs);
- Transparent and predictable Article 6 authorization procedures, including corresponding adjustment rules and protection against retroactive revocation.

5.1.2. Policy stability and certainty

Carbon finance is highly sensitive to policy changes and institutional uncertainty. Long-term sovereign commitment significantly lowers perceived risk, reducing risk premiums and enabling longer tenor financing. Credible signals include:

- A long-term national carbon market strategy aligned with NDCs;
- Transparent and consistent Article 6 engagement policies;
- Clear allocation between domestic use and export of mitigation outcomes;
- Public reporting on authorization volumes and revenue use.

5.1.3. Financial sector recognition and treatment

Regulatory and accounting clarity are essential to integrating carbon credits into the financial system. This requires intergovernmental coordination, including engagement with central banks and financial regulators, to deliver:

- Clear accounting guidance (e.g. IFRS treatment as inventory or financial instruments);
- Defined tax treatment for issuance, transfer and retirement;
- Recognition within prudential regulatory frameworks where relevant;
- Capacity-building within domestic financial institutions to assess carbon risk profiles.

5.1.4. Environmental integrity and standardization

Financial actors require confidence in the environmental robustness and reputational quality of carbon credits. Strengthening integrity requires:

- Alignment with internationally recognized standards (e.g. CCP);
- Transparent, digitized national registries with serial number traceability;
- Integration of national measurement, reporting and verification (MRV) systems with project-level verification;
- Clear permanence safeguards, including buffer pools and reversal management mechanisms;
- Social and environmental safeguards, including benefit-sharing frameworks and grievance redress systems.

Standardization reduces due diligence costs and enables aggregation and securitization.

5.1.5. Risk mitigation instruments

Carbon credit projects face multiple risk types, including regulatory, market, political, reversal and counterparty risks. Bankability improves when risk-sharing mechanisms are introduced, such as:

- Reversal and performance insurance products;
- Political risk insurance and partial risk guarantees;
- Blended finance structures that provide first-loss capital;
- Currency-hedging facilities in countries with exchange rate volatility;
- Clear and stable policy frameworks that minimize regulatory uncertainty.

Public institutions and development finance institutions (DFIs) play a critical role in derisking early-stage markets.

5.1.6. Project scale

Many carbon projects, particularly in least developed countries, are small and fragmented, which can constrain access to institutional capital. Governments can facilitate scale through:

- Jurisdictional or programmatic crediting approaches;
- National aggregation platforms for smallholder or community-based projects;
- Standardized documentation and transaction templates;
- Public facilities that bundle and warehouse credits prior to sale.

Aggregation reduces transaction costs and enhances investment attractiveness.

5.1.7. Predictable and robust revenue streams

Lenders require sufficiently predictable cash flows to assess repayment capacity rather than environmental outcomes. Carbon credits trade in illiquid markets, and their fungibility (i.e. potential to trade across markets) is limited, making it challenging for banks to rely on forecast revenues.

Carbon projects require mechanisms that enhance revenue certainty, since stable demand signals provide investors with confidence and so lower the cost of capital for project developers.

Policy instruments that strengthen predictability include long-term offtake agreements (5–15 years), sovereign or multilateral-backed purchase facilities, or carbon pricing mechanisms with offset provisions that create domestic demand.

Beyond these policy measures, expansion in carbon offtake opportunities (whether via exchange or the ability to trade in multiple carbon markets), strengthening routes to market (for example, capturing premium buyers) and developing quality credits experiencing high demand build confidence in revenue projections.

5.2. Barriers limiting Africa's carbon market participation

Africa has significant potential to supply high-integrity carbon credits, yet realizing this opportunity requires addressing interlinked policy, institutional and market barriers. This section outlines the principal constraints, both domestic and external, that currently limit Africa's full participation in global carbon markets. Readiness remains highly uneven: while a few countries have advanced legal and governance frameworks, others continue to face regulatory uncertainty, capacity gaps and emerging investment conditions. The constraints limiting Africa's participation in high-integrity carbon markets fall into two reinforcing categories: (i) foundational systems and governance constraints and (ii) human and transactional capacity constraints. Together, these gaps increase uncertainty, raise transaction costs and restrict access to compliance and high-integrity markets.

5.2.1. Policy and institutions

5.2.1.1. Gaps in national legislation

Gaps in national legislation restrict clarity and market integrity, fuelling policy uncertainty for market participants. In many African countries, carbon market legislation is absent or emerging, with only about a fifth of countries having enacted some regulatory provisions[325]. Policy and regulatory certainty provide market participants with a clearer pathway for engagement. Additionally, the scope and effectiveness of these regulations vary among the countries that have them[292]. The absence of carbon-market regulations among African nations hinders market development, creating a vacuum that leads to uncertainty and depresses returns for investors. Limited clarity regarding ownership of carbon rights, including benefit-sharing obligations, creates uncertainty over property rights, deterring investors. Factors including limited technical capacity, slow progress in developing regulatory frameworks and political uncertainty over viable pathways to NDC achievement[326] contribute to delays in authorization of corresponding adjustments, restricting access to compliance markets under Article 6.

5.2.1.2. Delayed or incomplete MRV systems

Underdeveloped MRV systems and national registry infrastructure continue to constrain market integrity and participation[292]. MRV ensures that an activity has effectively avoided or removed harmful GHG emissions, enabling these actions to be converted into credits with monetary value[327]. MRV infrastructure refers to carbon registries and independent verification capacity to facilitate accurate tracking of emission reductions, prevent double counting and validate project quality. Many countries are still building basic capacity for these activities and systems to ensure projects meet quality requirements set by international rules under standards bodies and offsetting schemes, such as Verra, Gold Standard and CORSIA[292]. African project developers consistently point out that limited MRV capacity on the continent creates bottlenecks, underscoring the need to scale MRV capabilities[328]. Enhancing MRV systems will improve data accuracy, improve project governance and enable access to climate finance[329].

5.2.1.3. Uncertain, delayed or revoked authorization of corresponding adjustment

A critical requirement for compliance market transactions is certainty regarding a host country's ability and willingness to issue letters of authorization that enable corresponding adjustments required for export under the Paris Agreement[330,331]. Without these authorizations, carbon developers cannot access regulatory/compliance carbon markets, including Article 6.2 and CORSIA, limiting offtake to international VCM or domestic buyers. Since carbon credits tend to trade at significantly lower prices in the VCM[332], uncertainty regarding the likelihood of government authorization deters project development, weakening project bankability and reducing investor appetite, with the most severe impact for more capital-intensive project types, given larger investment requirements per emission reduction.

As authorization processes are nascent, they are often lengthy, creating uncertainty for buyers. This is compounded by elevated levels of political risk, including election-related policy shifts, changes in ministerial leadership or mandates, and inconsistent inter-agency coordination. Such dynamics can delay approvals or trigger policy reversals, increasing perceived sovereign and regulatory risk, and deterring early investment in carbon market activities.

Similarly, compliance buyers are wary of the risk of revocation, meaning the withdrawal of a host country's authorization. In response, ICPs such as Verra and Gold Standard require carbon developers to arrange insurance (typically from the Multilateral Investment Guarantee

Agency) against this risk before credits can be tagged as CORSIA-eligible on their registries. Article 6.2 buyers have expressed concern about the potential for host-country revocation, noting that such actions could weaken investor confidence over time[333]. For example, Kenya's temporary suspension of carbon project approvals in 2023 underscored the sensitivity of the authorization environment and the market's vulnerability to abrupt policy shifts[334] and highlighted the importance of predictable authorization regimes.

Hesitation to approve corresponding adjustments stems from uncertainty about how international transfers may affect ability to meet NDC commitments. Host country governments that have not yet undertaken studies to inform their carbon market strategies, including MACCs revealing the cost of mitigation opportunities, may be unsure how they will achieve their NDC targets[335]. As a result, many prefer to proceed cautiously to avoid exporting mitigation outcomes that may later be needed for domestic NDC achievement or that could constrain future domestic mitigation pathways.

Even where foundational systems are improving, constraints in human capital and transaction capability continue to limit effective market participation and slow authorization timelines.

5.2.2. Human capital

5.2.2.1. Limited access to VVBs for project development

Shortages in local validation and verification body (VVB) capacity can hamper the scalability and integrity of carbon markets[295]. Few players certified by major ICPs such as Gold Standard and Verra have offices in Africa, apart from Bureau Veritas in Kenya[336], SGS and Carbon Check in South Africa[337]. The scarcity of VVBs has a negative impact on monetization potential, particularly for smaller projects. Large projects can afford to bring in international VVBs, but this is less feasible for small community-based projects. During the design phase, a lack of skilled VVB involvement could result in incorrect baselines and flawed technical additionality assessments. This could undermine revenues for the life of the project, due to flawed quantification and perceived low quality. Further, the need to 'import' VVB capacity across project lifecycles delays crediting and drives up costs[338]. Limited oversight and quality assurance in on-the-ground project monitoring pose risks of greenwashing, non-compliance and reputational damage, which could hinder Africa's participation in high-integrity carbon markets as activities expand across the continent[304]. These constraints prevent local value chains from developing fully.

5.2.2.2. Lack of technical expertise to transact in carbon markets

A lack of technical expertise hinders African participants' ability to transact in carbon markets. Many African governments lack the necessary technical expertise, institutional resources and market knowledge to implement governance and reporting frameworks that are Article 6-compliant, reducing the potential of compliance markets to support domestic policy implementation[339]. Additionally, current evidence suggests that they may not yet have all the requisite skills, resources or market expertise to negotiate and assert their interests effectively in international carbon markets[340]. Capacity is especially scarce in public institutions, where civil servants must monitor private developers and interface with global platforms. Furthermore, under Article 6.2, host governments are reluctant to approve corresponding adjustments for ITMOs if they are uncertain about how it will affect the achievement of domestic mitigation priorities. This is a particular area of expertise that needs to be improved: governments need to understand which mitigation outcomes could be authorized for transfer under Article 6.2, the potential pricing implications and how such transfers affect national NDC accounting once they become ITMOs following corresponding adjustments. Even within the private sector, the pool of carbon project developers in Africa remains limited, with existing firms showing gaps in local relevance, carbon expertise, delivery capacity and business skills[292]. This could be the result of limited participation in earlier carbon market mechanisms such as the CDM[341,342].

In the VCM, African carbon projects often rely heavily on intermediaries to access buyer markets, sacrificing value[292]. Up to 80 percent of carbon revenue may be retained by developers, leaving little behind for local communities and Indigenous Peoples[343]. Carbon markets remain opaque, with a high prevalence of non-transparent 'over-the-counter' transactions, fragmented markets and price heterogeneity making it difficult for developers and host-country governments to reliably establish the value of credits as sellers. This asymmetric information may give rise to inequitable transactions, or at least the perception that sellers are being exploited, escalating the risk of non-authorization or revocation by host country governments in compliance transaction settings.

5.2.3. Financial capital

Access to finance is a cross-cutting constraint affecting exposure, sensitivity and adaptive capacity across African carbon markets. Limited access to affordable finance amplifies other barriers discussed above, including delays in project development, reliance on foreign intermediaries, constrained participation in high-integrity and compliance markets and heightened sensitivity to regulatory and market shocks. This section unpacks how financing constraints operate across the carbon project lifecycle and why they remain a critical determinant of market resilience.

5.2.3.1. High upfront costs

African carbon project developers often lack the financial resources to develop high-quality carbon offset projects. Adherence to recognized and credible standards requires substantial upfront investment before any credits can be generated and sold to offset those costs[344]. For example, to reach first issuance under a Verra-approved methodology, a low-complexity AFOLU project in Africa typically requires an administration outlay of between $150,000 and

$300,000, and this excludes climate project implementation costs[345]. Similarly, in Africa, for micro-scale projects, developers generally face a set-up cost of between $50,000 and $150,000 or more[311,346]. Additionally, given the multitude of real and perceived risks by financiers, project developers often face a high cost of capital for the financing they receive[292]. These costs are often unaffordable for many local developers without access to concessional finance or technical partners that help to derisk, scale and ensure project viability[347]. The high upfront costs reinforce reliance on foreign intermediaries, which often take a higher revenue share, and, in some cases, a percentage of the credits issued in exchange for absorbing early development and verification costs.

5.2.3.2. Limited access to capital

Access to capital for carbon projects remains constrained in Africa, hindered by the lack of effective derisking mechanisms and little participation from institutional investors. A further barrier is that most financial institutions do not yet recognize carbon credits as assets, restricting their eligibility for collateralization or investment and limiting the flow of private finance into the sector and preventing carbon revenue streams from being used to secure project finance.

Apart from general country risk factors hampering investor appetite, common project types (forestry, soil organic carbon) face scrutiny over additionality, reputational risk is elevated in community settings, transaction costs are high given projects are often subscale and remote, and most credits are traded in illiquid, opaque voluntary markets given prevailing lack of readiness to trade in compliance markets where price signals and demand certainty are stronger. There are limited active mechanisms in Africa to reduce the high risks often associated with carbon project development and supply on the continent, making them far less attractive to private capital[292]. Notably, early feasibility work is mostly funded from the developer's balance sheet, and carbon investors remain the primary source of capital for scaling projects[314]. This reinforces dependence on specialized intermediaries and forward buyers. This reliance highlights the minimal contribution of financial institutions to project financing[314]. In Sub-Saharan Africa, the greatest shortfall is in early-stage concessional capital to derisk the project and commercial finance for initial project implementation[348] and bridge the transition from project design to revenue generation. This limits conversion of the project pipeline, particularly for more expensive, higher-quality project types that require longer development timelines and higher upfront capital expenditure.

5.2.3.3. Perceived country and project risk

Investors often perceive African carbon projects as higher risk due to political instability, disputes over project rights and unpredictable government intervention. In some instances, ministries and local governments compete for control over carbon projects and the associated revenue, leading to conflicting agreements with different developers for the same project rights[349]. This increases risk due to the lack of clear ownership, leading to project delays and increased complexity, risking project feasibility[292]. Additionally, political risk, in the form of unpredictable regulatory decisions, raises the investment risk[292], for example, when Zimbabwe initially announced in 2023 that all carbon projects must share 50 percent of revenue with the state[350]. These challenges are compounded by the fact that international country and credit risk ratings are not available for some African nations[292], making them invisible in global capital markets. The absence of these ratings increases uncertainty[351], which deters long-term investment in Africa's carbon markets.

The nature of the enabling environment further affects the perceived country and project risk. Specifically, in the case of the CDM, gaps in physical infrastructure – such as a stable electricity grid and transport links – and banking and financial infrastructure influenced the risk of carbon project development and operation in some African countries[352]. These factors affect the country's ability to conduct business, which in turn impacts investor confidence[318]. With regard to financial infrastructure, African countries where access to finance was limited did not perform well in the CDM[353]. This highlights how a weak enabling environment can increase perceived country and project risk, as well as raise the cost of carbon project development.

5.2.4. Supply

5.2.4.1. Lower-quality project types

Africa's supply has leaned heavily on avoidance credits, which can deliver climate impact at low cost. The continent has been a major producer of REDD+ credits with approximately 115 million issued credits that make up 29 percent of all REDD+ credits in VCMs[354], generated with respect to avoided deforestation and forest degradation. These projects seek to take advantage of natural assets through conservation measures, rather than reducing or removing emissions. Following media reports in early 2023, they have come under intense scrutiny, with methodological concerns including over-crediting and lack of additionality[355,356,357,358,325]. Such issues, along with broader sectoral concerns over the permanence of carbon sequestered in the case of nature-based climate solutions, have led to perceptions of low quality. These integrity concerns have materially affected buyer confidence and price realization, contributing to the discount applied to many African credits in voluntary markets.

Today, the scope for REDD+ projects is limited by measures aimed at restoring integrity, including mandatory safeguards in respect of non-permanence and leakage (e.g. extra buffers). The threshold for eligible REDD+ initiatives has moved from project to jurisdiction level, dealing with leakage (i.e. the practice of moving deforestation activities outside the project boundary). Such standards include Architecture for REDD+ Transactions (ART) TREES and Verra's Jurisdictional and Nested REDD+ (JNR). Jurisdictional initiatives are more challenging to implement, requiring political will and strong public-sector capacity to coordinate and monitor them, and typically involve complex benefit-sharing arrangements. This reduces viable opportunity

for countries with large forests, such as those in the Congo Basin.

Issues specific to commonly adopted forestry methodologies in Africa – namely VM0007 (REDD+), VM0009 (Avoided ecosystem conversion) and VM0015 (Avoided unplanned deforestation) – include:

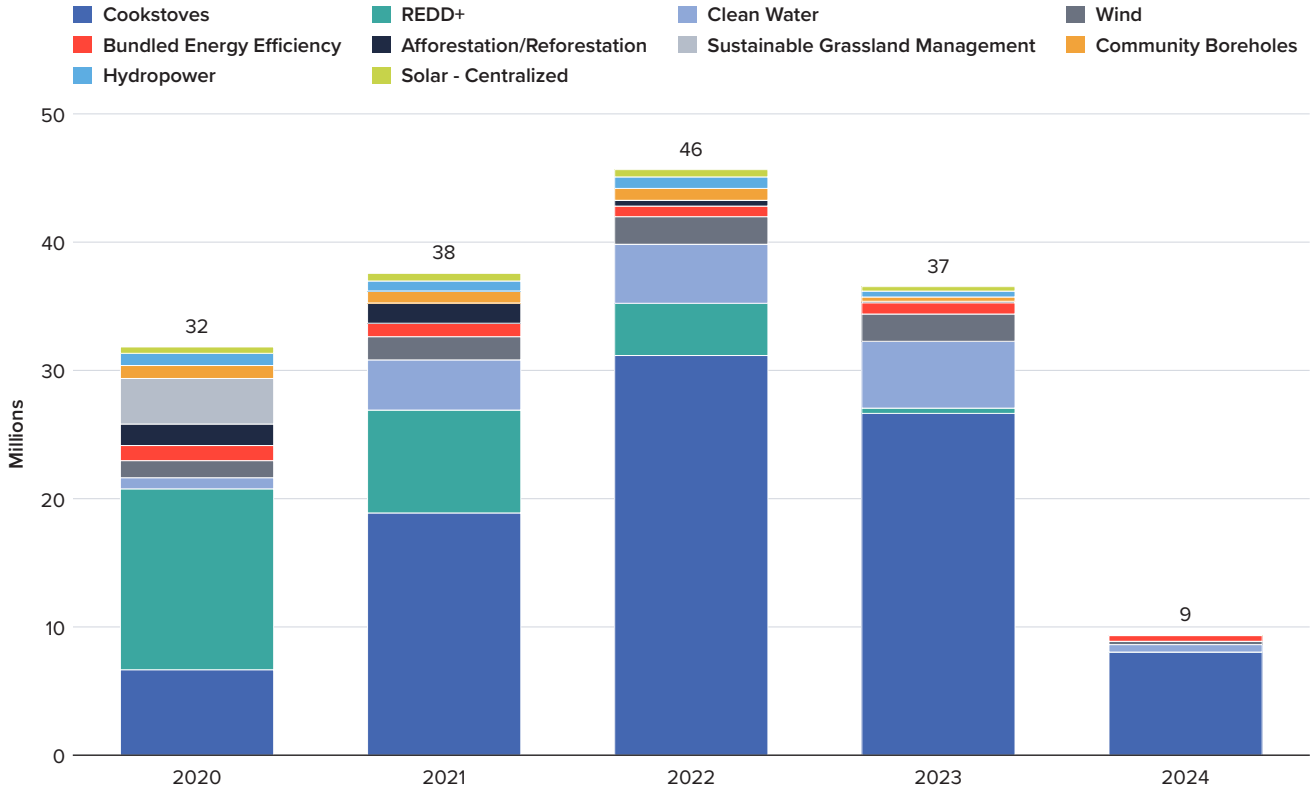
- **Project baselines**: There are general concerns over the overestimation of project baselines and the latitude given to project developers to select methodologies that maximize the number of credits issued[359,360];
- **Leakage:** Leakage from forest-related carbon projects refers to the risk that deforestation activities move away from the area that is being protected to another area. Typically, methodologies require leakage assumptions of between 10 and 70 percent; however, average reported leakage rates are closer to 4.4 percent, resulting in an overestimation of avoided deforestation[405,243];
- **Permanence:** Permanence refers to the long-term maintenance of a project's carbon benefits. In forestry projects, this requires managing the risk that stored carbon is released back into the atmosphere through fire, pests, deforestation or other disturbances. Research suggests that permanence factors are underestimated by a factor of 10.[325]

Together, these methodological risks elevate perceived non-delivery risk among buyers and insurers, increasing buffer requirements, due diligence costs and discount rates applied to credits.

