Regulatory Sandbox to Support Carbon Markets

A How-To Guide for Regulators and Policymakers on Testing Carbon Market Innovations

MARCH 2026

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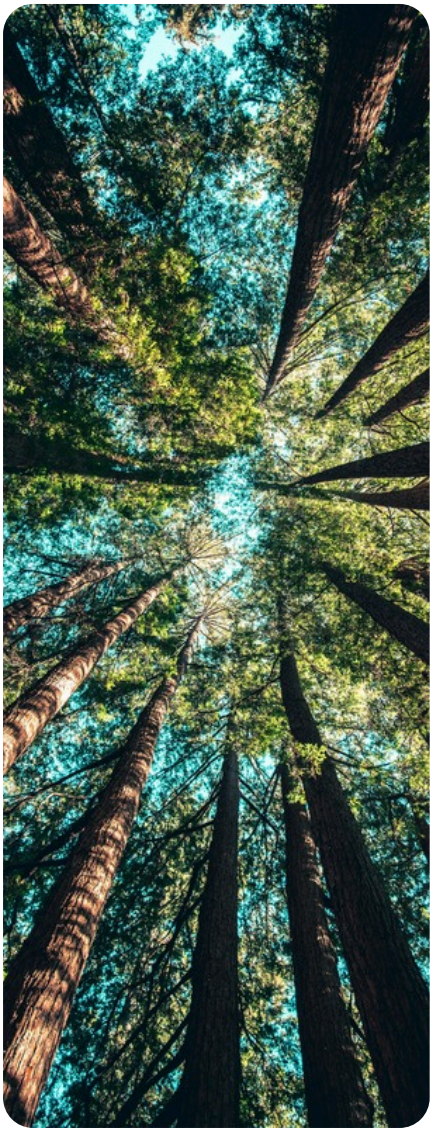
LIST OF ABBREVIATIONS

ABBREVIATION	FULL MEANING
AI	Artificial Intelligence
AML	Anti-Money Laundering
API	Application Programming Interface
BCB	Central Bank of Brazil (Banco Central do Brasil)
BII	British International Investment
BoE	Bank of England
CCLB(s)	Carbon Credit-Linked Bond(s)
CCA	Clean Cooking Alliance
CFRF	Climate Financial Risk Forum
CFT	Counter-Financing of Terrorism
CIX	Climate Impact X (Singapore-based carbon trading platform)
CMA	Capital Markets Authority (Kenya)
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CVM	Securities and Exchange Commission of Brazil (Comissão de Valores Mobiliários)
DFIs	Development Finance Institutions
DLT	Distributed Ledger Technology
DNA	Designated National Authority
ECB	European Central Bank
ERPAs	Emission Reduction Purchase Agreements
ESG	Environmental, Social, and Governance
EU	European Union

ABBREVIATION	FULL MEANING
EU ETS	European Union Emissions Trading System
FCA	Financial Conduct Authority (United Kingdom)
FMO	Nederlandse Financierings-Maatschappij voor Ontwikkelingslanden (Dutch Development Bank)
FPIC	Free, Prior and Informed Consent
FRTB	Fundamental Review of the Trading Book
FSCA	Financial Sector Conduct Authority (South Africa)
IBRD	International Bank for Reconstruction and Development
ICVCM	Integrity Council for the Voluntary Carbon Market
IFRS	International Financial Reporting Standards
IFWG	Intergovernmental Fintech Working Group (South Africa)
IOSCO	International Organization of Securities Commissions
IP	Intellectual Property
IoT	Internet of Things
ISS	International Sustainability Standards Board
ITMOs	Internationally Transferred Mitigation Outcomes
KBA	Kenya Bankers Association
KPI	Key Performance Indicator
KYC	Know Your Customer
LPG	Liquefied Petroleum Gas
M&E	Monitoring and Evaluation
MAS	Monetary Authority of Singapore
MRV	Monitoring, Reporting, and Verification