Other NbS, such as sustainable land management, are also in question. There is a strong movement to include project types that focus on avoided grassland conversion through livestock grazing. This project type is likely to be crucial in the African context. For example, with regard to Verra's VM0032 (Sustainable Grasslands), applied to avoided grassland conversion for grazing, several integrity concerns have been flagged[361]:

- **Additionality and baseline:** There are concerns that the project conceptualization is fundamentally flawed, where traditional and indigenous pastoralism methods lead to ecosystem degradation and carbon losses. This ignores the sustainability of these historical practices;
- **Leakage:** There is a significant concern regarding leakage as livestock grazing often occurs outside the project boundary. The movement of livestock outside the project boundary effectively reduces the carbon storage gains. For the Northern Kenya Rangelands Carbon Project, despite the inclusion of leakage estimates, independent evaluators noted that they could not monitor outside the project boundaries or control them;
- **Monitoring:** There are methodological issues in determining grazing patterns through self-reporting maps and remotely sensed data, where the selection of algorithms and indices can result in variation in grazing detection. Furthermore, the resolution of remotely sensed data, the timeframe, the latency or the return period may affect change detection studies;
- **Environmental and social safeguards:** There may be concerns of limited engagement with communities where project implementation is being undertaken, including the failure to communicate the objectives, financial revenue streams or outcomes of the project;
- **Permanence:** The permanence of grassland restoration through reduced grazing is questionable over an extended period. Longer crediting periods ignore the complexity and multivariable drivers that could change carbon storage dynamics, including climate change and

Figure 15. Top 10 carbon credit project types in Africa.



Source: Berkeley Voluntary Registry Offset Database[193]

nomadic movements of livestock. There is often a lack of contingency mechanisms if permanence challenges do manifest.

Rapidly expanding clean technology project types, particularly clean cookstoves, have not escaped scrutiny. As with AFOLU types, scepticism has arisen with respect to over-crediting in the case of cookstoves; household usage patterns may deviate from expectations, given diverse technologies, and monitoring is a key challenge. Data collection often depends on household self-reporting or irregular device readings[362]. The main cookstove methodologies employed in Africa are Gold Standard's TPDDTEC (technologies and practices to displace decentralized thermal energy consumption) and Verra's consolidated VM0050 (Energy Efficiency and Fuel-Switch Measures in Cookstoves) methodology, which completely replaced the legacy VMR0006 standard[363]. Specific methodology concerns resulting in over-crediting under these methodologies include the following:

- **Adoption rates:** Newer technologies may require additional time for users to adapt and internalize the use of different technologies, with carbon developers overestimating technology uptake in their favour[364,365]. There have been reports of cookstoves supplied but remaining unused or used in parallel with prior (carbon-intensive) cooking methods;
- **Behaviour changes:** Sampling usage for purposes of carbon MRV does not always capture non-use or suboptimal use of cookstoves. Recipient households have been found to change their behaviour while enumerators are surveying users[329,330];
- **Fuel consumption rates:** Assertions regarding fuel consumption values and the fraction of non-renewable biomass have proven incorrect, requiring greater conservatism, use of science-based estimates and regular monitoring and adjustment to avoid inflation of carbon credits.

These historical methodological over-crediting issues are being systematically addressed, with the ICVCM releasing its first wave of CCP-approved clean cooking methodologies, including Gold Standard's TPDDTEC (V4.0) and VM0050 (Energy Efficiency and Fuel-Switch Measures in Cookstoves)[366]. Monitoring technology, such as digital meters, sensors and remote data loggers, enables real-time tracking of device use and performance[367]. These tools strengthen verification accuracy, allow for early identification of performance gaps and facilitate prompt remediation when emission reductions deviate from expected baselines. Digital monitoring and CCP-aligned methodologies are improving credibility and may support price recovery for high-integrity household energy projects[368].

These methodological issues partly explain why African credits have been cheap. Projects with minimal capital expenditure requirements tend to have lower prices. **Figure 15** above reveals the changing mix. Note that by 2024, no African REDD+ issuance was recorded. Given their community focus and substantial social co-benefits, cookstove and water, sanitation and hygiene (WASH) carbon projects have the potential to attract competitive prices and access markets under Article 6 and CORSIA, subject to meeting the applicable integrity, authorization and eligibility requirements. As integrity standards tighten, projects demonstrating measurable emission reductions, strong safeguards and transparent monitoring are increasingly positioned to command price premiums and access compliance-linked demand.

5.2.4.2. Subscale projects

Typical carbon projects in Africa are 30 percent smaller than in Asia, raising relative transaction costs for carbon buyers and investors. The median project in Africa issues approximately 38,000 credits annually, compared to 54,000 credits in Asia. This can be seen in **Figure 16** below. To compensate for a smaller scale, investors require higher carbon prices, given the typical costs of project registration and issuance. However, dominant African project types have been lower-value types requiring minimal outlay, so this would usually not be achievable, weakening developers' ability to attract carbon investment. Smaller project sizes also reduce attractiveness to institutional buyers, which typically prioritize larger volumes to justify due diligence and transaction costs.

High project risks and persistently low carbon prices have led to market concentration, where a few large developers dominate activity. Although VCM databases reveal the average African project appears to generate around 627,000 credits a year compared to 182,000 in Asia[369], this figure is skewed by a small number of exceptionally large projects. Most African initiatives remain subscale, limiting cost efficiency and competitiveness in global markets. This fragmentation constrains economies of scale, increases per-unit verification and monitoring costs, and weakens Africa's ability to supply the large, standardized credit volumes preferred in compliance markets and long-term offtake agreements[370].

5.2.4.3. Inadequate project governance

Scandals associated with project-governance constraints raise buyer hesitation, depressing the price and increasing due diligence costs and perceived reputational risk for corporate purchasers. For example, the Kariba REDD+ project in Zimbabwe garnered attention due to controversy regarding the over-issuance of credits[371]. It was also revealed that the project developer and owner claimed most of the proceeds, rather than directing them to those working to combat deforestation[372]. As a result, international buyers withdrew from the project following governance-related concerns and reputational risks[373]. This gap is related to a concentration of carbon producer market power, limited domestic policy on benefit sharing and regulatory oversight, as well as MRV capacity across most of the continent, which together weaken transparency, accountability and investor confidence.

More generally, carbon project design has not always adequately addressed the rights of and risks to host communities[374], potentially resulting in negative impacts and inequitable benefit accrual. Women and vulnerable groups may not have the appropriate agency in decision-making processes to minimize negative impacts on their land-tenure security, livelihoods, and socioeconomic and environmental systems, and exclusion from decision-making can undermine project legitimacy and long-term sustainability.

Crucially, it also fails to ensure equitable benefit sharing, resulting in calls for regulation to mandate social safeguards (free, prior and informed consent) and benefit sharing as prerequisites for high-integrity certification, buyer acceptance and sustained community support.

5.2.5. Demand

5.2.5.1. Fragmented market rules

Differences across carbon market rules can create uncertainty for African policymakers and developers. For policymakers, the VCM and Article 6 have distinct features or processes that can make managing them together more complex. For example, corresponding adjustments, where the host country un-counts the carbon reductions from its NDCs and the buying country counts the reductions toward its NDCs or for other policy purposes, are a fundamental requirement for carbon trading under Article 6.2[375]. However, independent standards bodies, such as Verra and ICVCM, argue that corresponding adjustments should be optional in the VCM[339]. Managing two sets of frameworks, procedures and processes in parallel can be challenging, especially in African countries where institutional capacity is currently inadequate to support simultaneous implementation and oversight. This dual system increases administrative complexity, raises transaction costs and could delay project approvals, reducing Africa's competitiveness in accessing high-value compliance markets.

Frequent methodology shifts and variable eligibility of climate actions across standards drive uncertainty regarding technical project feasibility for developers. For example, several Article 6.2 buyer countries are eager to purchase ITMOs from renewable energy projects[326], yet VCM standards have become increasingly restrictive in respect of renewable energy as concerns over additionality have sent prices falling[376]. Further, at the time of writing, ICVCM has not yet approved any renewable energy methodologies under the CCP. This misalignment could create investment uncertainty, as developers risk designing projects that later become ineligible for premium markets, undermining bankability and long-term revenue projections.

Further, many project developers note that international methodologies often fail to capture the realities of African contexts – particularly in baseline setting, data quality, cost assumptions and technology applicability. Where methodologies do not reflect local socio-economic and environmental conditions, projects face higher validation risks, inflated compliance costs and reduced issuance volumes, weakening the commercial viability of African carbon supply.

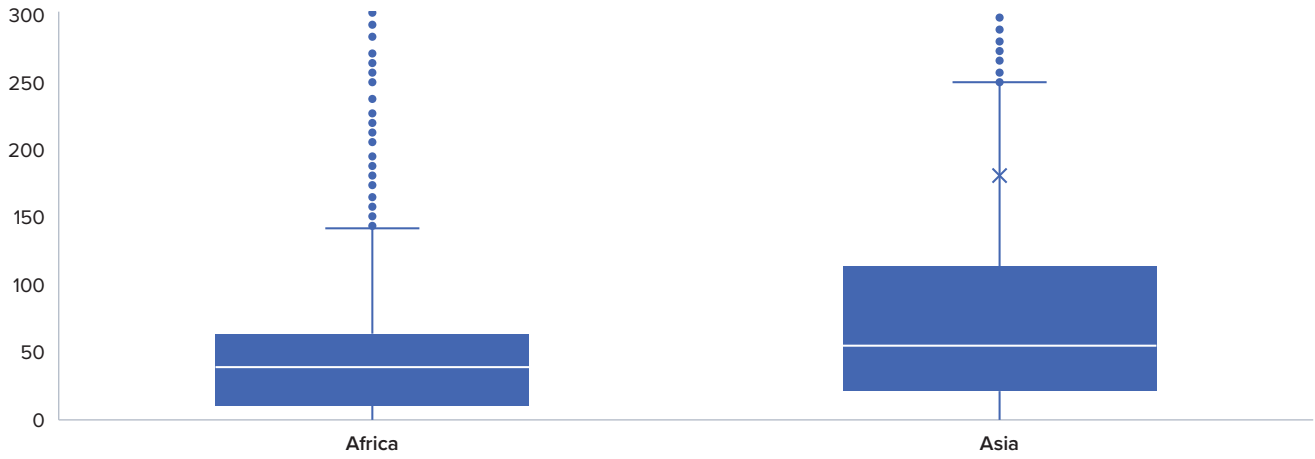
5.2.5.2. Lack of regional coordination

While several AU-led policy frameworks and regional initiatives support coordination on carbon markets, Africa lacks a fully operational, continent-wide platform to pool supply or coordinate market participation in practice. Existing efforts are uneven across regions and largely policy-oriented, limiting opportunities to aggregate supply or strengthen bargaining power through collective action. Where countries can coordinate pricing strategies or market engagement, investors may begin treating them as a unified group, which can enhance Africa's influence over market dynamics and negotiations[306]. Initiatives such as AUDA's emerging continent-wide programme, which seeks to establish shared integrity principles, a regional coordination mechanism and an Article 6 tracking platform[377], represent important steps toward addressing these gaps but remain at an early stage of implementation.

5.2.5.3. Absence of domestic demand

Minimal domestic demand for carbon credits restricts commercial know-how. Except for South Africa's offsetting allowance under its carbon tax, there are no regulatory markets for carbon credits across the continent[292]. Africa's carbon credit sales are dominated by large international buyers, with limited purchases from regional corporations[378]. According to ACMI reports, among the top 10 buyers of African credits that collectively accounted for 22 percent of retired credits in 2022[292], Nedbank stands out as the only Africa-based company in this group[292]. This lack of domestic and regional liquidity and experience makes it harder to

Figure 16. Carbon project distribution ('000 credits issued annually, VCM only).



Source: Berkeley Voluntary Registry Offset Database[193]

develop ecosystems to sustain growth and engage confidently in global carbon markets to reap the full benefits.

The table below summarizes the main findings from the market readiness assessment, vulnerability analysis, and gaps and constraints mapping, highlighting implications for opportunity development. This synthesis provides a bridge between diagnosis and forward-looking strategy.

Table 10. Summary of diagnostic findings and implications

Analytical lens	Key finding	Implication for Africa's carbon markets	Why this matters for opportunities
Market readiness assessment	Readiness is improving, with early movers operationalizing Article 6 frameworks, while others lag	Africa's participation is uneven, creating risks of concentration but also scope for replication and learning	Early-mover experiences can be scaled and adapted to unlock broader participation
Vulnerability analysis	Heavy reliance on a narrow set of project types and voluntary demand exposes Africa to integrity and demand shocks	Markets are sensitive to rule changes and buyer preferences	Diversification toward high-integrity, compliance-aligned credits becomes a strategic priority
Institutional and MRV gaps	Weak MRV systems, registries and limited local VVB capacity raise costs and deter smaller developers	Transaction costs remain high and local value capture is constrained	Digital MRV, local capacity building and shared infrastructure offer high-impact opportunities
Finance and demand constraints	Limited domestic demand and dependence on foreign buyers and ODA persist	Revenue volatility and external dependence undermine resilience	Domestic pricing instruments, blended finance and carbon-linked fiscal tools can stabilize demand
Regional coordination	Fragmented national approaches limit bargaining power and scale	Africa captures less value than its mitigation potential suggests	Regional cooperation and joint platforms can improve pricing, scale and credibility

5.3. Opportunities

5.3.1. Policy and institutions

These opportunities reflect the operational pillars of UNDP's carbon market programming in Africa: governance strengthening, institutional capacity building, financial innovation and integrity enhancement. Africa's carbon market expansion presents several policy and institutional opportunities that can unlock participation and strengthen resilience. This section identifies specific opportunities available to governments and market actors, alongside enabling actions to realize them.

5.3.1.1. Opportunity 1: Enabling high-value transactions through strengthened governance, policy and MRV

Africa has a near-term opportunity to use governance reforms, policy development and strengthened MRV systems to access compliance-market demand and higher-value transactions. Sound enabling environments provide legal clarity and strengthen investor confidence. In this regard, key aspects include common points of contention, such as land rights, project ownership, benefit-sharing mechanisms, governance over VCM versus Article 6 participation, approval processes and environmental integrity. Legislation should also create the regulatory backing for institutions, such as registries, that support carbon market readiness. Developing these frameworks through inclusive stakeholder participation can help ensure the rules are practical and widely accepted[379].

Policy guides investment by export-oriented developers towards decarbonization activities while safeguarding NDC commitments. To create policy certainty and stimulate investment, governments can publish a methodology positive list[380] that specifies which types of initiatives may qualify for Article 6 authorization and corresponding adjustments. Ideally this should be informed, where feasible, by a marginal abatement cost curve (MACC) study, ranking climate project options by cost to support effective decarbonization planning[381]. Project positive lists operationalize this insight, and signal to developers, financiers and buyer countries which activities will receive priority approvals. In short, a MACC-informed positive list helps governments achieve NDCs while raising international climate finance beyond committed targets.

Similarly, transparent and nuanced benefit-sharing mechanism regulations represent an opportunity to enhance project credibility and buyer confidence. While governments can design and direct benefit sharing in the jurisdictional programmes they sponsor, their role in private projects is to create guidelines for benefit-sharing best practices[382]. Accordingly, they should avoid rushing to introduce rigid formulae that raise costs for developers and slow the pace and scale of project deployment. This principles-based approach embeds equity and credibility while preserving flexibility and investment viability. Consultation processes, including securing FPIC, should permit communities to have input into the form of benefit. In some cases, locally prioritized in-kind benefits (e.g. jobs, roads, clinics, schools) may deliver a more desirable benefit than revenue splits, while managing transaction costs. Documenting FPIC, governance arrangements, benefit plans and delivery milestones improves transparency and provides buyers with

clear assurance that the process is well managed with equitable distribution of gains.

Strengthening institutions and regulations presents an opportunity to improve the fungibility and value of high-integrity credits, with the same unit qualifying for sale into multiple end-markets. Interoperable registries and clear authorization rules enhance developers' ability to monetize credits across markets, resulting in lower offtake risk. Broader eligibility widens the buyer pool and can support price premiums for compliance-ready credits, increasing investment attractiveness. For example, credits with corresponding adjustments qualify in both Article 6.2 and CORSIA markets, expanding viable routes to market.

Africa's investment in national MRV infrastructure creates a strategic opportunity to supply jurisdictional and compliance-eligible mitigation outcomes to high-integrity buyers. This includes national carbon registries, data-management systems and trained personnel to accurately track emission reductions and avoid double counting. Using international tracking systems allows African MRV systems to directly interface with compliance markets, reducing transaction risk and improving buyer confidence. UNDP's country-level technical assistance supports governments in operationalizing these governance reforms, translating policy clarity into authorization-ready transactions.

Robust MRV systems enable countries to access demand channels that explicitly require jurisdictional accounting and transparency, enabling high-integrity REDD+ projects. For example, the Architecture for REDD+ Transactions (ART) TREES crediting standard requires alignment with UNFCCC REDD+ MRV guidance and consistency with the national GHG inventory. These credits are eligible for Article 6 and CORSIA markets, creating high-value offtake potential. This opportunity is monetized through faster issuance cycles, reduced verification costs and eligibility for premium buyers, demonstrating potential to enable scalable supply within the voluntary and compliance markets.

Emerging digital MRV-enabled methodologies support the shift to high integrity through facilitating better quality monitoring and measurement. These methodologies use satellite monitoring, the Internet of Things and digital reporting tools to increase the level of confidence in the measurement of carbon abatement, particularly for projects with measurement challenges such as NbS and household devices (e.g. cookstoves), allowing high-resolution detection. Further, better data availability and direct integration with ICPs allow for streamlining of verification processes, now becoming more dynamic, transparent and scalable[383]. Deploying digital MRV solutions could significantly reduce development costs and accelerate issuance, thus enhancing the continent's participation in carbon markets[384]. This momentum is already under way, with leading crediting standards such as Gold Standard and Verra implementing digital MRV processes[385] that enable more transparent, automated and cost-effective verification**.**

The scalability of digital MRV creates an opportunity to attract private investment where adequate infrastructure, reliable power and robust data networks are in place[386]. Because digital MRV systems can capture sensitive data – for example, personal information from household appliances or decentralized energy – stronger privacy safeguards are also essential[348]. Therefore, authorities should adopt clear policies or guidelines specifying how data is collected, used and stored.