ABBREVIATION	FULL MEANING
MVP	Minimum Viable Product
NDC	Nationally Determined Contributions
NGFS	Network for Greening the Financial System
NIFC	Nairobi International Financial Centre
NSE	Nairobi Securities Exchange
REMA	Rwanda Environment Management Authority
SARB	South African Reserve Bank
SDG	Sustainable Development Goal
SFI	Sustainable Finance Initiative
SMEs	Small and Medium Enterprises
SPV	Special Purpose Vehicle
SUSEP	Insurance Regulator of Brazil (Superintendência de Seguros Privados)
TAL	Testing Approval Letter
tCO_2e	Tonnes of Carbon Dioxide Equivalent
TCFD	Task Force on Climate-related Financial Disclosures
UK	United Kingdom
UNFCCC	United Nations Framework Convention on Climate Change
VCM(s)	Voluntary Carbon Market(s)
VCMI	Voluntary Carbon Markets Integrity Initiative
VCU	Verified Carbon Unit
VVBs	Validation and Verification Bodies

About CCA and VCMI



The **Clean Cooking Alliance (CCA)** works to accelerate the global adoption of clean, efficient, and sustainable cooking solutions. By supporting innovation, strengthening markets, and expanding access to modern energy services, CCA aims to reduce household air pollution, improve health outcomes, and create economic opportunities in communities where traditional cooking fuels remain the norm.

As carbon finance becomes an increasingly important enabler of clean cooking scale-up, CCA partners with global initiatives to help countries design market-ready, high-integrity approaches that unlock investment.

The **Voluntary Carbon Markets Integrity Initiative (VCMI)** is a global non-profit initiative focused on ensuring that carbon markets are transparent, credible, and contribute meaningfully to climate and sustainable development goals. The VCMI's **Access Strategies Program** provides tailored support to governments in emerging and developing economies, enabling them to participate more effectively in high-integrity carbon markets. Through this program, countries receive practical guidance, capacity building, and analytical tools to develop national frameworks that align with their climate ambitions and maximize local benefits.

This **'how-to' guide** was developed with support from the VCMI's Access Strategies Program as part of its mission to expand equitable, country-driven participation in voluntary carbon markets while reinforcing integrity and impact at every stage of the carbon value chain.

Executive Summary

This **'how-to' guide** provides a comprehensive framework for designing, implementing, and operating regulatory sandboxes specifically tailored for carbon market innovations.

Carbon markets represent a major frontier for financial innovation, with voluntary carbon markets (VCMs) projected to reach US$5–20 billion by 2030 and US$60–270 billion by 2050.[1] The compliance market is even larger, estimated at US$0.88 trillion in 2025, and is expected to grow to US$5.91 trillion by 2031.[2] Despite this strong growth potential, the sector continues to struggle with structural barriers such as inconsistent credit quality, limited transparency, high transaction costs, and regulatory uncertainty that undermine market confidence and limit the flow of capital to high-impact climate-mitigation projects.

Targeted regulatory engagement can play a catalytic role in addressing some of these barriers. Financial regulators can strengthen transparency, credibility, and the bankability of carbon-market instruments by establishing clear standards, improving disclosure requirements, and enabling controlled testing of innovative products and practices.

However, regulators worldwide recognize that conventional regulatory approaches designed for mature financial instruments may inadvertently stifle the very innovations needed to achieve global climate targets, particularly under Article 6 of the Paris Agreement. **Regulatory sandboxes offer a practical solution by creating "safe spaces" where carbon credit-linked financial instruments and policies can be rigorously tested under regulatory supervision before being deployed at scale in the wider market.**

[1] https://www.msci.com/research-and-insights/blog-post/carbon-credits-come-of-age-in-2025
[2] https://www.mordorintelligence.com/industry-reports/compliance-carbon-credit-market

A **regulatory sandbox** is both a tool and a controlled environment that enables regulators and innovators to test new products, services, or business models under real market conditions with appropriate safeguards and limited regulatory relief. It serves as an evidence-gathering mechanism, enabling regulators to observe how emerging innovations perform in practice, identify potential risks, and collect data to inform future policy and regulatory decisions.

This **'how-to' guide** on regulatory sandboxes serves multiple critical functions:

For regulatory authorities

Offers step-by-step guidance on establishing sandbox programs, including governance structures, eligibility criteria, testing protocols, and exit mechanisms.

For market participants

Clarifies expectations for innovators seeking to test carbon credit-linked financial instruments, digital MRV systems, and blockchain-based registries.

For policy makers

Demonstrates how sandboxes can accelerate climate finance innovation while maintaining environmental integrity and investor protection.