5.3.1.2. Opportunity 2: Making use of regional and continental institutions

Africa has a structural opportunity to use regional and continental institutions to aggregate supply, reduce transaction costs and increase bargaining power in global carbon markets. Piloting regional carbon-trading hubs linked to existing economic communities[387] could test Africa's capacity for coordinated carbon-market operations. For example, the West African Alliance on Carbon Markets and Climate Finance under the Economic Community of West African States (ECOWAS) and the Eastern and Southern Africa Regional Carbon Market Hub (supported by ACMI and the African Development Bank) are early initiatives exploring how regional cooperation can harmonize methodologies, share registries and build verification capacity across countries. These pilots provide a pathway to pool project pipelines, harmonize methodologies and share technical infrastructure such as registries, verification systems and price-discovery mechanisms. By experimenting with interoperable registry systems or metadata layers, for instance, linking national registries through the Climate Action Data Trust (CAD Trust)[388], regional pilots could demonstrate practical approaches to reducing double counting and enhancing transparency. Similarly, regional collaboration could promote the acceptance and adaptation of methodologies better suited to local conditions, strengthening market relevance. Pilot hubs provide a mechanism to identify governance models, institutional partnerships and capacity requirements needed to sustain regional cooperation before continent-wide implementation.

At the continental level, the AU and AGN shape Africa's collective stance within Article 6 negotiations and facilitate international carbon transactions. The AU's continental carbon market framework (CCMF) and the AGN's Article 6 Technical Working Group provide coordination across Member States, ensuring that Africa speaks with one voice in defining corresponding-adjustment rules, benefit-sharing norms and cross-border-transfer governance[389]. These institutions can mitigate the fragmentation that currently characterizes African participation in international carbon markets. By issuing continental guidance on authorization procedures, registry interoperability and carbon-rights recognition, the AU and AGN can enhance transparency and credibility, which are all key prerequisites for international buyer confidence. A unified continental position strengthens Africa's negotiating leverage in global forums such as COP meetings and within emerging initiatives such as the Article 6.4 Supervisory Body under the UNFCCC. Translating these governance efforts into practice requires tangible infrastructure for trading and price discovery[390]. Emerging initiatives within Africa's regional economic communities illustrate how cooperation can evolve into functional carbon-market ecosystems.

Regional cooperation enables pooled project pipelines, shared MRV infrastructure and joint price discovery mechanisms that are increasingly attractive to compliance buyers. By piloting interoperable registries and harmonized authorization processes, African regional blocs can enable

larger-volume transactions and position the continent as a credible counterpart for large-scale Article 6 cooperation in the medium term.

5.3.2. Human capital

Building a domestic carbon services industry retains a larger share of carbon value locally while reducing the time and cost associated with developing and transacting high-integrity credits. This opportunity is driven by the scale-up of Article 6 readiness, the expansion of compliance-linked demand channels and growing buyer preference for transparent, locally grounded project delivery.

5.3.2.1. Opportunity 1: Growing VVB presence to strengthen bankable supply and inclusion

Strengthening local VVB presence represents a near-term opportunity. Initiatives have demonstrated how to expand local VVB expertise, both through upskilling and demonstrating the business case to existing firms in related industries. For instance, ACMI launched an auditor training programme intended to accelerate the qualification of auditors in African VVBs, reducing the typical training period from 18 months to approximately six months[295],[298]. African countries could implement this same training model in local contexts to improve VVB presence. Increasing locally available VVB capacity can strengthen domestic pipeline, reduce project registration and issuance timelines, and improve access to smaller local firms. This highlights the potential to address skills gaps by leveraging parallel industries and creating pathways to expand existing expertise into needed carbon services. Expanding local VVB presence, therefore, represents a near-term opportunity to accelerate project issuance, reduce verification costs and make smaller and locally led projects commercially viable under both voluntary and compliance markets.

5.3.2.2. Opportunity 2: Expanding carbon skills to scale up transactional activity

Expanding carbon skills across the project life cycle creates an opportunity to anchor more of the carbon value chain within African institutions and firms. Governments and NGOs can invest in capacity-building workshops for civil servants on carbon accounting and Article 6 processes and embed climate finance curricula at universities to develop local expertise. Knowledge exchange with other developing countries and across the continent can also accelerate learning. For example, AUDA's newly launched continent-wide initiative can facilitate such learning through its continental coordinating mechanism, comprising technical experts and focal points across the 55 AU Member States, and its digital tracking platform for Article 6 Readiness[391,345]. By developing a deep pool of African technical specialists, from carbon project managers to MRV technicians, the continent can reduce its dependence on external consultants and capture a greater share of carbon value. Over time, this skills base can position African countries to move from intermediary-led project development toward locally originated, compliance-ready pipelines.

5.3.2.3. Opportunity 3: Strengthening negotiating capacity through regional approaches to capture value

Strengthening negotiators' capacity will result in greater influence in international forums, improving carbon export opportunities. Through sharing market information and aligning policy objectives, African countries can approach buyers with collective bargaining positions. Establishing unified pricing benchmarks and coordinating regionally can prevent buyers from exploiting individual projects or countries for cheaper credits[306]. This could mean forming coalitions or platforms, potentially under the AU or regional blocs. One example is AUDA's continental coordinating mechanism that brings together technical experts to promote shared priorities and strengthen Africa's voice in global carbon-market negotiations[342]. Coordinated negotiation capacity enables African countries to improve price realization, secure longer-term offtake and reduce information asymmetries in Article 6 transactions.

Continental and global convening platforms play an important role in advancing these opportunities by aligning policymakers, market actors and development partners around shared priorities and integrity expectations. Processes such as the Africa Climate Summit and dedicated forums such as the Carbon Markets Africa Summit, co-hosted by UNDP, provide spaces to translate evolving market rules into coordinated regional approaches, including MRV systems, registries and benefit-sharing frameworks. Engagement through UNFCCC negotiations at COP29 and COP30 further shapes the standards and market signals that African countries must navigate to scale high-integrity participation.

5.3.3. Financial capital

5.3.3.1. Opportunity 1: Lowering transaction barriers through strengthening bankable pipelines

Technical assistance facilities can help translate Africa's mitigation potential into bankable, investment-ready carbon project pipelines by absorbing early-stage transaction costs that local developers may struggle to finance**. Table 11** describes some of these facilities. A major initiative is the AfDB's proposed Africa Carbon Support Facility, which aims to address structural barriers by strengthening regulatory frameworks, market infrastructure and readiness among project developers[356]. The scale of its impact will depend on swift operationalization and coordination with other mechanisms. African uptake of technical assistance funding hinges on strong national institutions to absorb and deploy funds effectively with the goal of derisking and accelerating high-integrity carbon project pipelines on the continent.

Table 11. Examples of technical assistance funding related to climate finance and carbon markets

Technical assistance funding	Size/funding available	Purpose
UNDP High-Integrity Carbon Markets Initiative	No specification of available funding	Comprehensive support for African governments on[392]: • Strengthening country capacities; • Facilitating the development of policies, regulations and institutional frameworks; • Private-sector engagement through bankable project pipelines and public-private partnerships (PPPs); • Mitigation activity development through the development of project design documents, validation, verification, etc.
AfDB: Africa Carbon Support Facility	The facility is still in the design stage but is expected to be launched with a $100 million capitalization[393]	This facility aims to support national policy frameworks across African nations and build market infrastructure (e.g. registries, exchanges), enabling carbon credits to become tradable assets[394]. However, the bulk of this facility will be used to derisk and provide technical assistance for carbon project design, structuring and development[395]
AfDB: African Carbon Support Program	Grant of $1 million from Fund for African Private Sector Assistance (FAPA)[396]	Helps project developers prepare documentation necessary for accessing carbon finance. Unclear whether it will be phased out or absorbed into the new Africa Carbon Support Facility
AfDB: Africa Climate Change Fund	Initial contribution of €4.725 million from Germany. In 2017, it became a multi-donor trust fund. The fund size has grown to $38.6 million[397]	Provides small grants to governments, NGOs and regional institutions to promote climate resilience, low-carbon growth and access to climate finance
World Bank: Partnership for Market Implementation (PMI)	Capitalization target of $250 million over a 10-year programme (2021–2031)[398]	The PMI aims to provide capacity-building on carbon pricing and Article 6-aligned carbon markets in emerging-market and developing economies

5.3.3.2. Opportunity 2: Attracting investment through risk mitigation

African countries can mobilize substantial private sector finance through blended finance: the strategic use of public or concessional instruments to derisk investment and crowd in commercial capital[399]. When paired with risk-mitigation tools such as guarantees, first-loss tranches or political risk insurance, blended finance can lower perceived risks for investors and accelerate funding for carbon-project development, particularly in early-stage or high-impact sectors. In practice, this means using grants, concessional loans or insurance from development finance institutions to improve a project's risk-return profile. Through consultation with key intermediaries and financiers, ACMI developed concepts for five innovative mechanisms to address barriers faced by project developers and investors, described below. Regional alliances or capacity-building initiatives should build on this progress by engaging DFIs and multilateral financial institutions on the potential implementation of the five proposed mechanisms outlined in **Table 12**. Together, these instruments create an opportunity to crowd in private capital at scale by shifting carbon projects from grant-dependence towards commercially financed delivery models.

Table 12. Derisking mechanism options (adapted from 'ACMI Status and Outlook Report 2024–2025')

Derisking mechanism	Description	Challenges addressed
Emissions-linked bonds	A bond facilitating investment into carbon credit projects, often with risk-reducing principal protections	• Helps investors hedge risk; • Can reduce risk premiums to lower financing costs.
Government-backed development platform	A financing platform working with governments to identify endorsed projects and then finance them through to operation	• Provides financing through to operation; • Government backing reduces risk.
Advance market commitment at a platform level	Commitments helping channel carbon financing to projects through buyers; commitments to a platform of carbon projects	• Can crowd in low-cost financing; • Facilitates offtake agreements.
Derisking lending from local banks to projects	Concessional capital is used to derisk local bank lending in support of carbon credit projects	• Helps banks reduce the risk of their investments; • Can reduce risk premiums charged by banks.
Political risk insurance	Clarifies political support and regulatory frameworks that can reduce investment risk and increase project developers' confidence in public backing	• Can crowd in low-cost financing; • Reduced political risk can lower risk premiums.

Source: Adapted from ACMI (2025)

5.3.4. Supply

Africa has an opportunity to reposition its carbon supply towards higher-integrity credit types with stronger demand, higher prices and greater resilience to market tightening, drawing on mitigation pathways the continent can produce at scale:

- **High-integrity, high-quality carbon removal credits**: from NbS and engineered sources, suitable for all markets;
- **High-integrity emission-reduction credits**: from clean technology, green industrialization and landfill gas capture, suitable for export into Article 6 and CORSIA markets;
- **Carbon avoidance credits**: from avoided deforestation and livestock methane avoidance. High-integrity types such as CCP-approved cookstove credits are suited to export to international markets, while others can be used for domestic or regional purposes (e.g. carbon tax systems) if they meet the additionality and safeguard standards set by credible standards bodies.

5.3.4.1. Opportunity 1: Scaling up high-integrity carbon project types

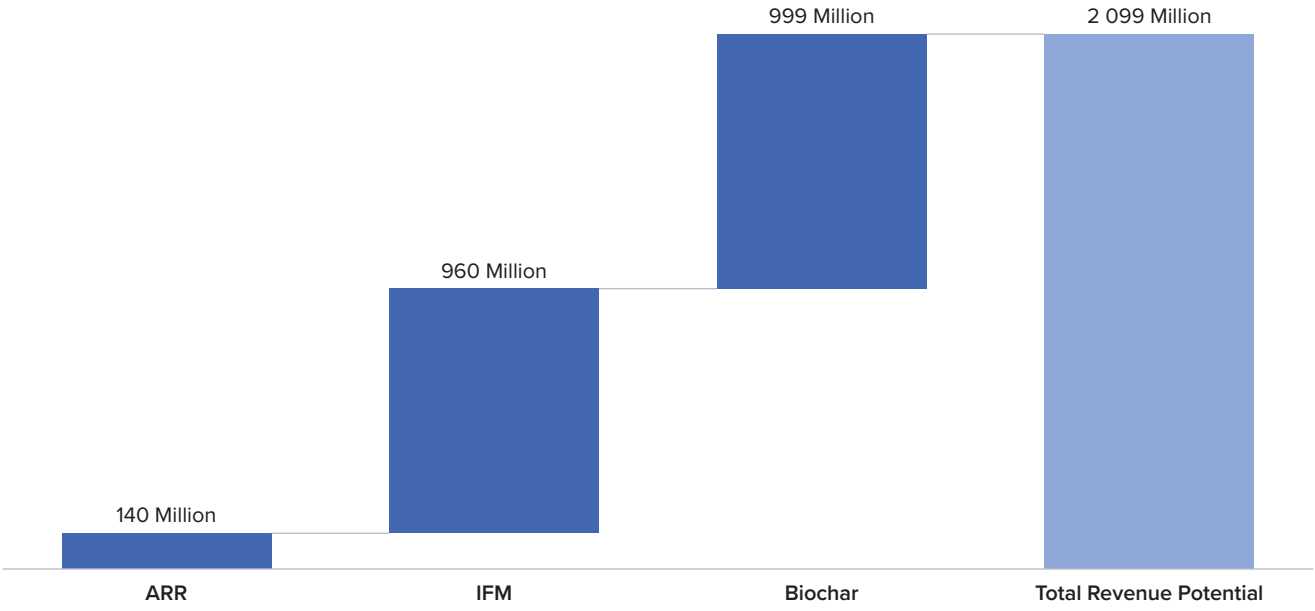
Africa has immense untapped carbon potential. In 2023, ACMI estimated that Africa could increase supply to 2,400 $MtCO_2e$ across a broad range of project types, including forestry and land use, agriculture, blue carbon, renewable energy, household devices, livestock, waste management and engineered carbon dioxide removals, among others[400].

Scaling up high-integrity carbon project types can deliver substantial value. ARR, IFM and biochar were selected as illustrative portfolio opportunities based on three criteria: (i) alignment with emerging high-integrity demand, particularly for removal-based or nature-based solutions; (ii) relevance to Africa's land-use, biomass and forestry endowments; and (iii) feasibility under current or near-term carbon market methodologies. The estimates presented below are indicative, order-of-magnitude approximations intended to illustrate relative scale rather than precise forecasts. They are based on conservative assumptions regarding uptake rates, additionality and sequestration potential, combined with prevailing VCM price ranges for high-integrity credit types. This report estimated the value of these opportunities for Africa using VCM pricing data:

- Biochar offers substantial potential given its ability to command more than $\$170/tCO_2e$ as a permanent carbon-removal credit type[401]. If 20 percent of the continent's annual 418 million tons of biomass eligible for biofuel[402] were utilized by only 10 percent of producers, Africa could produce 2.5 million tons of biochar every year, generating up to 5.6 million carbon credits annually. Kenya hosts the first African biochar project, registered in June 2025, suggesting this is a medium- to long-term opportunity[403];
- IFM represents another significant opportunity: while Africa's forests hold the potential to avoid 1 gigaton of CO_2 emissions annually[404], evidence suggests only around 6 percent of such interventions achieve additionality[405], translating into 60 million tons of carbon credits;
- ARR can also contribute meaningfully: with 700 million hectares of degraded land[406] and 130 million hectares already committed for restoration by 33 African countries[407], dedicating only one percent of this area to ARR at conservative sequestration rates would yield 5.85 million credits annually.

Taken together, as shown in **Figure 17**, these three pathways could deliver approximately $2.1 billion in annual revenue potential from high-integrity carbon projects in Africa. Actual realizable revenues would depend on project-level feasibility, policy and regulatory conditions, integrity requirements and market demand dynamics[365,408,409,410,411,412,413,414,415].

Figure 17. Estimated annual revenue potential from high-integrity carbon projects in Africa ($).



Source: Adapted from Uzoagba et al.; International Energy Agency Bioenergy; Sustainable Manufacturing and Environmental Pollution Programme; Chinese Academy of Sciences; Nature Conservancy; University of Cambridge; AFR100; World Wildlife Fund; Bernal et al.

Beyond the VCM, African countries can scale up higher-integrity carbon credit types aligned to compliance market rules. The UNFCCC's Article 6.4 Supervisory Body approved the first methodology under Article 6.4 in October 2025 for methane emissions from landfill sites, marking an important milestone in operationalizing the Paris Agreement's carbon market framework and setting the stage for broader compliance-aligned participation. The core requirements are:

- Demonstrate additionality;
- Ensure permanence of emission reductions/removals;
- Prevent or account for leakage (shifting of emissions elsewhere);
- Use robust MRV systems;
- Align with the host country NDC;
- Contribute towards sustainable development, incorporating environmental and social safeguards.

While this suite of requirements favours credits generated through clean technology projects, AFOLU credits remain eligible under more stringent requirements. Project preparation facilities such as The Nature Conservancy's Africa Forest Carbon Catalyst can provide technical support and advice to strengthen project design and make pipelines investment-ready, aligning early-stage forestry projects to high-integrity methodologies during the design phase.

5.3.4.2. Opportunity 2: Switching to high-integrity methodologies

Selecting a methodology approved by the ICVCM's CCP or the forthcoming Article 6.4 framework signals high integrity. Over the past decade, the lines have blurred between the perceived environmental integrity of methodologies developed by ICPs – Gold Standard and VCS – and the UNFCCC CDM, many of which the ICPs certify against. However, the ICVCM's launch of the CCP and subsequent approval of selected methodologies – many of which apply to African carbon landscapes – have ushered in a new era, redefining the rules of the game. To qualify for CCP labelling, methodologies must be:

- Real (additional, measurable, permanent);
- Verified (through independent, accredited auditing);
- Transparent (public data and tracking);
- Safe from double counting; and
- Socially and environmentally responsible.

REDD+ and clean cookstoves are among the project types that now have CCP-approved methodologies. Within forestry, there are several approved REDD+ methodologies[416]. This reinstates the potential of REDD+ to deliver quality carbon credits, although some integrity concerns remain[90]. For cookstoves, there are currently four CCP-approved methodologies, including three from Gold Standard[417] and one from the VCS (VM0050 Energy Efficiency and Fuel-Switch Measures in Cookstoves, v 1.0). Other eligible project types include household biodigesters, biochar and landfill gas project types, providing diverse opportunities. These developments hold significant potential to upgrade future African carbon credit production.

5.3.4.3. Opportunity 3: Adopting quality labels

Pursuing certification with quality labels signalling co-benefits can result in a price premium. For example, AFOLU projects can apply for Verra's Climate, Community and Biodiversity (CCB) certification, signalling that the carbon project delivered verified, measurable benefits to communities and ecosystems. High-integrity buyers, such as corporate and institutional purchasers adhering to the ICVCM's CCPs, typically prioritize projects with such co-benefits[418]. These companies are willing to invest more per ton to ensure their offset purchases are credible, resilient and resonate positively with customers and regulators. Some reports suggest that credits with co-benefit certifications like CCB have been selling for nearly double the price of equivalent standard credits[419].

5.3.5. Demand

5.3.5.1. Opportunity 1: Scaling high-integrity credits for compliance markets

Today, of the $50 billion in climate finance flows that Africa receives[420], less than one percent comes from carbon finance. Unlocking Article 6 potential could lift that share to 10–20 percent of current climate finance flows. Ecosystem Marketplace reports that the VCM market transaction value in Africa amounted to approximately $55 million in 2024[215]. This report estimates that flows from the sale of Article 6 ITMOs by 2030 could increase carbon finance flows by 100 to 200 times relative to current levels, based on scenario calculations conducted for this analysis and consistent with projections in the existing literature[421]. This creates a time-bound opportunity for African countries to prioritize authorization-ready, compliance-aligned supply capable of securing premium prices and longer-term offtake.

Compliance markets – Article 6 and CORSIA – provide African project developers an opportunity to capture a higher carbon credit price. Article 6 supports the potential for higher-value transactions tied to national climate commitments, while CORSIA reflects sector-specific demand from the global aviation sector, required to offset emissions growth above 85 percent of 2019 levels using eligible credits[422]. Through CORSIA, the strong demand from the aviation sector anticipates higher credit prices, ranging from $27 to $91 per credit during the latter stages of Phase 2 (2033–2035)[423]. Together, these pathways create the opportunity to scale high-quality carbon projects across the continent, provided that these projects can navigate the rigorous methodologies, governance requirements and monitoring standards necessary to qualify.

Forecasts show that these regulated markets could drive total demand for 700 million ITMOs by 2030[424]. If Africa were to maintain the 25 percent share of VCM retirements it held in 2024, this suggests a potential of about 175 million ITMOs. At indicative Article 6 prices of $30/$tCO_2$e to $60/$tCO_2$e, Africa could achieve between $5.25 billion and $10.5 billion in climate flows. This calculation is illustrative: it assumes that Africa can achieve a comparable share of compliance demand and that the price range applies across

those sales. It does not represent confirmed purchases or a forecast of secured revenues.

The market success of African credits under compliance pathways will depend on policy choices and buyer participation. For example, under Article 6, the EU's current prohibition on using international offsets for its NDC means immediate demand for African ITMOs may be limited to a few progressive countries (such as Sweden). The slow maturing of the market highlights how short-term demand for credits may be muted. However, the longer-term potential is much greater, particularly given the EU's agreement to allow limited international credits towards its 2040 goals[425].

5.3.5.2. Opportunity 2: Reaching premium carbon buyers

Strong global appetite for high-quality credits creates an opportunity for Africa to grow its presence as a premium producer. Credits with Sylvera ratings of A and AA comprise approximately 10 percent of retired carbon credits. Of these high-quality credits, about 15 percent of credits are procured from Africa-based projects[426]. By increasing its share of high-quality retirements to its VCM share of about 21 percent, Africa could generate approximately one million additional credit sales and attract an additional $21 million in revenue, subject to the underlying market and pricing assumptions.

Certain VCM buyers are willing to pay a premium for high-quality credits, particularly where there is high strategic alignment**. Table 13** below profiles these premium buyers and outlines their carbon-credit procurement approaches.

- **Philanthropic climate funds and impact-first buyers** are mission-driven funds, NGOs or coalitions that prioritize social equity, community benefits and climate justice. The LEAF Coalition (backed by governments and companies) provides a minimum of $10/ton for high-quality REDD+ forest credits – double the prevailing forest credit price at launch[427,428]. Such buyers willingly pay a premium to ensure projects deliver robust co-benefits (such as biodiversity conservation or local livelihoods). They often procure credits via forward contracts or results-based finance agreements. For instance, LEAF uses advance purchase agreements at floor prices to guarantee revenue for tropical forest nations, and philanthropic-backed facilities like the World Bank's carbon funds have paid above-market rates to reward emissions reductions in least-developed countries[429]. These buyers typically work directly with project developers or through specialized platforms (e.g. Emergent, which intermediates LEAF purchases) to source high-integrity credits;
- **Corporate sustainability leaders with aggressive climate targets or public-facing brands** often choose to pay more for carbon credits that are verifiably high quality and aligned with their values to strengthen their brand reputation and meet stakeholder expectations. According to a 2023 Boston Consulting Group survey, companies are indeed 'willing to pay significantly more for carbon credits that have a demonstrable impact' on emissions and co-benefits[430]. Tech firms like Microsoft, Shopify and Stripe have paid premium prices for removals and community-based projects[431,432]. These corporates usually procure credits through requests for proposal or partnerships, inviting project developers or technology providers to sign multi-year purchase agreements for credits from high-quality credit projects. This hands-on procurement (rather than anonymous spot-market buying) allows them to select projects with strong SDG co-benefits, certifications (e.g. Gold Standard, Verra CCB) and community impact. **Table 13** below provides more details on a select group of premium payers.

Table 13. Premium payers in the VCM

Name of organization	Procurement methodology	Focus
LEAF Coalition (public-private tropical forest fund)[393]	Enters forward-purchase agreements with forest country programmes via specialized platforms (e.g. Emergent). It guarantees a floor price (at least $10/ton for REDD+ credits) through results-based contracts, ensuring projects have upfront revenue. Rather than buying cheap offsets on open markets, LEAF works directly with governments and developers to source high-integrity credits.	High social and environmental integrity is paramount. LEAF pays a premium (its $10 floor is almost double typical forest credit prices) to support robust co-benefits like biodiversity conservation and Indigenous livelihoods. Credible verification (ART-TREES standard) and climate justice outcomes are key, even if it means paying above market rates.
Microsoft (tech giant with carbon-negative pledge)	Uses requests for proposal (RFPs) and direct partnerships to secure multi-year offset deals. For example, Microsoft's 2020 carbon removal RFP drew 189 project proposals and led to purchases from 15 suppliers (around 1.3 $MtCO_2e$)[433]. It often signs long-term contracts (10+ year offtake agreements) for nature-based projects (e.g. reforestation) and invests early in carbon removal technology start-ups, rather than one-off spot market buys[434].	Prioritizes high-quality, innovative credits that align with its values and science-based targets. Microsoft is willing to pay more for quality – e.g. buying nature-based credits around $20 to $30+ per ton and even funding innovative direct air capture removals at $600 to $1,000+ per ton. It seeks verified permanence and co-benefits, often favouring credits with reputable certifications (e.g. Gold Standard), despite their higher prices.

Name of organization	Procurement methodology	Focus
Shopify (e-commerce firm with Sustainability Fund)[435]	Procures credits through a direct investment approach. Via its Sustainability Fund, Shopify issues a call for proposals and partners directly with carbon-removal project developers. It frequently provides advance-purchase agreements or upfront funding to nascent projects (including those 'in the lab') and participates in coalitions such as Frontier (an advance market commitment) to secure future high-quality removals. This proactive strategy lets Shopify lock in credits from innovative start-ups before they hit the open market[400].	Quality and innovation first. Shopify's strategy is to pay a premium for high-quality carbon removal as a 'demand signal' to help novel solutions scale. It deliberately funds projects with permanent CO_2 removal and strong climate impact, even if prices are hundreds or thousands of dollars per ton. By investing early (often as a first buyer), Shopify ensures its credits are credible, additional and drive technology development – aligning with its climate-forward brand image. Co-benefits are valued, but the integrity and future potential of the removal method are paramount.
Stripe (payment company via Stripe Climate)[436]	Adopts a venture-capital-like procurement model. Stripe launched a negative emissions commitment to spend at least $1 million per year and solicited proposals worldwide – pledging to buy carbon removals 'at any price' needed to foster new climate technologies. Through its Stripe Climate programme, it selects early-stage carbon removal projects (direct air capture, enhanced weathering, bio-oil sequestration, etc.) and signs purchase agreements (often pre-paying for future tons). Stripe also co-founded Frontier to pool corporate funds for forward contracts on nascent removal tech.	Maximizing climate impact and permanence is the core goal. Stripe explicitly avoids cheap, low-quality offsets and instead pays top dollar for innovation – in 2020, it paid up to $775 to $800 per ton for novel removal projects, versus $10 for standard offsets[437]. Key criteria include real, verifiable CO_2 removal, scalability and long-term storage of carbon. Stripe is driven less by immediate co-benefits; it is willing to overpay now to stimulate technologies that could achieve gigaton-scale impact later. Ensuring additionality and scientific credibility is essential, even if it means an extremely high price per credit.

5.3.5.3. Opportunity 3: Generating domestic demand through carbon pricing mechanisms

Domestic compliance mechanisms represent an opportunity to create stable, policy-driven demand for African carbon credits while reducing exposure to volatile international markets. Regional economic communities can develop the harmonized systems needed to enable the trading of carbon credits across borders. As countries pilot domestic compliance mechanisms, regional blocs can function as coordination platforms to align key technical and regulatory elements, such as MRV protocols, registry interoperability[438] and offset-eligibility criteria, to ensure that national markets can eventually connect. Regional platforms provide a low-risk pathway to generate predictable demand, test price signals and build liquidity ahead of deeper market integration.

The potential anchors of regional carbon offset demand are four large emitters: South Africa, Nigeria, Algeria and Egypt[439]. Although these countries are Africa's largest emitters, their emissions base is still too small to support a liquid ETS. Accordingly, a carbon tax, as used in South Africa, is a better fit; it is also less complex and costly to administer. Given these dynamics, a phased approach is suggested to establish and grow domestic compliance markets on the continent:

- First, the few large emitting nations can establish a carbon tax with an offset regime, outlining the basics: clear legal authority, robust MRV, a functioning registry and clear price pathways;
- Second, these nations can unlock access to high-integrity imported credits from surrounding African nations to deepen liquidity and set a regional bar for quality. A key development that would take place at this stage is the piloting and creation of harmonized systems;
- Third, medium-sized economies, such as that of Kenya, can pilot simplified compliance mechanisms in high-emitting sectors, such as cement or power generation. As a basic example, a high-emitting sector could be required to offset 10 percent of its emissions using credits. Such pilots could also include triggers that define when to scale or sunset.

This phased approach builds credibility where capacity is highest, creates an immediate market for eligible credits across borders and gives low-emitting nations a low-risk on-ramp to a potential continental compliance system. While this pathway is suggested as an overall strategy for the continent, the initial development of domestic compliance mechanisms will depend on in-country realities in the large-emitting nations. The further expansion of domestic compliance markets across the continent will also depend on how well harmonized systems, such as in MRV, can be developed.

Collective technical platforms, such as regional digital MRV systems or linked registries, can enhance market confidence and efficiency. This can be achieved through shared data governance, certification and reporting. Pooling resources at the regional level would enable countries to avoid duplicating IT infrastructure and auditing systems, as the EU ETS Union Registry does by centralizing registry functions across Member States. Early pilots could help identify governance models and capacity needs before scaling to fully operational regional or continental systems. In parallel, regional blocs can explore alignment between carbon-pricing strategies and broader macroeconomic frameworks, including customs unions, fiscal coordination and trade protocols to assess how price signals and regulatory consistency might encourage private-sector participation. By gradually testing and refining these harmonized systems, regional communities could lay the groundwork for deeper integration of Africa's compliance and carbon-market infrastructure, enabling future cross-border credit transfers and greater alignment with international Article 6 mechanisms.

6. Strategy roadmap



Photo by: UNDP

OVERVIEW

This strategy roadmap translates insights from Africa's carbon market vulnerabilities, readiness gaps and emerging opportunities into recommendations comprising a coherent set of sequenced, implementable actions.

It emphasizes **the need to establish a robust policy and legal foundation first**. Clear climate policy signals, explicit integration of carbon markets into NDCs and a dual-track approach to voluntary and compliance markets are foundational to investor confidence and market access. Without this backbone, African countries remain exposed to regulatory uncertainty, double-counting risks and weak negotiating positions in Article 6 transactions. The roadmap positions these reforms not as administrative exercises, but as strategic enablers that determine whether African credits can command premium prices and long-term offtake.

Achieving **sound governance and institutions, and data integrity, emerges as the second critical pillar**. The analysis demonstrates that uneven administrative capacity and opaque systems are key sources of vulnerability, particularly as markets shift toward higher-integrity thresholds. In response, the roadmap prioritizes the creation of lean but authoritative national carbon offices, interoperable registry infrastructure and MRV systems aligned with the ICVCM's Core Carbon Principles. These measures directly address risks identified in the vulnerability assessment, including delays, credibility erosion and exclusion from compliance markets. They also create the institutional conditions necessary for regional cooperation and future market integration.

Third, the importance of an effective carbon supply strategy is recognized as central to developing resilience through diversification and alignment to new standards. This emphasizes the strategic selection and scaling of project types and methodologies that are aligned with emerging demand under Article 6, CORSIA and high-integrity voluntary markets. Evidence from the opportunities analysis suggests that Africa can generate billions of dollars annually from high-integrity removal and emissions reduction pathways, including biochar, ARR, IFM, methane abatement and jurisdictional NbS approaches. However, realizing this value depends on early alignment with approved methodologies, robust baselines and safeguards that withstand tightening market rules.

Fourth, the roadmap identifies the government as a market shaper in a rapidly evolving landscape. It highlights the importance of preparing standardized Article 6.2 transaction templates, monitoring evolving buyer preferences and engaging premium demand segments that value integrity, permanence and co-benefits. This responds directly to risks identified in the vulnerability analysis around buyer concentration, information asymmetries and geopolitical uncertainty. By strengthening negotiation capacity and regional information sharing, African countries can improve price realization and reduce exposure to opportunistic contracting.

Finally, the roadmap addresses the finance architecture required to achieve scale. It acknowledges that early-stage project development remains constrained by high transaction costs, limited local capital and delivery risk. In response, it outlines a layered approach combining technical assistance, blended finance, guarantees, insurance and demand backstops. These instruments are not presented as abstract solutions, but as concrete mechanisms already tested in climate finance and increasingly applicable to carbon markets. Together, they enable African countries to shift from grant-dependence toward commercially financed, investment-ready pipelines that retain a greater share of value domestically.

6.1. Introduction

Global and regional market shifts are reshaping incentives, creating a rapidly evolving environment in which African countries must navigate risks while strengthening their market participation. Rising demand for high-integrity carbon credits presents a significant opportunity to mobilize climate finance, strengthen economic and climate resilience, and advance long-term development priorities. As climate ambition increases, policy frameworks mature and investor interest grows, the continent is better positioned than ever to translate its climate mitigation potential into tangible economic gains. Although carbon finance has historically accounted for less than one percent of Africa's annual $50 billion climate finance inflows[420,440], changing market dynamics suggest this contribution could grow to 10–20 percent[441], depending on market demand, country readiness and project viability. Carbon finance could therefore provide an additional source of funding that complements official development assistance and other climate-finance flows. African countries have an opportunity to overcome inefficiencies associated with earlier carbon market mechanisms and establish modern, digitally enabled carbon market systems grounded in environmental integrity from the outset.

From an international trade perspective, growth opportunities are driven by the expansion of Article 6 markets under the Paris Agreement. Collectively, Article 6.2 buyer commitments and the CORSIA scheme could generate demand for an estimated 700 $MtCO_2e$ in exported credits[424], with Article 6 cooperation estimated to reduce the cost of meeting NDCs by up to $250 billion annually by 2030[442]. Africa is well positioned to supply a substantial share of this demand, given its rich natural capital, diverse mitigation potential and emerging policy reforms. Forecasts indicate that African retirements could increase more than eightfold, from 37 $MtCO_2e$ in 2024[38] to around 300 $MtCO_2e$ by 2030. This upward trajectory is reinforced by Africa's early leadership in operationalizing Article 6.2 transactions[443], anchored by Ghana, and the growing appetite for high-integrity African credits in both compliance and voluntary markets. Africa currently accounts for one third of bilateral Article 6.2 cooperation agreements and more than 20 percent of voluntary market issuances, reflecting its rising prominence as a carbon credit producer. Importantly, emerging demand channels are increasingly shaped by compliance-aligned frameworks, including Article 6 cooperation, CORSIA eligibility requirements and high-integrity voluntary market standards, which reward credits that demonstrate robust accounting integrity, permanence safeguards and alignment with host-country NDCs.

However, realizing this potential requires navigating several material risks. Carbon markets remain fragmented, with rule systems still evolving. Geopolitical shifts influence buyer commitments, host country readiness is uneven and nature-based projects face additional safeguards-related challenges linked to permanence, leakage and social impact. These risks, if unaddressed, could hinder Africa's ability to secure long-term benefits from carbon markets. In addition, tightening integrity standards, evolving buyer preferences toward high-durability removals, and increased scrutiny of social and environmental safeguards are reshaping demand conditions and raising the threshold for market participation[444]. Foresight, resilience and coordinated action will therefore be essential to realizing the continent's full potential.

This strategy roadmap responds to that need. It outlines a clear set of policy objectives and strategic actions designed to strengthen resilience, widen opportunity and guide African countries toward high-integrity, high-impact participation. It proposes milestones, coordination structures and governance mechanisms for implementation, and introduces the core actions presented in the form of a country playbook required to achieve desired outcomes. The roadmap also emphasizes positioning African supply to access premium market segments and compliance-aligned demand by strengthening integrity systems, improving transaction readiness and reducing risk for private investors.

The roadmap builds on the evidence assembled across accompanying analyses. The market readiness assessment identifies baseline capabilities through deep dives into five priority markets: Ghana and Kenya as early movers with operational Article 6 frameworks; South Africa and Egypt as countries advancing strong domestic market structures; and the Democratic Republic of the Congo (DRC) with immense mitigation potential but significant governance and institutional constraints. Across the continent, supply remains heavily concentrated in a limited set of project types, exposing African markets to integrity-driven rule changes and demand volatility. The vulnerability analysis highlights additional risks: delays in scaling Article 6, tightening voluntary market rules, and uneven administrative capacity that could challenge Africa's competitiveness. It shows wide variation in resilience across countries, with Kenya demonstrating the highest adaptive capacity, Ghana the lowest exposure, and the DRC elevated exposure and vulnerability. Meanwhile, the gaps and opportunity mapping provides a forward-looking view of what must change. It emphasizes the need to strengthen policy and MRV systems, expand African technical expertise, reduce dependency on foreign intermediaries, and mobilize blended finance. It also stresses the need to leverage opportunities in high-integrity project types, digital MRV and premium demand linked to Article 6, CORSIA and removals. It further highlights the growing importance of private-sector participation, risk-sharing instruments and scalable project aggregation models to enable bankable carbon supply.

Taken together, the insights from all these analyses indicate the importance of a dynamic, coordinated strategic roadmap. By integrating the readiness assessment, vulnerability assessment and opportunity pathways, this roadmap will equip African policymakers with the tools needed to deepen participation in carbon markets, negotiate equitable outcomes and mobilize climate finance that advances both national development priorities and continental resilience. In doing so, it positions carbon markets not only as an environmental instrument, but as a strategic economic opportunity capable of strengthening fiscal resilience, attracting investment and supporting inclusive green growth across the continent.

6.2. UNDP's vision and objectives for carbon markets in Africa

UNDP's vision for carbon markets in Africa is to mobilize high-integrity carbon finance as a driver of sustainable development, climate resilience and economic transformation. This vision recognizes that developing countries will require trillions of dollars in climate finance by 2030, and that carbon markets, particularly under Article 6 of the Paris Agreement, can contribute to mobilizing this finance[445,446].