In carbon markets, regulatory sandboxes can:

1

Accelerate innovation and access to finance

Regulatory sandboxes can provide controlled live environments for testing innovations such as carbon credit-linked bond instruments, standardized listing, trading and clearing criteria for carbon credits, and clarifying carbon credit assets' prudential treatment.

2

Ensure market integrity and mitigate risks

Controlled testing ensures that only high-integrity carbon solutions reach scale, protecting buyers from fraudulent or low-quality credits while building trust in carbon markets.

This guide outlines a comprehensive regulatory sandbox framework which balances three critical objectives: **accelerating climate finance innovation, ensuring environmental integrity and transformative social and economic impacts, and protecting investors and consumers.** Additionally, the guide recognizes three primary sandbox models that regulatory authorities can adopt based on their policy objectives.

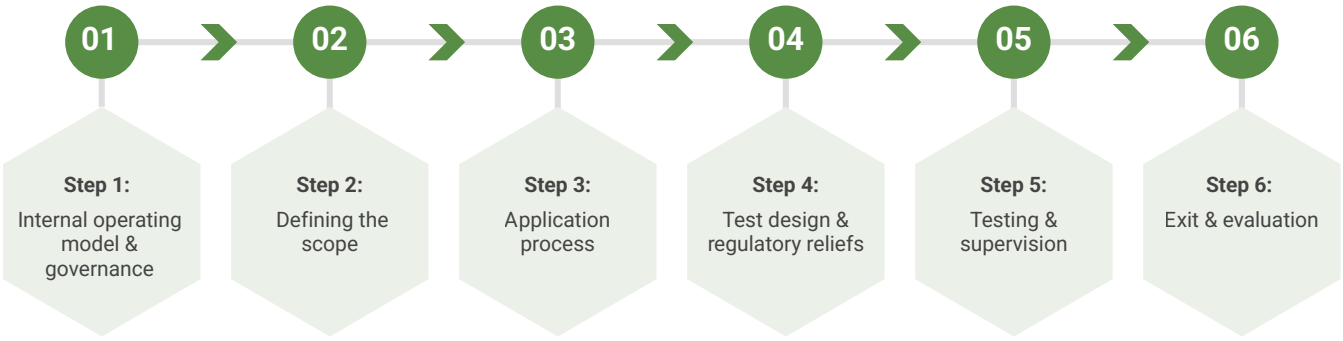
These include:

Table 1: Model sandbox types

MODEL TYPE	PRIMARY FOCUS	WHEN TO USE
Product-testing sandbox	Accelerate market entry for innovative carbon finance products and services	When the goal is to increase competition, support climate tech startups, and build capacity around new businessmodels (e.g., tokenized carbon credits, Carbon credit- linked bonds). Examples in Annex 3.
Policy-promoting sandbox	Evaluate and refine specific policies or regulatory frameworks	When regulators have identified specific regulatory barriers requiring reform and want to test the impacts of proposed changes (e.g., test new MRV standards, benefit-sharing requirements, or processes linked to Article 6 authorization for internationally transferred mitigation outcomes to understand operational impacts before formal adoption).
Hybrid approach	Many jurisdictions adopt a hybrid model that combines product testing with policy evaluation. For example, testing a carbon credit-linked bond (product) while simultaneously evaluating disclosure requirements for carbon-backed securities (policy).	

The sandbox framework operates through a structured six-stage lifecycle, ensuring systematic progression from initial application to market graduation or regulatory adoption.

Figure 1: Proposed sandbox lifecycle



This process is discussed in detail in Chapter 4 of this document.

The key distinguishing factors of this framework include:

Carbon-specific criteria

Benefit-sharing requirements

Innovations must demonstrate mechanisms for equitable distribution of carbon revenues to affected communities, particularly Indigenous Peoples and smallholders.

Article 6

Multi-stakeholder governance

Sandbox panels include environmental scientists and carbon market experts alongside financial regulators, ensuring holistic evaluation.

Both developed and developing countries are increasingly leveraging the regulatory sandbox approach to fast-track carbon market development, pilot climate finance innovations, and enhance trust in both voluntary and compliance-based crediting systems.