UNDP's approach positions carbon markets not merely as trading platforms, but as structured development instruments capable of generating fiscal revenues, catalysing private investment and delivering measurable social and environmental co-benefits. The vision emphasizes building country readiness for Article 6 and voluntary markets, strengthening governance systems, embedding transparency and environmental integrity, and ensuring that carbon markets generate tangible benefits aligned with the SDGs. UNDP works with governments to establish the institutional, technical and financial foundations required for Africa to participate effectively and equitably in global carbon markets, while attracting investment at scale and expanding opportunities for communities, youth, women and Indigenous groups.

This vision is implemented through UNDP's carbon market service lines and facilities, including the Carbon Payments for Development Facility. Its support includes strengthening national institutions, developing high-integrity, investment-ready project pipelines, mobilizing finance and supporting countries' participation as trusted market partners[413]. UNDP's support spans the full transaction lifecycle: diagnostic assessments, technical awareness and market design, strategy and Article 6 framework development, project design and implementation, negotiation of agreements with private entities, issuance of letters of authorization, and reporting. This structured approach ensures that countries produce high-integrity credits and connect them with high-quality buyers, while maintaining development benefits domestically.

In Africa, UNDP is already supporting multiple governments to operationalize this vision. Ghana is engaging in Article 6 transactions with Switzerland, Sweden and Singapore; Kenya hosted a large-scale carbon market auction; Zambia has strengthened its eligibility and approval processes under Article 6; and Rwanda has launched a Carbon Market Framework to advance climate action[413],[414]. These examples illustrate how institutional readiness, clear authorization processes and strategic partnerships translate vision into transaction-ready supply.

The UNDP vision is reinforced through Africa's engagement in continental and global policy platforms that shape the future architecture of carbon markets. Processes such as the Africa Climate Summit, UNFCCC negotiations at COP29 and COP30, and dedicated market forums such as the Carbon Markets Africa Summit provide important spaces for articulating African priorities, advancing shared positions on integrity and Article 6 implementation, and aligning technical discussions with development objectives. UNDP supports African countries' participation in these platforms by translating evolving global norms into practical, country-relevant strategies and implementation pathways.

The AU vision articulated through initiatives such as the Africa Action Plan on Carbon Markets (AAPCM) provides a complementary continental mandate for collaboration, harmonized governance and collective bargaining power. The AU positions carbon crediting potential as a strategic continental asset supporting NDC delivery and Agenda 2063, while UNDP provides the technical, institutional and implementation support required to operationalize this vision at the country level. At the heart of the Action Plan is a set of objectives to strengthen governance frameworks, build capacity for effective engagement, ensure transparency and integrity in carbon trading, and optimize returns for African countries by embedding social and environmental co-benefits[447]. The AU's vision-driven objectives are[413]:

- Strengthen governance and authorization frameworks for Article 6 participation;
- Build institutional and technical capacity to produce high-integrity credits;
- Enhance transparency, MRV robustness and registry interoperability;
- Optimize fiscal returns and price realization for African countries;
- Embed social and environmental safeguards to ensure equitable benefit sharing;
- Mobilize partnerships with private sector actors, financial institutions and sovereign buyers to scale climate finance inflows.

Through this integrated approach, UNDP seeks to position African countries not only as participants in global carbon markets but as credible and strategic counterparts capable of shaping market norms, securing favourable transaction terms and converting mitigation potential into sustainable development outcomes.

In parallel, the AU plays a critical political and coordination role in shaping African countries' collective engagement in carbon markets. Through initiatives such as the AAPCM and continental coordination platforms, the AU provides a framework for regional alignment, shared negotiating positions and harmonized governance approaches. UNDP's technical and institutional support is designed to operate within and reinforce this continental architecture, ensuring that country-level readiness and transaction support contribute to a coherent African position in global carbon-market negotiations and implementation.

6.3. The purpose of this roadmap

The roadmap translates UNDP's strategic vision for high-integrity carbon markets into sequenced, time-bound implementation actions. This roadmap is intended to provide a guide to African policymakers navigating the opportunities, risks and uncertainties of carbon markets, with implementation adapted to national circumstances and readiness. Historically, Africa participated to an extremely limited extent in multilateral carbon financing mechanisms, which resulted in forgoing a fair share of the $300 billion of investment mobilized by CDM projects under the Kyoto Protocol[448]. Now on the cusp of an even larger global opportunity and committing to playing a part in global climate mitigation through NDCs, Africa must secure its position as a leading high-quality carbon producer. This requires building

on existing participation through coordinated market positioning, strengthened institutional readiness and strategic engagement with emerging compliance markets and demand for high-integrity credits.

The roadmap rests on these pillars:

- **Policy and legal foundation:** Establishing a policy and legal foundation aligned with national climate and development priorities and relevant international and domestic carbon-market opportunities;
- **Governance, institutions and data integrity:** Enabling the scaling up of carbon transactions through sound governance, institutions and data integrity;
- **Project pipeline:** Building a bankable pipeline that delivers development benefits and realizes domestic mitigation potential, taking account of evolving buyer preferences. This includes supporting high-integrity credit types that meet target-market requirements and can attract long-term offtake arrangements;
- **Market strategy:** Developing market entry strategy across voluntary and compliance markets to access multiple demand channels. A diversified market strategy can strengthen resilience by reducing dependence on any single source of demand;
- **Finance architecture:** Mobilizing appropriate finance and reducing project-development risks to attract private capital, support local developers and strengthen domestic value retention; and
- **Risk management:** Managing carbon supply risks, including permanence and leakage, while strengthening environmental and social safeguards. This includes meaningful participation, respect for land and resource rights, compliance with applicable consent requirements, gender-responsive benefit sharing and accessible grievance mechanisms.

6.3.1. Policy and legal foundation

6.3.1.1. Provide a clear climate policy with a designated role for carbon financing

Through clear and coherent climate policy, African countries can enhance investor confidence and attract low-carbon investment, strengthening carbon markets and trade competitiveness. Predictable policy frameworks reduce regulatory risk, improve access to green finance and position African exports as compliant with emerging global carbon standards.

Participation in carbon markets must be firmly grounded in states' NDC commitments, with strategies aligned to national climate goals and supported by strong national carbon market frameworks[449,450]. In this regard, the NDCs must be up to date and explicitly incorporate carbon markets as a tool to achieve targets. Currently, 77 percent of parties to the Paris Agreement have communicated that they plan to use at least one of the scopes of voluntary cooperation under Article 6 in implementing their NDCs[451]. Going one step further, by identifying climate project priorities in the NDC, governments can guide investment decisions and bilateral negotiations that align with national goals. Notably, establishing structured national MRV systems within the relevant institutions is the foundation for ensuring NDC alignment and integrity. Such systems should be tailored to national contexts – reflecting each country's emissions profile, sector priorities and long-term development goals. Critically, countries must address double counting in their carbon market regulations by declaring how exported credits (ITMOs under Article 6) will be adjusted against the NDCs[413]. A clear accounting policy builds confidence that carbon credits from the host country possess environmental integrity, which in turn attracts investment.

Policy statements should affirm that carbon finance is a recognized component of climate funding. This could include articulating how revenues or investments from carbon credits will support national climate programmes, which will provide clear market signals. The goal is to integrate carbon markets into the development agenda rather than treating them as unrelated foreign transactions. The integration of climate and development objectives is based on the strong increase in climate-related development finance[452].

6.3.1.2. Declare dual-track carbon market policy

African governments should adopt a dual-track carbon market policy to enable participation in distinct market opportunities across compliance markets and the VCM. This approach enhances resilience by diversifying demand channels and positioning countries to capture premium pricing opportunities as compliance markets scale. A cabinet-level policy should be issued stating that the country will:

- Authorize mitigation activities for transfers under Article 6.2 (and Article 6.4 when operational) and for CORSIA, applying corresponding adjustments as required;
- Enable participation in the voluntary market strictly under integrity rules aligned with the ICVCM and the VCMI to ensure environmental credibility and maintain access to high-integrity buyer segments.

Pursuing a dual-track carbon market approach is based on the current fragmentation in demand and operationality of the two markets. Currently, most demand for carbon credits lies in the VCM, as the Article 6 market is still in the initial stages. There is a degree of uncertainty on the timing and scale of transactions concluded under Article 6.2 bilateral cooperative agreements, and Article 6.4 is not yet operational. Thus, following an Article 6-only approach brings much uncertainty. Additionally, once Article 6.4 is operational, it is expected that it will heavily influence the VCM[453]. So, following a VCM-only approach will neglect the related impact of Article 6. This highlights the growing complexity and convergence across voluntary and compliance systems, which need to be addressed through greater interoperability and consideration of both markets[454]. A dual-track policy therefore provides strategic flexibility, allowing governments to respond to evolving market rules, buyer preferences and integrity benchmarks. Kenya, for example, considers participation both in the VCM and under Article 6 in its Climate Change (Carbon Markets) Regulations of 2024[455].

To inform carbon credit export (i.e. ITMO) decisions, countries can develop a MACC. This helps identify cost-effective mitigation needed for domestic targets and assess the opportunity costs of international transfers. The most affordable emission reductions should be counted towards

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the NDC, with only non-authorized units (e.g. VCM or Article 6.4 mitigation contribution units) sold from these low-cost reductions. Once the government is confident that the NDC targets can be met, it can 'whitelist' methodologies for more expensive carbon abatement options, for international compliance transactions. This sequencing helps prevent overselling of mitigation outcomes while safeguarding national climate commitments.

Key factors that may guide legislating and operationalizing the transfer of authorized credits[414]:

- Create positive and/or negative lists to determine which sectors and activities can generate authorized credits;
- Consider how to price authorized credits. For example, countries can develop opportunity-cost pricing approaches to ensure revenues exceed the cost of applying corresponding adjustments and any additional mitigation needed to meet host country NDCs;
- Mitigate overselling by authorizing only a portion of verified units and retaining a buffer for domestic NDC needs, applying corresponding adjustments solely to the authorized share. Retaining a strategic buffer can also protect against future policy tightening or upward revisions in national mitigation requirements.

6.3.1.3. Establish regulatory frameworks compatible with Article 6 requirements

In the period 2024–2025, the infrastructure and guidance for Article 6 reached a new level of maturity, providing host countries with enough certainty to codify procedures. Key UNFCCC interim tools are in place, such as functional requirements for the CARP with reporting templates and the Article 6 database[456], specifications for the International Registry[457] and user guidance for the interim Article 6.4 mechanism registry[458]. Meanwhile, decisions from COP and the Supervisory Body during this period clarified essential standards and supervisory procedures for Article 6.4 (which introduced the Paris Agreement Crediting Mechanism [PACM])[459]. This gives host countries sufficient certainty to formalize and codify their own implementation procedures. The UNFCCC's implementation materials, outlined before, now serve as reference points for national systems.

When creating an Article 6 framework, national regulations should create clarity on how projects are authorized, tracked and accounted for**.** This section makes explicit the key elements to be considered in operationalizing Article 6. Regulations should:

- Define *ex-ante* or *ex-post* authorization triggers, i.e. outlining triggers for authorizing the transfer of ITMOs at the project approval stage (*ex ante*) and after credits exist and are verified (*ex post*);
- Set criteria for when corresponding adjustments apply, and clarify circumstances for corresponding adjustment exemptions (e.g. purely domestic voluntary credits);
- Provide revocation and reversal rules, for instances of fraud or forest fires, for example, empowering authorities to cancel credits to maintain integrity.

The Article 6.2 reference manual for accounting, reporting and review of cooperative approaches and CARP documentation includes templates and functional requirements that can be transposed into national law[460,461].

6.3.1.4. Set benefit-sharing and community protection standards

Embedding community safeguards in law builds legitimacy and supports positive social outcomes. To safeguard the interests of local communities, the following mechanisms should be instituted: FPIC, stakeholder engagement, social safeguards and grievance mechanisms[414]. This reduces the risk of exploitative project development or transaction activity. UNDP's safeguards frameworks and guidance on rights-based, inclusive development can support governments in operationalizing these protections within carbon market policies and project approval processes[462,463].

Similarly, mechanisms should be developed to guide fair benefit sharing with project participants. These may take the form of norms and standards to serve as guidelines, recognizing that regulating fixed shares may render several projects infeasible. The establishment of benefit-sharing national policies or regulations should be informed by international best practice and follow a rigorous domestic consultation process, with considered stakeholder communication to avoid deterring investment.

These measures align with the ICVCM's CCP dimension of Sustainable Impact[464], and help buyers meet due diligence expectations, while ensuring social license. They create clarity for market participants from project inception, informing planning and costing.

6.3.1.5. Clarify tax and foreign exchange treatment of carbon revenues

Governments should provide predictable tax and foreign exchange (FX) frameworks for carbon finance. This means clarifying VAT or withholding rules, ensuring international carbon revenues are treated consistently as export income, and guaranteeing FX convertibility so investors can repatriate earnings without delay. Stable fiscal treatment lowers project risk and reduces the cost of capital, while still allowing governments to capture value through transparent, moderate taxes or levies. This exercise may involve clarifying the legal nature of carbon credits, i.e. whether they are considered commodities or securities under national regulation. South Africa is currently undertaking this exercise.

Engaging private-sector expertise, such as financial institutions, project developers and professional service firms, can help design these frameworks to reflect real market dynamics and international best practice. Their input can improve tax efficiency, streamline revenue flows and ensure that fiscal measures attract rather than deter investment. Over time, consistent policy signals in taxation and currency management can anchor investor trust, attract long-term finance and position carbon markets as credible components of national economic and trade strategies.

6.3.1.6. Consider introducing a domestic carbon-pricing system

Beyond clarifying the fiscal treatment of carbon revenues, **governments may consider introducing a domestic carbon pricing system as a complementary policy tool to**

support mitigation, competitiveness and carbon market resilience. Carbon-pricing systems are especially relevant for emission-intensive economies, including Egypt, Algeria, Nigeria and the continent's largest emitter, South Africa, which has Africa's most established carbon-pricing system[465].

Carbon pricing can also mobilize public revenue and, where offsetting components are allowed, support domestic carbon project development, reinforcing the institutional foundations needed for participation in international carbon markets. As noted by the World Bank, global carbon pricing generated over $100 billion in 2024[466]. While national taxes are seldom earmarked for specific purposes, tax receipts can contribute towards the establishment of institutions required for international carbon trading, such as those under Article 6.

Under the carbon border adjustment mechanism (CBAM), exporters to the EU from affected sectors (cement, steel, aluminium, fertilizers, electricity and hydrogen) will face carbon border taxes based on the carbon footprint of their products. From 2026, EU importers must buy CBAM certificates priced at the weekly average auction price of EU Emissions Trading System (EU ETS) allowances, €78/tCO_2e to €80/tCO_2e at the time of writing[467]. Crucially, only a carbon price effectively paid in the exporting country (via a carbon tax or ETS) can be deducted.

Carbon tax systems build resilience through generating predictable demand, which stimulates the development of local carbon market expertise. This sheltering from international volatility can provide a springboard for local carbon developers to build a base from which they can scale and become internationally competitive over time.

Prerequisites for success include:

- Institutional basics: reliable emissions data, legal authority, enforcement capacity;
- A solid economic foundation: functioning tax systems, limited fossil fuel subsidies;
- An enabling political environment: public support, complementary clean energy policies; and
- Just transition plans to mitigate impacts on vulnerable communities.

Over time, African countries can link to each other to create a regional ETS, enabling smaller economies to benefit from regional integration.

6.3.2. Governance, institutions and data integrity

6.3.2.1. Create a lean national carbon office

Governments should establish or designate a coordinating institution, such as a national carbon office (NCO) to serve as a one-stop 'single window' responsible for the day-to-day activities around Article 6 engagement and voluntary mechanisms. This institution would function as the single national counterparty for approving and authorizing ITMOs under Article 6.2, making corresponding adjustment decisions and issuing letters of approval or no-objection for voluntary carbon projects. By concentrating these responsibilities in one body, the NCO can ensure consistency and efficiency in how the country engages with carbon markets. The NCO should work through and alongside existing environmental agencies, drawing on their mandates and expertise, while focusing solely on carbon market functions.

The NCO should be lean but empowered, for example, composed of a technical secretariat (to oversee MRV standards and methodologies) and a legal unit (to review emission reduction purchase agreements and ITMO transfer agreements against a national template). This approach mirrors successful models elsewhere: Ghana's Carbon Market Office, for instance, centrally oversees all Article 6.2 bilateral agreements, the national carbon registry, and even voluntary market activities, acting as the regulatory hub within Ghana's EPA[468]. Governments should also explore ways to self-finance the NCO to ensure the sustainability of this institution. Modest authorization or registry fees, a share of transaction levies or dedicated budget lines may provide potential pathways through which the NCO can be self-financed. It is essential that self-financing mechanisms avoid imposing onerous fees on project developers, as this would discourage participation and weaken market activity.

6.3.2.2. Build a registry architecture that prevents double counting

A robust national carbon registry system is essential infrastructure for market integrity. It underpins environmental credibility, enables participation in high-value compliance markets and builds investor confidence by ensuring transparent accounting of mitigation outcomes. At a minimum, the registry stack should include the following features:

- **National registry core:** A secure database that issues unique serial numbers for every carbon credit and tracks each credit's full life cycle, from issuance to retirement. Uniquely identifying each credit enables full traceability and helps ensure the same ton of reduction is not counted twice[469]. The registry should also record metadata on host country authorizations (e.g. tagging credits that receive a corresponding adjustment) so that anyone can distinguish between units that are counted towards the host's NDC and those authorized for transfer. Clear tagging and life-cycle tracking are essential for avoiding double claiming and maintaining trust with compliance buyers. UNDP has experience working with countries to develop registries through the HICMI that align with the most recent standards, with examples of registries in Namibia and Sri Lanka;
- **Interoperability:** The national registry should enable secure information exchange with the Article 6 international registry and relevant voluntary-market registries. Interoperability also implies establishing an application programming interface (API) service to enable seamless exchange of information between different registry systems. In practice, a modern registry should be built with a RESTful API that allows secure integration with other systems[435]. Interoperability reduces transaction friction, enables real-time reconciliation across systems and ensures that credits are transparently tracked across voluntary and compliance markets. This ensures that when a credit is issued or used, all relevant registries (national, international, voluntary) can update accordingly, thereby preventing double counting across markets;

- **Audit trail and provenance:** Every credit entry should carry an immutable record of its origin and status changes. This includes a log of which project generated it, all transfers between accounts, any authorizations granted by the host, and benefit-sharing tags at the batch or credit level (indicating, for example, if a share of proceeds is allocated to local communities or a national climate fund). A transparent audit trail builds trust by allowing auditors and buyers to verify the 'provenance' of credits. Embedding benefit-sharing and authorization metadata enhances transparency and supports social integrity safeguards. For example, Ghana's national registry requires that all activities seeking authorized credits be registered and tracked in the system, capturing their authorization status and transfers in line with Article 6 requirements[435].

Notably, countries may use the international registry once it is fully operational, rather than creating their own registry[435]. However, governments can benefit from establishing national registries, as these can then be used for VCM credits as well. Maintaining a national layer allows countries to retain data sovereignty, support domestic policy objectives and integrate carbon market data with broader climate planning systems.