The following table shows examples of these initiatives and the types of innovations tested:

Table 2: *Sandbox initiatives*

COUNTRY	LEAD SANDBOX REGULATOR	INNOVATION TESTED
United Kingdom	Financial Conduct Authority (FCA)	Digital sandbox for carbon market innovation (digital sandbox sustainability cohort)
Singapore	Monetary Authority of Singapore (MAS)	Tokenized carbon credits, spot/futures exchanges
Brazil	Comissão de Valores Mobiliários (CVM)	Carbon credit trading platforms, green bond innovations
South Africa	IFWG (led by the National Treasury, SARB, FSCA, FIC)	Digital MRV and carbon tax integration
Kenya	Capital Markets Authority (CMA)	Blockchain-powered platform for tokenized securities, cloud-based analytics platform, crowdfunding platform

It is important to note that none of these examples operate as “carbon-only” sandboxes. Rather, they are broader financial- or market-regulation sandboxes that provide space to test carbon-market innovations within their wider regulatory mandates. This guide delves deeper into the process of designing a regulatory sandbox that can support carbon markets tailored to the unique needs of carbon-linked financial instruments and market mechanisms.

This document is structured to guide readers through the complete lifecycle of a sandbox. It provides practical direction on governance, risk controls, stakeholder roles, and technical considerations. For each carbon-market-related intervention that can be sandboxed, a dedicated guidance document will be required. This document should set out the details of the intervention product, its transaction structure, design process, enabling mechanisms, monitoring and evaluation frameworks, policy learning and scaling up, etc. As part of this series, CCA has developed a guideline specifically on incubating carbon-credit-linked bonds through the CMA regulatory sandbox. This document can be requested from carbon@cleancooking.org.

In conclusion, regulatory sandboxes present a pathway to bridge carbon market innovation with robust oversight.

With thoughtful design and implementation, sandboxes can accelerate credible climate finance solutions while upholding environmental integrity.

Jurisdictions that strike the right balance between enabling innovation and ensuring environmental integrity through well-designed regulatory sandboxes will be best positioned to lead in the emerging global carbon economy.

Target audiences

Capital markets authorities, financial regulators, central banks, climate finance innovators, carbon project developers, and international development partners.

1 Introduction

1.0. BACKGROUND TO CARBON MARKETS

Carbon markets have emerged as an innovative mechanism in global climate action, enabling countries, companies, and individuals to purchase and transfer emission-reduction or removal units (carbon credits), each equivalent to one metric tonne of CO_2 equivalent, while mobilizing critical financefor low-carbon projects.These markets provide a market-based complement to jurisdiction-specific climate policies, many of which rely on regulatory measures at national or subnational levels by mobilizing private finance and rewarding projects that deliver quantifiable mitigation and adaptation outcomes.

The carbon market landscape encompasses two primary segments: **compliance markets** and **voluntary carbon markets (VCMs)**. A compliance market is a regulated carbon market where entities are legally required to measure, report, and reduce their emissions, and may use government-issued allowances or approved carbon credits to meet these mandated obligations. A voluntary carbon market is a marketplace that encompasses transactions of carbon credits that are not purchased and used with the intention of meeting regulatory requirements. It includes carbon credits purchased with the intent to resell or for retirement by companies to compensate for unabated emissions and/or contribute to global climate action.

Compliance markets, such as the European Union Emissions Trading System (EU ETS), operate under mandatory regulatory frameworks that require participants to measure their greenhouse gas emissions and surrender allowances equivalent to those emissions. The EU ETS remains the world's largest and most established compliance carbon market, setting global benchmarks for market design and governance.

In parallel, voluntary carbon markets are forecast to experience significant growth as governments and corporations accelerate their climate commitments and adopt ambitious net-zero targets. This rising ambition is driving increased demand for high-quality carbon credits. Despite this growth trajectory, carbon markets continue to face persistent challenges that threaten their long-term viability and effectiveness. These include safeguarding the environmental integrity of carbon projects, preventing double counting of emission reductions and removals, addressing governance weaknesses across project development and verification, and ensuring transparent price discovery mechanisms (World Bank, 2023).[3]

$20B

VCMS PROJECTION

While VCMs are projected to reach US$5-20 billion by 2030, credibility challenges, including double-counting, greenwashing risks, and governance gaps, continue to threaten market confidence and limit capital flow. Regulatory sandboxes offer a controlled environment to test solutions that address these concerns, harmonizing local markets with internationally recognized best practice.