6.3.2.3. Ensure MRV guidance aligns with CCPs

National MRV standards should meet the evolving global benchmark for high-quality credits. To this end, the NCO (or relevant authority) should publish national MRV guidance that explicitly references the ICVCM's CCP Assessment Framework (version 1.1, January 2024[470]). Consideration should be given to conservative baselines, dynamic benchmarks and sufficient buffer contributions. This should be sector specific, consistent with evolving CCP expectations for pooled buffers' permanence across programme lifetimes. For example, it should include long monitoring and compensation periods for nature-based credits[428]. By embedding these principles, the country's MRV framework will provide a clear 'line of sight' from project-level rules to internationally recognized quality criteria. Overall, updating MRV guidance to mirror CCP guidance is a forward-looking move that future-proofs the carbon market framework against rising integrity standards.

MRV improvements can also take place through the adoption of digital MRV. Using satellite monitoring, the Internet of Things and digital reporting tools reduces the need for manual MRV, streamlining the verification of projects[384]. This enhances the real-time capabilities of MRV systems, allowing for the improved detection of low-quality credits. Deploying digital MRV solutions could reduce development costs and help the continent leapfrog into carbon market participation[471].

6.3.2.4. Scale up the local presence of validation and verification bodies

African countries need to create a stronger local presence of VVBs, considering their centrality to carbon-project development and issuance over project life cycles**.** Scarcity of such specialist resources results in a weaker pipeline (through late-stage engagement during design), ongoing issuance delays, potentially lower quality audits (given lack of knowledge of local language, regulation and social norms), and higher travel costs. This is especially critical for small-scale, community-based projects that often lack the resources to engage international VVB services or face delays in securing their services.

To address this bottleneck, governments can adopt a phased approach combining regulatory reform, institutional coordination and targeted capacity-building:

- **Create regulations** that outline the criteria that VVBs need to meet to be registered and designate the VVB registration process. Egypt, for example, set out five eligibility criteria for Egyptian VVBs and three criteria for international VVBs to be registered in the country, and designated the FRA as the institution to administer the registration process[421]. Designating a lead authority facilitates oversight of VVB registration and compliance. This could be tasked to the NCO, for example;
- **Recognize existing international VVBs already accredited under leading standards**, like Verra and Gold Standard. Like Egypt, governments can introduce regulations or criteria that international VVBs need to meet to operate in the country. By officially accepting the credentials of international VVBs that meet these criteria, a country can immediately draw on global best practice in project validation and verification, while saving time on building its own system. This method can also be used to build local capacity. For example, one of the eligibility criteria for international VVBs in Egypt is that the VVB must include at least one Egyptian expert in the VVB's team;
- **Create upskilling programmes** and highlight the business opportunity to existing auditing firms. These programmes should include technical training, accreditation pathways and business development support to help firms transition into carbon market services. For example, ACMI developed a programme for verifiers that streamlined the process of training VVBs and further pitched the VVB business opportunity to auditors in parallel industries[472].

6.3.2.5. Provide transparency into registry data and benefit sharing

Transparency is the foundation that supports the above governance measures and strengthens market trust. The NCO and registry should provide comprehensive public information on key aspects of carbon credit transactions. This reduces the due-diligence burden on buyers and meets the growing disclosure expectations set by initiatives like ICVCM and VCMI[414]. This should include openly sharing host-country authorizations and corresponding adjustments, benefit-sharing arrangements and revenue distribution, and VVB reports and project performance data. Providing open access registry data, augmented by regular reporting on key transaction information, builds credibility[414].

6.3.2.6. Coordinate cross-border data-system pilots through regional bodies

Regional collaboration mechanisms could be explored through targeted pilots to evaluate their feasibility and benefits before broader implementation. For example, piloting a pan-African registry interface or API linkage between a few national systems could help assess the technical and governance requirements for data interoperability. These pilots would provide practical insight into whether shared digital infrastructure can reduce transaction costs, improve transparency and enhance Africa's collective market position, without committing to full continental integration prematurely.

6.3.3. Project pipeline

6.3.3.1. Map key pipeline methodologies against carbon standards

African countries should form a strategic view of the carbon market through mapping the eligibility of their project pipelines to market rules, given the choice of methodologies and other key characteristics. This includes VCM credits tagged as eligible for Article 6 markets, high-integrity removal credits (e.g. CCP-approved NbS or engineered removal credits) and credits with other attributes rendering them valuable to buyer segments outside the VCM (e.g. emitters covered by the Republic of Korea's Emissions Trading System). These credits have more resilient demand outlooks, supporting bankability and value.

6.3.3.2. Prioritize strategic project types and methodologies

African countries should promote project types and methodologies with high strategic value and resilience.

Strategic value refers to alignment with policy objectives with respect to national sustainable development and international finance mobilization. This covers projects with strong community or biodiversity co-benefits or those generating high-value credits. This will differ from country to country, based both on domestic policy objectives and needs for international funding. The ICVCM officially recognizes this imperative in its CCPs, highlighting that carbon projects should directly deliver sustainability co-benefits[430]. Additionally, under Article 6.2, ITMOs may include mitigation co-benefits resulting from adaptation actions and/or economic diversification[473]. This means prioritizing high-integrity projects that embed livelihood enhancements, gender equality and other social or environmental co-benefits into their design[474]. Relevant project types include clean cookstoves, agroforestry and blue carbon. Prioritizing such high-impact project types can advance national development agendas alongside climate goals. Therefore, pipeline-building should focus on just transition goals.

Establishing clear and transparent methodology baselines for each project type is equally critical to ensure environmental integrity, comparability and credibility across markets. Strong baselines define the conditions under which emissions reductions or removals are measured, preventing overcrediting and ensuring that credited outcomes reflect real and additional climate benefits. Clear baselines also facilitate consistent verification, support interoperability between standards, and strengthen investor confidence in the long-term value of generated credits. By developing context-specific yet internationally aligned baselines, countries can safeguard integrity while enabling fair market access for local project developers.

Resilience incorporates integrity attributes, which serve as safeguards as carbon standards become more stringent and fungibility across markets evolves. High-integrity carbon credits have been approved under rigorous frameworks such as the ICVCM's CCPs, ICAO's CORSIA programme or the forthcoming UN Article 6.4 mechanism, with more stringent criteria building buyer confidence[475]. Policymakers are already encouraged to adopt these standards – several countries are considering officially incorporating the ICVCM's labelling approach into their policies[440]. By channelling development toward internationally recognized methods, a country ensures its carbon credits are regarded as credible and premium in the market.

Governments can introduce incentives to promote the development of preferred credit types. For example, they can provide tax breaks or grant funding for projects that use CCP-approved methodologies or CORSIA-eligible project types. This rewards developers for pursuing robust methodologies and helps populate the pipeline with credits that are more likely to retain long-term value. Streamlined approval processes for top-tier projects can also accelerate implementation. The result is a more valuable and resilient national portfolio of credits, where the country's credits will be well positioned to command higher prices and face fewer risks of being excluded. Additionally, governments can introduce integrity labelling to foster adherence to safeguards, particularly considering Africa's comparative advantage in forestry, where safeguards are critical.

6.3.3.3. Scale up for green growth

At scale, carbon projects can support the achievement of green growth objectives. This is particularly the case where industry-wide approaches are taken, such as in China, where carbon finance can support a large-scale transition to clean technologies. The same approach can be applied to rural economies. If a country has large standing forests, consider moving from fragmented project-by-project REDD+ to jurisdictional REDD+ programmes (at the national or state/provincial level). A jurisdictional approach substantially reduces the issues of leakage and permanence that affect isolated projects, aligning with more stringent compliance market requirements[476]. By monitoring deforestation and degradation across an entire region, any would-be leakage (i.e. deforestation shifting outside a project's boundaries) is still detected and accounted for[441]. Equally, permanence is strengthened by pooling risk – e.g. a robust jurisdictional programme can include buffer reserves and government oversight to address reversals (such as a future spike in deforestation) in a coordinated way[441]. In short, scaling up to the jurisdiction level unifies accounting and risk management for land-use emissions, enhancing the environmental integrity of the credits produced.

Under Article 6.2 cooperative approaches, countries can agree on large-scale jurisdictional approaches, avoiding typical limitations[477]. Structuring deals around jurisdictional approaches can simplify MRV. Instead of hundreds of small projects, a single sectoral programme can generate credits based on outperforming an agreed baseline for the whole sector. This yields economies of scale (one larger MRV system, rather than many small ones) and reduces transaction costs per ton. Crucially, it also 'locks in' corresponding adjustment accounting, since any credits transferred come directly from the national emissions budget, instead of the government having to track and authorize credits per project. By moving to large-scale programmes, countries can increase credibility (through uniform standards and data) while generating bigger volumes of credits to attract buyers.

The private sector can aggregate small projects and partner with governments to reach larger offtakers and compliance markets, both critical for scaling.

First, carbon developers or carbon platforms can use programmatic approaches to bundle smaller activities so community- and SME-scale actions can reach market more easily and efficiently. Independent crediting standards allow for this route to market, which delivers economies of scale and lowers transaction barriers; in addition, it is explicitly a feature under Article 6.4-style approaches.

Second, the private sector is responsible for driving the investment, technology innovation and delivery of the mitigation projects that generate ITMOs. While government is an enabler, the private sector is a doer, positioning it as a strategic partner of host-country governments. Specifically, developers must work with host-country authorities to secure authorization so outcomes can be transferred internationally as ITMOs.

6.3.4. Market strategy

6.3.4.1. Prepare for Article 6.2 transactions

Countries should focus on developing standard government-to-government mitigation outcome purchase agreement (MOPA) templates for Article 6.2 transactions. These templates define the terms for transferring authorized mitigation outcomes between countries and help ensure transparency, legal certainty and consistency with the Paris Agreement rulebook. They should clearly specify authorization procedures, corresponding adjustment responsibilities, risk allocation, dispute resolution mechanisms, and provisions addressing potential revocation or non-delivery risks. Where appropriate, additional reference materials such as mitigation activity implementation notes can also be used to ensure clarity and consistency in documenting cooperative arrangements and implementation procedures. Establishing such standardized templates will streamline bilateral negotiations, reduce transaction costs, and build confidence among participating governments and private investors. Standardization also improves bankability by providing predictable contractual structures familiar to lenders and institutional buyers.

In addition to procedural clarity, strengthening fiscal integrity is essential for building a credible Article 6.2 participation framework. Governments should adopt predictable carbon-pricing guidance, including indicative price floors for ITMO exports and minimum reference prices for voluntary market transactions. Transparent pricing frameworks help prevent undervaluation of mitigation outcomes and strengthen negotiating positions in bilateral transactions. This reduces revenue volatility and allows expected inflows to be integrated into medium-term expenditure frameworks. To maximize developmental impact, carbon revenues should flow through on-budget mechanisms with clear tagging to SDG-linked programmes, such as job creation, public health, adaptation infrastructure, and community development, ensuring traceable and transparent use of proceeds. Public disclosure of revenue allocation and periodic reporting strengthens domestic accountability and reinforces international buyer confidence. Such fiscal governance measures are critical for investor confidence, domestic accountability and long-term market stability.

6.3.4.2. Foster a high-quality supply in the VCM

Governments need to incentivize project developers to scale removal project types in the VCM, in addition to prioritizing the supply of high-integrity credits as outlined above. Ecosystem Marketplace reports that buyers in the VCM increasingly favour carbon removal credits[478]. Governments need to determine which removal projects have the most potential in their countries. For example, countries with large forests that have primarily relied on REDD+ (avoidance) credits in the past can consider forestry-based carbon removal project types, such as ARR. Keeping abreast of further developments in the VCM is key to the country's strategy. For example, a survey by IETA found that non-adjusted Article 6.4 credits and correspondingly adjusted 6.2 ITMOs are expected to command premium prices compared to the same credits issued in the existing VCM[479]. If these circumstances materialize, governments need to position their frameworks to selectively authorize credits and actively market Paris-aligned units to capture premium demand.

6.3.4.3. Monitor market developments to achieve competitive terms

In opaque markets with high heterogeneity, like carbon markets, the existence of imperfect information makes it difficult for sellers to reliably determine the value of their credits. This is due to the absence of reference prices to inform the development of forward curves, which would otherwise enable fair transacting. There is a risk of asymmetric information benefiting the small number of large buyers, with their market power and reach enabling offtake from multiple jurisdictions. This could be manifested in low prices as producers are placed under competitive pressure.

African countries should keenly monitor market developments to ensure the best terms, whilst striving for a win-win outcome. This could include building knowledge through networking and market databases, using expert carbon advisors to price credits, and using analytical platforms such as UNDP's partnership with Sylvera, which provides governments with access to project benchmarking,

price transparency, and trend analysis to support evidence-based decision-making. Strengthening negotiation capacity and fostering regional information sharing will further ensure that African countries achieve fair value for their carbon credits in international markets.

6.3.5. Finance architecture

6.3.5.1. Sources of funding

Africa should reduce its dependence on external donor funding by building a more self-sustaining climate finance architecture. While the continent received approximately $47 billion in ODA in the period 2021–2022, only around 33 percent of these commitments were climate related[480], underscoring both the scale of reliance on concessional finance and its limitations in meeting Africa's climate investment needs. This can be achieved by anchoring financing within domestic systems that mobilize resources from carbon revenues, blended finance and green bonds. Channelling a portion of carbon market proceeds into national climate funds can provide predictable revenue streams, while blended finance instruments can attract private capital for mitigation and adaptation projects, as noted above. Similarly, governments can consider issuing bonds in which returns and/or principal are redeemed through the transfer of ITMOs, to reduce foreign debt obligations. Together, these mechanisms strengthen financial sovereignty, reduce reliance on unpredictable donor flows and position African economies to drive their own low-carbon development agendas.

This cannot succeed without scaled-up participation by private capital. While developmental finance is required to address market failures such as gaps in demand and other systemic risks, private capital sources bring the project finance required to implement projects, financial-structuring skills to address project-specific risks and create risk-return profiles aligned to investor expectations and the intermediation mechanisms required to match capital supply with project demand. These include carbon funds, aggregators, banks, insurers and platforms that reduce transaction costs and pool risk (for example through diversified portfolios).

The financial instruments described below can be developed in partnership with African insurers, multilateral finance institutions and carbon exchanges. UNDP's role in convening development finance institutions, supporting regulatory reform and facilitating early transactions provides the institutional foundation required to execute this roadmap.

6.3.5.2. Developmental finance for growth and derisking

Developmental finance is needed to strengthen the project pipeline, reduce demand uncertainty and unlock investment for high-integrity projects.

First, domestic project developers often need technical assistance for early-stage project preparation. Many emerging-market projects fail to reach 'bankable' status due to underfunded preparation stages and limited local capacity[481]. Targeted project preparation facilities (PPFs) or technical assistance grants can help local developers conduct feasibility studies, impact assessments and structure projects so they meet investor criteria[482]. These can be provided through regional programmes, for example, the African Development Bank's Carbon Support Facility, or dedicated national facilities, growing the domestic developer base and thus retaining a greater share of proceeds for domestic benefit.

Second, a demand guarantee is needed to stimulate the development of high-integrity projects that align with SDGs, particularly for countries or strategically important project types that currently cannot access Article 6 markets or domestic compliance demand. The absence of certainty regarding offtake stunts the ability to secure project finance, even for large projects. Relevant examples include:

- **Price floors via put options (auctioned backstops),** for example, the World Bank's Pilot Auction Facility (now closed), which guaranteed a minimum price;
- **Government buy-back guarantees (domestic schemes),** for example, the UK's Woodland Carbon Guarantee;
- **AMCs/committed offtake,** for example, Frontier guarantees future volumes of demand for engineered carbon removal via multi-year offtake agreements;
- **Jurisdictional offtakes with minimum prices:** The LEAF Coalition aggregates buyers for jurisdictional REDD+ and has functionally set a minimum (floor) price signal for credits, anchoring demand for forest-country programmes.

Consider establishing a guarantee or first-loss facility to encourage local lending for high-integrity projects that are more difficult to bank, for example, NbS. Under a first-loss structure, public or concessional capital covers the initial layer of risk on loans, giving commercial lenders greater confidence to finance projects with forward-offtake agreements (such as pre-contracted carbon credit purchases). This type of risk-sharing mechanism is increasingly standard in blended climate finance – derisking tools such as junior equity tranches or guarantees have proven highly effective at mobilizing private capital by improving the risk-return profile for investors[483]. For example, International Finance Corporation's (IFC) Catalytic First-Loss Guarantee Facility provides first-loss coverage to incentivize banks to lend to underserved sectors (including climate-related projects), thereby demonstrating the commercial viability of these investments[484]. By capping downside risk (a 'capped' first loss), such facilities reduce the cost of capital more efficiently than broad subsidies, and can mobilize private financing for domestic climate projects otherwise perceived as too risky[447].

6.3.5.3. Carbon insurance

Countries can negotiate with carbon insurers to provide non-delivery insurance to local developers. By insuring forward offtake agreements, developers can guarantee buyers (or investors) that if the project underproduces or fails to issue the expected credits, the insurer will compensate for the shortfall. This significantly improves the bankability of forward sales agreements and can help developers attract upfront project finance or equity investment. Non-delivery is a top concern for credit buyers, and the nascent carbon

insurance sector is responding with products to cover this contingency[485]. Transferring delivery risk to a specialized insurer not only gives investors greater confidence but also 'releases' more capital for projects[486]. By catalysing such solutions, policymakers can derisk domestic carbon projects and accelerate their development.

6.3.6. Risk management

6.3.6.1. Monitoring market rules

International market rules influence both supply and demand, requiring effective navigation by governments and the private sector.

From a supply-side perspective, market rules can significantly affect host countries' production potential, with respect to both volume (e.g. the ability to issue credits within crediting programmes) and pricing (i.e. demand strength). Countries that are more reliant on at-risk project types, for example, REDD+ (Article 6.4) and renewable energy (VCM), should ensure representation in technical working groups and other forums developing rules and standards. Specifically, countries should carefully monitor multilateral processes determining the eligibility of strategically important credit types in compliance systems (for example, Article 6.4), considering this is where growth will come from.

On the demand side, anticipated rule changes could generate substantial additional opportunities over the next decade. Within Article 6 markets, the critical development to monitor is the EU's position on the use of international offsets to meet NDC commitments, particularly the EU's implementation of limited international credit use from 2036. Within the VCM, the evolving guidelines from the Science Based Targets initiative and the ISO standard on carbon neutrality (ISO 14068-1) will determine to what extent corporates pursuing decarbonization strategies should be allowed to use offsets to meet their climate goals, and which credit types may be used.

6.3.6.2. Strategic buyer relationships

The international climate policy landscape is changing as the governments of certain major emitters reconsider or abandon prior commitments under multilateral agreements, creating uncertainty regarding the future of Article 6 carbon markets. Second-round impacts may be observed in the VCM following the scaling back of corporate climate commitments within affected jurisdictions.

Within the VCM, demand is influenced by market sentiment, which can result in price volatility and the risk of stranded assets where credits are perceived to be of low quality.

African countries should foster relationships with large institutional and bilateral buyers with durable climate commitments, transparent procurement frameworks and aligned strategic interests to build resilient market partnerships.

6.3.6.3. Carbon project risk management

Developers need to manage both environmental and social integrity risks to enable participation in high-integrity markets.

For Africa to achieve its full potential in delivering high-quality NbS credits, robust risk management is essential to ensure credited emissions reductions are real and durable. Regulators should insist on the following best practices for permanence and leakage mitigation (reflecting the direction of travel in ICVCM's Assessment Framework v1.1):

- **High buffers:** Consider setting aside a minimum of 15–25 percent of issued NbS credits in reserve to cover potential future reversals, monitoring international guidance in this regard[489];
- **Conservative baselines:** Use cautious assumptions to avoid overcrediting[487];
- **Robust leakage accounting:** Quantify and deduct emissions that shift outside project boundaries[451];
- **Long liability tails:** Maintain monitoring and liability for reversals for decades after the initial crediting period. The ICVCM requires 40 years of post-issuance monitoring for some NbS projects with permanence risk[489].

Carbon risk can be managed through insurance products that protect against permanence and delivery risk, managing the impact on financial feasibility. Governments can align insurance policy requirements with integrity safeguards referenced by the ICVCM[428]. Orderly wind-down provisions should also be in place so that if a project ends, any reversals (such as forest fires or pest outbreaks) are covered by insurers or pooled buffers, rather than resulting in *ex-post* recovery of losses from vulnerable communities.

In respect of social risks, developers need to ensure fairness in engaging local communities. To avoid perceptions of carbon grabs and ensure true alignment of interests, developers need to secure free, prior and informed consent (FPIC) where relevant, provide transparent contracts, deliver equitable and auditable benefit sharing and ensure access to grievance mechanisms.

6.4. Country playbook

Addressing the full spectrum of risks, institutional requirements and market dynamics outlined in this chapter requires more than isolated reforms. Countries must move through a sequenced implementation pathway that strengthens policy credibility, builds institutional capacity, improves market positioning and safeguards integrity as rules and demand evolve. **Figure 18** above presents this pathway across three horizons. It illustrates that countries do not progress from 'low readiness' to 'high performance' in a single step; rather, readiness and resilience are built in stages, with each horizon establishing the conditions necessary for the next. This staged progression reduces policy risk, improves investor confidence and enables learning-by-doing before scaling participation.

Horizon 1 focuses on laying foundations for market participation. This is where countries define national carbon-market strategy, legislate the essentials and establish the core policy and legal foundation. The emphasis is on establishing the minimum viable rules, systems and institutional roles for credible participation in voluntary and Article 6 pathways. At

this stage, clarity and credibility take priority over complexity or scale.

Horizon 2 focuses on optimizing carbon revenues by shifting from basic readiness to strategic positioning. Once core rules and systems are established, countries can scale strategically important project types and methodologies, strengthen project pipelines and assess options for domestic demand creation, including the feasibility of a domestic carbon pricing mechanism. The emphasis is on improving transaction outcomes, strengthening alignment with demand and building a resilient and bankable supply pipeline that meets evolving integrity standards. Countries begin shifting from initial participation towards value capture and development benefits.

Horizon 3 focuses on strengthening market participation by moving from transaction readiness to sustained market performance. In this horizon, countries strengthen financing arrangements, build on transaction pilots, launch regional joint-action pilots to test interoperability and coordinated approaches, and publish regular market-integrity updates. The emphasis is on building credibility at scale, reducing transaction barriers and sustaining participation through transparency, predictable rules and stronger regional coordination. Performance, transparency and regional integration become the primary drivers of competitiveness.

The three horizons are presented to clarify how the country playbook discussed below should be used in practice. The playbook is not a standalone checklist. It is a sequenced set of actions that should be applied in line with the horizon a country is currently in, and the specific decisions it needs to take before progressing.

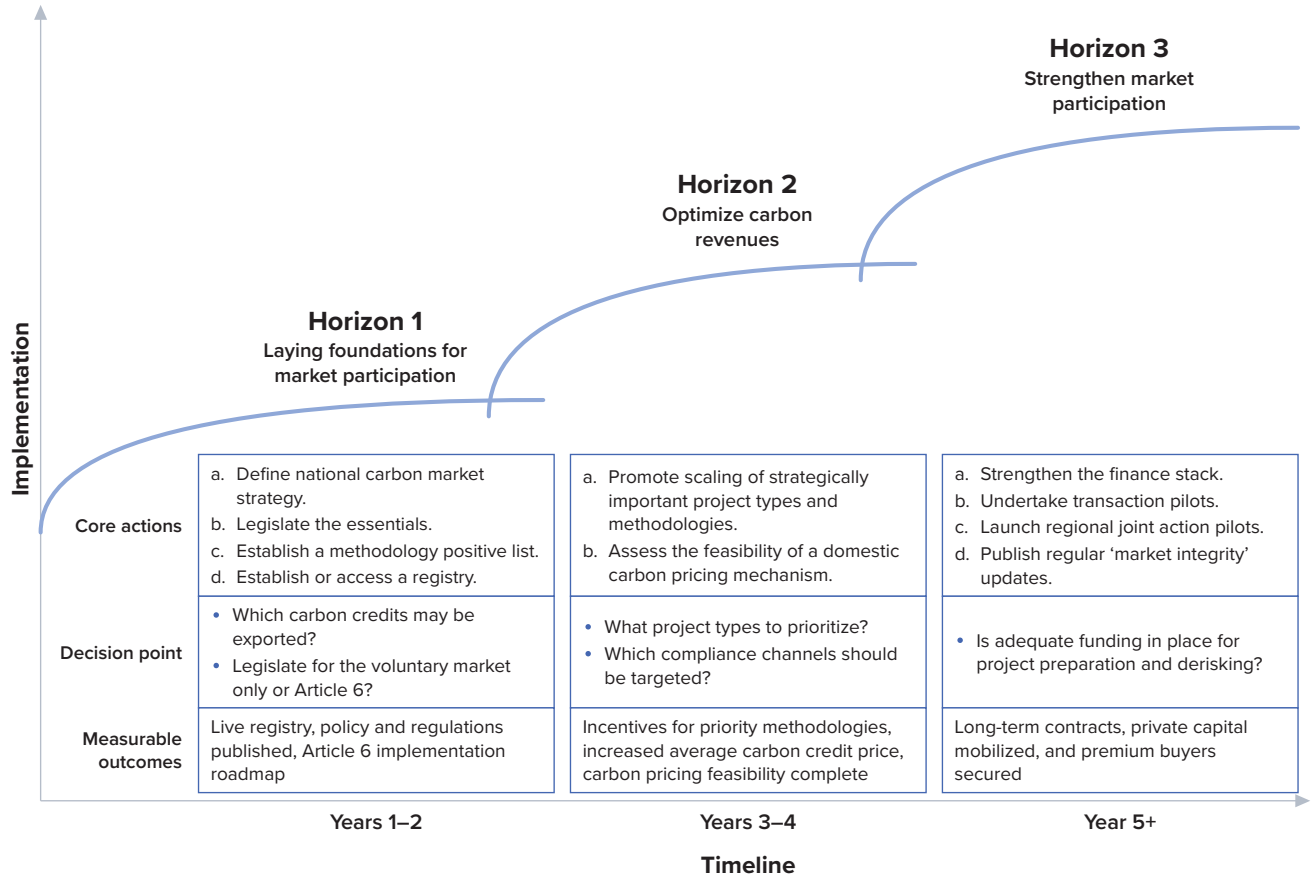
- **Define national carbon market strategy.** This requires investing in a solid evidence base to support credible decisions, including a MACC study where feasible, to inform which emission reductions may be exported using Article 6-aligned compliance market mechanisms. MACCs also help governments understand opportunity costs and avoid exporting low-cost mitigation needed for domestic NDC compliance.

A national carbon-market strategy should clearly define the country's desired role in global carbon markets, the balance between NDC use and export, priority sectors (linked to climate policy), domestic carbon pricing and market development objectives, the legal framework governing carbon rights and transfers, and governance including interministerial coordination structures. It should include a phased implementation plan to guide action. The strategy should also define principles for integrity, transparency and equitable benefit sharing to guide market participation.

- **Legislate the essentials**, supported by evidence of carbon market potential**.** Ensure climate policies, including NDCs, reflect national carbon-market priorities and assess project-pipeline alignment with target-market requirements. Engage early with known Article 6.2 buyers to assess interest. At this stage, policy and regulatory clarity on critical issues such as carbon rights ownership, project approval processes and taxation should be clarified to give certainty to market participants. Early clarity reduces perceived sovereign risk and lowers developer financing costs.

Should there be high potential for Article 6 transactions, governments should pass a compact regulation package covering authorizations – including criteria, processes and

Figure 18. Three-horizon pathway for high-integrity carbon-market participation.



revocation – along with rules for corresponding adjustments, benefit sharing and claims. Templates should be based on UNFCCC Article 6 materials (CARP, reference manual) and cross-reference VCMI for claims[488].

More generally, mechanisms to encourage positive community impacts, such as minimum revenue-sharing or benefit-sharing plans and transparent disbursement processes aligned with the ICVCM's CCPs, should be put in place[489].

Robust tax and FX frameworks should be established. These must clearly define VAT obligations, set out withholding rules and provide guarantees for FX convertibility. FX convertibility assurances are particularly critical for attracting international buyers and investors.

- **Establish a methodology positive list for Article 6 targets to guide transactions and portfolio development.** Countries pursuing Article 6 cooperation can publish criteria identifying activities or methodologies that may qualify for authorization. These should reflect national mitigation priorities, NDC requirements and buyer expectations, informed by MACC analysis and relevant integrity frameworks. The positive list should be reviewed quarterly using the ICVCM's assessment-status updates[489]. CCP assessments can inform this process but do not replace Article 6 requirements or project-level authorization decisions. Regular updates signal policy responsiveness and help maintain investor confidence.
- **Establish or access a registry** to support transparency and credible carbon accounting**.** Assess whether national, shared or UNFCCC-provided registry services best meet the country's needs. Where a national system is developed, use a modular approach covering relevant unit identifiers, life-cycle events, authorization status and accounting information. Plan secure information exchange with relevant systems and define consistent data fields from the outset[490]. These arrangements support traceability and safeguard market integrity.

To build trust, the registry must maintain a transparent audit trail that verifies the provenance of credits. Transparency should also extend to publishing host country authorizations, corresponding adjustments, benefit-sharing arrangements, revenue distribution, VVB reports and project performance data. Public transparency reduces due-diligence costs for buyers[491].

- **Promote scaling of strategically important project types and methodologies to strengthen the pipeline**. Provide targeted incentives or grant funding for high-integrity projects aligned with national development objectives and climate goals. Support developers in meeting applicable CCP-labelling, CORSIA or Article 6 requirements, while maintaining project-level assessment and safeguards. Incentivizing developers to adopt high-integrity methodologies strengthens the pipeline with carbon credits that are more likely to hold long-term value and align priority project types with both national development objectives and climate goals. High-integrity credits are more resilient to future rule tightening and demand shifts[492].
- **Assess the feasibility of a domestic carbon-pricing mechanism** aligned to decarbonization policy. Consider domestic economic and institutional conditions, distributional impacts and international trade competitiveness, including the implications of trading partners' climate-related trade instruments. Carbon-pricing mechanisms with eligible offset provisions can create domestic credit demand, although their effect on project revenues depends on policy design and market conditions[493].
- **Strengthen the finance stack.** Mobilize technical assistance, blended finance, guarantees and insurance to support project preparation and reduce investment risks. Engage AfDB's emerging facility and other relevant facilities according to their mandates and eligibility requirements. Ensure domestically hosted projects can access insurance for non-delivery and reversals; some insurers do not underwrite entities domiciled in developing country jurisdictions. Appropriate credit enhancement and guarantees can enable commercial lending.
- **Undertake transaction pilots.** Where appropriate, undertake an Article 6.2 pilot and a voluntary-market pilot involving private-sector buyers. Use these to test authorization procedures, transaction documentation, registry operations, reporting and safeguards before scaling. Pilots can reduce execution risks and demonstrate feasibility to investors.
- **Launch regional joint action pilots.** Regional pilots covering cross-border registry interoperability tests and harmonized MRV exercises, for example, should be implemented to test the feasibility of continental or regional market integration.

Such initiatives will allow participating countries to evaluate systems, identify regulatory or technical gaps, and build institutional trust ahead of full-scale integration. By demonstrating practical cooperation and generating lessons for policy and system design, such pilots lay the groundwork for a unified African carbon market architecture that positions Africa as a rule-maker.

Once standardized government-to-government MOPA templates are established, countries should pilot an Article 6.2 transaction to check delivery schedules, pricing structures and corresponding adjustment provisions. This will validate documentation workflows, demonstrate readiness to partners and build confidence in transacting at scale under emerging UN-supervised guardrails.

Countries should pilot one VCM removal credit transaction alongside an Article 6.2 deal to assess the single registry's ability to manage both markets. This will validate interoperability, ensure registry readiness and demonstrate the government's capacity to supply high-quality, Paris-aligned credits that can capture premium buyer demand.

- **Publish regular 'market integrity' updates.** These should outline the current state of the national carbon market. These updates should include quarterly statistics on authorizations, corresponding adjustments, issuances and retirements, community benefit distributions and audit outcomes. The registry should ensure full transparency by making all essential data publicly accessible. Such measures will ease due diligence for buyers while aligning with growing disclosure requirements from initiatives like the ICVCM and the VCMI. Routine disclosure strengthens market credibility and reduces perceived integrity risk.

In addition, the registry should identify and publish which methodologies or project categories are gaining CCP-eligibility or being phased out. This will keep stakeholders informed, enhance transparency and enable more predictable market participation.

6.5. Conclusion

Africa's position in global carbon markets is being transformed by evolving market rules, integrity requirements and international demand. As global actors raise their climate ambition and seek high-quality carbon credits, the continent faces an unprecedented opportunity to expand its role as a major supplier of carbon credits. Rising demand for high-integrity credits opens the door for countries to mobilize significant climate finance, strengthen economic resilience and advance broader development priorities. Combined with emerging policy frameworks and increased investor interest, these shifts provide a pathway for African countries to translate mitigation potential into real economic and resilience gains. If strategically managed, carbon markets can evolve from a niche climate instrument into a core component of Africa's green growth and development financing architecture. Historically, carbon finance has contributed less than one percent of approximately $50 billion in annual climate finance flows to Africa, but evolving market dynamics could raise this share to 10–20 percent, partially offsetting declines in official development assistance. For many countries that could not fully participate in earlier UNFCCC mechanisms, this creates the possibility to leapfrog directly to modern, integrity-driven and digital-ready systems without inheriting legacy inefficiencies.

Demand growth is driven primarily by Article 6 markets established under the Paris Agreement. Article 6.2 buyer commitments and CORSIA could together generate demand for about 700 $MtCO_2e$ by 2030, and Article 6 could cut NDC compliance costs by up to US$250 billion a year. Africa is well placed to meet a meaningful share of this demand, drawing on its natural assets and inclusive green growth potential. Recent estimates suggest that African retirements could increase about eightfold by 2030, from 37 $MtCO_2e$ in 2024 to approximately 300 $MtCO_2e$. The continent's leadership in Article 6.2 activity, exemplified by Ghana's pioneering agreements, and its growing visibility in voluntary markets further reinforces this trajectory. Africa's carbon market currently accounts for one third of all bilateral cooperation agreements under Article 6.2 and represents over 20 percent of voluntary market issuance in 2024, underscoring its emerging importance as a global carbon supplier. This early-mover advantage provides a critical window for shaping market norms and securing long-term buyer partnerships.

However, the environment in which these opportunities exist remains highly dynamic and complex. Fragmented and evolving rule systems, shifting geopolitical priorities, tightening integrity standards and uneven host-country readiness create risks for African suppliers. Nature-based solutions face additional scrutiny, with stringent safeguards required to address permanence, leakage and community rights. Meeting integrity expectations is essential to maintaining buyer confidence and market access. To fully benefit from the next decade of carbon market development, African countries will require coordinated action, strategic foresight and strengthened institutional systems.

The strategy roadmap responds directly to that need. It outlines a set of clear policy objectives, supported by strategies designed to build resilience, expand opportunity and guide coordinated implementation. It also introduces milestones, governance mechanisms and a practical country playbook that translates recommendations into actionable steps that can be adapted to varying national readiness levels.

The evidence base underpinning this roadmap is drawn from the broader analytical suite accompanying the report. The market readiness assessment provides a baseline view across five key African markets. Ghana and Kenya have advanced architectures and early Article 6 agreements; South Africa and Egypt are rapidly building domestic systems; and the Democratic Republic of the Congo, despite substantial natural assets, continues to face significant institutional challenges. Carbon supply across the continent remains concentrated in a narrow set of project types, leaving markets exposed to shifts in integrity standards and buyer preferences.

The vulnerability analysis highlights risks that may undermine this progress, including delays in Article 6 operationalization, tightening voluntary market rules and capacity constraints in regulatory and MRV systems. Adaptive capacity varies, with Ghana and Kenya showing stronger institutional resilience relative to the DRC, where exposure remains high. Without diversification, stronger governance and targeted support, African markets risk being marginalized as global requirements evolve.

The gaps and opportunities mapping provides solutions to address these challenges, identifying priority areas such as strengthening MRV and policy frameworks, expanding local technical expertise and VVB capacity, reducing dependence on foreign intermediaries and scaling blended finance to support early-stage project development. There are also opportunities in expanding into high-integrity project types, adopting digital MRV and accessing premium demand segments, including removals, CORSIA-eligible units and Article 6 buyers. Capturing these opportunities will require aligning climate ambition with industrial policy, finance mobilization and skills-development strategies.

Together, these insights reinforce the need for a dynamic, forward-looking strategy. By synthesizing readiness, vulnerability and opportunity assessments, the roadmap equips African policymakers with the tools to enhance participation in global carbon markets, negotiate stronger and more equitable outcomes, and mobilize climate finance that advances both national development goals and long-term continental resilience.

Appendix 1: Country selection criteria

Six dimensions were considered in selecting countries:

- First, the scale and sectoral profile of carbon credit issuance was considered, as countries with smaller markets or heavily concentrated carbon supply – such as forestry and land use (REDD+/AFOLU) – are more vulnerable to global market shifts than diversified economies;
- Second, the track record of trading in the VCM and the CDM was examined since prior transaction experience is often associated with stronger private-sector involvement and greater resilience to policy and market transitions;
- Third, progress in concluding Article 6 bilateral agreements was used as an indicator of readiness, given that most future carbon market growth is expected under Article 6 with its stricter institutional and MRV requirements;
- Fourth, the maturity of domestic policy, regulation and institutions was assessed, as predictable and market-friendly frameworks lower risk, encourage investment and strengthen market resilience;
- Fifth, the existence of local carbon markets and financing platforms was seen as important for stimulating domestic demand, mobilizing capital and reducing vulnerability to external market fluctuations;
- Lastly, both the region and trade blocs were considered in selecting countries.

Applying these criteria led to the identification of five African countries for in-depth study:

- **South Africa (**Southern African Development Community, SADC) stands out as a major carbon credit producer with a diversified supply profile spanning energy, industry and land use. It has a track record in both the VCM and CDM, and while Article 6 frameworks are being developed, its well-established carbon tax regime and emerging trading platforms, such as the JSE Ventures Carbon Market, make it a frontrunner in local market development;
- **Kenya** (East African Community, EAC) is Africa's leading VCM player, with a highly diverse project base in renewable energy, cookstoves and land-based initiatives. It is also becoming active in compliance markets, signing JCM agreements, while actively negotiating under Article 6. Its policy framework is maturing accordingly, while a local ecosystem of finance and demand is emerging;
- **Ghana** (Economic Community of West African States, ECOWAS) is the continent's Article 6 leader, as the first African country to conclude Article 6 agreements. It has a balanced issuance profile spanning forestry and community-based energy efficiency, with a track record in both the VCM and CDM. Ghana's institutional architecture is robust, and efforts to stimulate local demand and financing are under way;
- The **DRC** (ECCAS) has substantial forest-based carbon potential, attracting the attention of carbon sequestration credit buyers. However, it has only limited market experience and nascent institutional frameworks. Although it has yet to conclude any Article 6 agreements, the DRC's growing project pipeline reflects increasing momentum;
- **Egypt** (COMESA) has a large industrial and energy efficiency base, which is beginning to support the establishment of domestic mechanisms. These include a VCM launch on the EGCX and consideration of a carbon tax, supported by a mature policy environment and centralized coordination. Although its VCM involvement has so far been limited, it has strong CDM credentials and is advancing discussions on Article 6.

Appendix 2: Scoring system for country analysis readiness ratings

Component	Indicator	Red (0)	Orange (1)	Green (2)
Legal and regulatory				
Legal mandate	Legislation for carbon markets	No legislation	Draft law/policy, or existing law does not directly address carbon markets	Enacted law/regulation
Policy alignment	NDC integration; carbon markets mentioned in climate policy	No mention in NDC/ policy	Reference in draft climate strategy or alignment is unclear	Explicit integration in NDC and/or adopted climate policy
A6.2 participation readiness	Authorization procedures, CARP report submissions	No authorization procedures and no report submissions	Draft authorization procedures and/or evidence of CARP submission(s)	Formal authorization procedure and evidence of CARP submission(s)
A6.4 mechanism readiness	Presence of A6.4 game plan	No national game plan for A6.4	Draft game plan for A6.4 or current laws create scope for A6.4 activation	Formal game plan for A6.4
Benefit sharing	Clear benefit-sharing framework	No guidelines or framework in place	Existence of a draft framework or best practice outlined from big projects	Formalized and clear framework/ guidelines in place
Institutional				
Designated national authority	Operational DNA and level of resources	No DNA	DNA exists, but with limited staff, budgets, etc.	DNA is well staffed and fully operational, with a dedicated budget
Interministerial coordination	Formal coordination body (and use thereof)	No coordination	Legislation mandates coordination, but not yet functional	Formal and functional body in place
National carbon registry	Presence of functional registry	No registry	Legislation mandates registry, but not yet functional, or registry in the pilot phase	Functional registry in place
Data and transparency	Public project pipeline dashboard with metadata	No visibility or project data	Registry mandated by law, but not yet functional or difficult to access project data	Project dashboard is available and easily accessible
Technical				
MRV systems	Presence of a national GHG accounting system	No MRV system	Less robust MRV system due to partial MRV guidelines for some sectors	Strong MRV system
VVBs	Country presence	None present	One to three VVBs (foreign or local) present	More than three VVBs (foreign or local) present
Methodology support	Localized methods; national guidance	No domestic standard(s)/ project methodologies	Draft domestic standard/ project methodologies and/ or government set out a project positive list	Presence of domestic standard/ project methodologies and project positive list from the government
Market and finance				

Component	Indicator	Red (0)	Orange (1)	Green (2)
Project pipeline development	Scale and degree of diversification of the project pipeline	No projects or one project type accounts for over 90% of projects	More than 10 projects in one or two project types (one project type cannot account for more than 90% of projects)	Diverse pipeline, more than 10 projects across three or more project types (one project type cannot account for more than 90% of projects)
Integrity of supply	Share of projects covered by CCP-approved methodologies	Fewer than 20% of projects	20–50% of projects and/or high reliance on renewable energy projects	More than 50% of projects
Private sector readiness	Participation by major developers in local projects	No major developers	Growing ecosystem of developers	Strong presence of major developers
Finance mobilization	Presence of Article 6.2 deals	No A6.2 deals	MoUs in place and/or more than five projects under way	Signed agreements and/or more than five projects under way
Finance platforms	Domestic trading/ exchange platform	None	Planning under way	Operational domestic trading/ finance platform

Appendix 3: Detailed country readiness assessment results

Best practice Partial readiness Absent

Indicator		South Africa	Democratic Republic of the Congo	Kenya	Ghana	Egypt
Legal and regulatory	Legal mandate					
	Policy alignment					
	Article 6.2 participation readiness					
	Article 6.4 participation readiness					
	Benefit-sharing framework					
Institutional	Designated national authority					
	Interministerial coordination					
	National carbon registry					
	Data and transparency					
Technical	MRV systems					
	Validation and verification bodies					
	Methodology support					
Market and finance	Project pipeline development					
	Integrity of supply					
	Private sector readiness					
	Finance mobilization					
	Finance platforms					

Appendix 4: Country risk and resilience measures

Table 14. Risk measures

Dimension	Indicator	Description	Metric	Ranking
Exposure	Issuance from risky project types	Carbon credits from vulnerable project types as a share of total issuance	Share of recent issuance from flagged projects (%, issued from 2020+, Berkeley)	• 0–30% = low exposure (good); • 30–60% = medium exposure; • 60–100% = high exposure (bad).
	Reliance on avoidance credits	Carbon credits from carbon-avoidance projects as a share of total	Share of recent issuance from avoidance types (%, issued from 2020+, Sylvera)	• 0–30% = low exposure (good); • 30–60% = medium exposure; • 60–100% = high exposure (bad).
	Political risk	General political risk measure comprising: • Political stability and absence of violence; • Government effectiveness; • Regulatory quality; • Rule of law; • Control of corruption.	An average of the S&P Global Country Risk Service indicators for 2023 (accessed through the World Bank Governance Indicators)	The inverse of the S&P indicators aligns with the following: • 0–30% = low exposure (good); • 30–60% = medium exposure; • 60–100% = high exposure (bad).
Sensitivity	Concentration by number of project types	The diversity of the project portfolio	Inverse of Herfindahl-Hirschman index (HHI) to get the effective number of project types: • 6.5 project types were considered a diversified portfolio; • The effective number of project types was divided by 6.5 to determine portfolio diversification level.	• 0–40% = high sensitivity (bad) • 40–70% = medium sensitivity • 70–100% = low sensitivity (good)
	Institutional adequacy	Key institutions present domestically as a share of total, with consideration for degree of implementation	Presence of functional: • DNA/ Article 6 focal point; • National registry; • MRV system; • Authorizing entity. Rank functionality from 0–2: • 0 = absent; • 1 = drafted policy/law or present, but not functional; • 2 = present and functional. Aggregate the scores per institution and divide by the maximum score (8)	• 0–40% = high sensitivity (bad); • 40–70% = medium sensitivity; • 70–100% = low sensitivity (good).

Table 15. Resilience measures

Dimension	Indicator	Description	Metric	Ranking
Adaptive capacity	Access to technical assistance	Participation in readiness programmes	Extent of participation relative to peers. Higher access if the country has participated or is participating in recent Article 6 readiness programmes	Relative rating: low, medium, high
	Supportive domestic market ecosystem	Network of capable developers, industry bodies and supporting entities, mostly focusing on local project developers and VVBs	Extent of carbon market network relative to peers	Relative rating: large, moderate, small
	Pipeline quality	Eligibility of credits for sale into the alternative compliance market as a share of total issuance	Share of issuance from 2020 on eligible for CORSIA Phase 1 (%, Sylvera)	• 0–30% = low adaptive capacity (bad); • 30–60% = medium adaptive capacity; • 60–100% = high adaptive capacity (good).

Appendix 5: Data appendix

This section summarizes findings from a series of interviews conducted with key informants. It is organized into three key themes: the market outlook for international carbon markets, focusing on VCM and Article 6; African readiness to participate in emerging carbon market opportunities; and resilience measures for African countries. Where relevant, quotes are provided on an anonymized basis.

- **Carbon market outlook including trends and risks**

Outlook

Both VCM and Article 6 markets are viewed as fragile but with significant growth potential, and Article 6 particularly so. The VCM is considered more resilient due to its track record and diversity of buyers, with recent contractions associated with the integrity transition viewed as a necessary stage of market maturation. Article 6 compliance markets are expected to set an international forward price for carbon credits, which could transform the market by establishing the conditions for carbon credits to become bankable revenue streams. However, its mechanisms (6.2 and 6.4) are still nascent and face operational and regulatory challenges. CORSIA also has a strong growth outlook, although transactional activity will likely start to increase closer to the deadline for offset retirement for Phase 1 (31 January 2028).

Interviewees emphasized a need for high integrity, transparency and alignment of international standards. The CCPs are currently bringing VCM standards like Verra and Gold Standard closer to compliance standards. This means that the supply side of carbon markets is converging, as stated by one of the interviewees: "These markets all overlap and intersect in all sorts of complex ways. Carbon credits can start their life in one of these markets, move to another market, potentially move to a third market, or move back to the starting point. So, we really need to think of them as one partially integrated set of overlapping markets."

This suggests that African countries can pursue multiple markets through the production of high-integrity credits.

Risks

The impact of geopolitical shifts was raised as a concern, particularly in relation to indirect impacts on international climate institutions, American corporates that are major VCM buyers, and other countries facing political pressure to withdraw from climate policy commitments.

This sentiment is expressed as follows by one of the interviewees: "I would say we … are very concerned … that there is dismantling of institutions that have the knowledge and ability to implement climate policies. If they don't exist, you can't implement things. Second, [there's] nervousness among companies about legal action if they are seen to be pursuing climate goals that aren't additive to the bottom line. So, there's fear there, which makes companies go very quiet about what they're doing. And then the third [concern] is the knock-on impact if the biggest polluting country in the world pulls out. Why should smaller countries participate when it's so hard to do and so challenging … to implement?"

A direct negative impact could be failure by the USA government to enforce compliance with CORSIA requirements in the aviation industry, considering that USA airlines account for approximately half of the emissions covered by this scheme. However, this is considered a low risk given the high likelihood of reciprocal action by the EU to enforce offsetting on USA flights to the region on more onerous terms.

Drivers of fragility differ across the carbon markets: Article 6.2 is hampered by political will, while the VCM faces challenges around the integrity transition and new eligibility criteria for carbon credits. Overall, demand is viewed as more certain/robust in the case of Article 6 (among the limited number of active buyers), while the profile of demand constantly shifts in the VCM, a function of corporate branding and reputation management decisions. This is captured in this interview quote: "In the voluntary markets, there is essentially a high level of confidence in the supply, but a lot of uncertainty in the demand – whereas, in comparison, in the … Article 6 markets, we have the opposite. We have uncertainty around supply, but we have more certainty around the demand."

Within the VCM, methodological shifts to address integrity issues (e.g. to meet the CCP requirements) are creating a high degree of uncertainty for project developers. This investment deterrent is compounded by VCM buyers requiring additional quality assurance. One project developer mentioned requiring two independent project ratings (Sylvera and BeZero), each at a cost of £50,000, massively raising transaction costs.

Interviewees highlighted that the Article 6.4 rulebook could make it very difficult to realize NbS, given extremely stringent permanence requirements. This would affect not only REDD+, ARR, IFM and agriculture projects, but also clean cookstoves, which earn credits based on avoided deforestation. Some interviewees were concerned that African negotiators and members of the UNFCCC technical working groups were not lobbying actively enough to relax these rules.

Gold Standard has adopted Article 6.4 for vintages issued from 2026 on, aligning with these rules, creating significant concern for clean-cookstove developers. Further, major Article 6.2 buyers are exploring aligning their procurement rules to Article 6.4, which will have significant consequences for African transactions.

- **African market readiness**

Africa is experiencing a surge of activity in the Article 6.2 space, with eleven countries concluding bilateral agreements to date. One major buyer described a scramble for Article 6.2 credits in Africa. Enablers like the GGGI emerge

as important aggregators and matchmakers within this context. In parallel, UNDP has played a central role in supporting market readiness through policy engagement, institutional capacity building and the convening of public and private stakeholders, helping to create enabling environments for Article 6 participation. African countries are emerging as pioneers and leaders, setting precedents. For example, Ghana is viewed as a global leader in Article 6.2 negotiations, providing a template for others to follow. Overall, readiness is improving on the continent. However, very little seems to be happening in Central Africa, which is concerning given the implied lack of investment in protecting the forests of the Congo Basin.

Article 6.2 cooperative agreements give expression to strategic political relationships. Several African countries enjoy sound relationships with major Article 6.2 buyers, especially in Europe, supporting strategic supply agreements. Critical minerals and green value chains strengthen this negotiating position.

A key challenge for buyers is host countries' hesitation to authorize Article 6 transfers, which appears to result from failure to develop domestic marginal abatement cost curves (MACCs) linked to NDCs. This acts as a barrier to developing credible NDC compliance strategies and thus to taking a strategic view on carbon exports. This quote captures this sentiment: "The overwhelming consensus from the host countries within Article 6 … is that they want to wait as long as possible before they authorize anything because they want to know that they're on track to meet their NDC, their national targets … There is a reluctance to sign LoAs because there is so much opacity, so much confusion around the extent to which they are even on track or delivering against their NDC. They don't want to oversell credits, especially sell credits at a low price and then realize that they missed their own NDC as a result."

A second interviewee confirmed this perception: "From a distance, it looks to me that definitely NDC compliance is a big issue right now, so some countries fear they may offer something later on, they do not meet their NDC, so they would prefer to then revoke it."

Some African governments were viewed as lacking a clear understanding of their carbon pipelines, hindering effective participation in international markets. Knowledge partnerships (e.g. with Sylvera) are helping to bridge data gaps by sharing project-level market data with governments.

Interviewees commented on regulatory risk in some jurisdictions. In particular, 'share of proceeds' regulations introduced in East Africa were referred to as weakening the business case for developers – especially if combined with benefit-sharing rules.

Pricing sentiment was cautious. Interviewees recognized that generating a sufficient pipeline of eligible projects is challenging, especially under strict integrity requirements. The market is still new, and developing a steady flow of projects that meet both buyer and seller criteria takes time. Higher integrity standards tend to command higher prices but also raise transaction costs and exclude certain project types.

- **African resilience measures**

The importance of early investment in capacity and institutions was emphasized. Many African countries face challenges in establishing and operating the necessary institutional frameworks for carbon-market participation. This includes limited staff and a failure to retain highly skilled staff within public institutions, a lack of experience and the need for learning-by-doing to develop robust processes for project assessment, authorization and monitoring. Building these capacities takes significant time and resources, and countries that start early are better positioned when demand increases.

The certainty and clarity of national regulations were recognized as critical. Policymakers should ensure stable, transparent and predictable regulatory frameworks, particularly regarding the timing and conditions of project and ITMO authorizations. Corruption or lack of transparency in project selection, authorization or revenue management can undermine the credibility of a country's carbon market activities. Strict safeguards and anti-corruption measures are essential.

Interviewees highlighted the importance of developing national carbon market strategies underpinned by credible MACCs to ensure that emission reductions are optimally applied. One interviewee expressed this as follows: "What you have to watch for is that you don't export your cheap credits and get left with the more expensive credits up the MAC curve. And so, the World Bank had issued a paper that talked about actually charging for corresponding adjustments, not for the fact that just to create a pool of money so that you didn't want that would subsidize later emission reductions that you were going to have to do for your own self."

Another described how to implement this measure: "Ideally every country would have its own marginal abatement cost curve, a MAC, which is broken down by sectors of the economy and it gives them almost real-time data on how they're performing against their NDC targets within each sector and they can see which sectors are doing well, which sectors are struggling, and then that will give much clearer insights into when and where and how and how many LoAs they can sign up on, and at what price – because by knowing the market payment cost, they then know if they should be selling, say, two Article 6 credits and allowing the buyer to claim one of them."

African policymakers need to equip themselves to trade carbon on a competitive basis. This requires building carbon-market knowledge and preparing effective negotiating strategies to drive optimal outcomes.

Reflecting on Africa's history in carbon markets, an interviewee expressed the following sentiment: "For a number of African countries that were already building businesses and building programmes around the potential entry into VCM, that was not encouraging. Prices dropped as low as $4. In some cases, we were hearing of $2.7 per ton … Now, when you come into ITMOs, depending on who you have the transaction with, you could find yourself in a pricing mode of anything between $30 to $50 per ton … And that's a huge shift … The social cost of carbon in Africa is $21 ton. Anything below that is really not profitable for an African developer or programme project. So having markets in the ITMOs above the social cost of carbon was very good for them."

Moving forward, countries should ensure continued alignment with international standards. Some interviewees noted that as Article 6.4 rules and other international standards evolve, there is a risk that national approaches may diverge, limiting market access. Policymakers should monitor and align with emerging global norms to ensure continued participation and credibility.

Appendix 6: Stakeholder interview list

No.	Interviewee	Organization	Designation	Date interviewed
1	Andrew Gilder	Climate Legal	Director	15 September 2025
2	Aaron Drayer	Global Green Growth Institute (GGGI)	Deputy director, Carbon Pricing Unit	16 September 2025
3	Ben Rattenbury	Sylvera	VP policy	17 September 2025
4	Olivia MacDonald	Sylvera	Policy analyst	17 September 2025
5	Lorna Ritchie	The Integrity Council for the Voluntary Carbon Market (ICVCM)	Director of public affairs	17 September 2025 and 1 October 2025
6	Henk Sa	Brundtland	Co-founder and partner	25 September 2025
7	Perumal Arumugampillai Kalyani	United Nations Framework Convention on Climate Change (UNFCCC)	Manager, markets, non-markets and stakeholder interaction, Mitigation division	25 September 2025
8	Kazuhisa Koakutsu	Paris Agreement Article 6 Implementation Partnership (A6IP) Center	Director	30 September 2025
9	Thelma Mahachi	A6IP Center	Policy researcher	30 September 2025
10	Toby Colquhoun	Rand Merchant Bank (RMB)	Head, carbon markets–finance and trading	30 September 2025
11	Robbie Louw	Promethium Carbon	Director	30 September 2025
12	Olivia Tuchten	Promethium Carbon	Principal climate change advisor	30 September 2025
13	Kevin Whitfield	Nedbank	Head: Africa treasuries and carbon	1 October 2025
14	Sandra Lindström	Swedish Energy Agency (SEA)	Head of international climate cooperation	6 October 2025
15	Andrea Abrahams	International Emissions Trading Association (IETA)	Managing director, VCM	7 October 2025
16	Sharlin Hemraj	South African National Treasury	Senior economist	7 October 2025
17	Dr. Olufunso Somorin	African Development Bank (AfDB)	Regional principal officer	8 October 2025
18	Shelley Estcourt	The African Stove Company (TASC)	CEO, Africa	13 October 2025
19	Storm Patel	The African Stove Company (TASC)	Commercial director	13 October 2025
20	Martin Stadelmann	Federal Office for the Environment (FOEN)	Principal policy advisor, environmental finance	17 October 2025
21	Paul Muthaura	International Valuation Standards Council (IVSC)	Member of the board of trustees	22 October 2025
22	Heather McEwan	Verra	Regional representative	27 October 2025
23	Lawrence Cole-Morgan	Standard Bank	Lead: carbon credit trading	27 November 2025

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