1.1. THE RISING FINANCIAL SIGNIFICANCE OF CARBON MARKETS

Carbon markets are quickly becoming some of the most important tools for mobilizing climate finance, supporting projects that would otherwise struggle to attract investment. As these markets grow in scale and complexity, the role of financial regulators is becoming increasingly central. Regulators are now shaping how carbon revenues flow through national financial systems, how risks linked to carbon assets are managed, and how market integrity is upheld.

This convergence of climate finance and financial oversight marks a pivotal moment: carbon markets are evolving into critical engines for achieving national climate goals, and the institutions responsible for financial stability are playing a defining role in guiding their development.

[3] State and Trends of Carbon Pricing 2023

a. Carbon markets as enablers of financing

Beyond emissions trading, carbon markets have become powerful financing ecosystems, unlocking capital for projects that would otherwise struggle to achieve commercial viability. By monetizing verified emission reductions, these markets enable business models with high social and environmental impact but limited near-term profitability to attract private investment and scale sustainably.

Through mechanisms such as forward purchases, carbon-linked loans, and carbon-revenue-backed securities, these markets have created new financing models that convert environmental assets into investable opportunities, bridging the gap between climate ambition and financial feasibility.

Across developing countries, these models are enabling access to carbon revenues, necessary for the economic viability of:

Mitigation solutions such as clean cooking technologies, renewable mini-grids, and efficient transport systems.

Adaptation interventions such as reforestation, watershed restoration, and climate-resilient agriculture.

Such projects often reach low-income communities, reducing household energy costs, improving health, and supporting livelihoods, proving that carbon markets can simultaneously deliver climate, economic, and social benefits.

Governments are increasingly leveraging carbon market mechanisms to support the achievement of their Nationally Determined Contributions (NDCs) under the Paris Agreement. By integrating carbon revenues into national budgets and financial systems, they can mobilize private finance for mitigation and, in some cases, adaptation priorities. This evolution is a clear demonstration that carbon markets, when governed with integrity, can bridge the financing gap between global climate ambition and local climate action.

b. Role of financial regulators

Financial regulators are increasingly recognized as central actors in shaping the credibility, integrity, and stability of carbon markets. Their role extends beyond traditional prudential oversight to include climate-related risk management, transparency, and market integrity.

Carbon markets are increasingly recognized as vital instruments for channeling private finance toward national and global decarbonization targets. As these markets mature, financial regulators, including central banks, prudential supervisors, and securities authorities, must balance market growth with the oversight of financial stability, transparency, and integrity. Below is a detailed description of the evolving role of financial regulators in governing carbon markets, the prudential treatment of carbon-linked assets, and emerging enabling policies globally.

Figure 2: Carbon market opportunity

First, regulators are tasked with integrating carbon markets into the broader financial system. This includes setting standards for reporting, verification, and the disclosure of climate-related assets and risks. The International Organization of Securities Commissions (IOSCO) has issued consultation reports highlighting the need for strong governance transparency and oversight in voluntary carbon markets to mitigate greenwashing and safeguard investor confidence (IOSCO, 2022).

Second, regulators play a role in enabling investor participation while maintaining financial stability. For instance, the Monetary Authority of Singapore (MAS) has actively promoted carbon trading platforms and supported blended finance structures to crowd-in private investment for carbon projects. Similarly, in Kenya, the Capital Markets Authority (CMA) has been reviewing potential frameworks for the listing and trading of carbon credits on regulated exchanges, positioning itself as a hub for Africa's carbon finance ecosystem.

Third, regulators are instrumental in ensuring alignment with international commitments under the Paris Agreement. Financial oversight is critical to operationalizing Article 6, where the trading of Internationally Transferred Mitigation Outcomes (ITMOs) requires strict monitoring, verification, and avoidance of double-counting to maintain credibility and avoid reputational risks.

Other key aspects of financial regulation with regard to climate finance include:

i Central banks and climate prudential oversight

Central banks are increasingly treating climate risk as financial risk. Through the Network for Greening the Financial System (NGFS), over 130 central banks and regulators are integrating climate risk scenarios into important areas of supervision. Many include carbon price volatility and transition risk into system-wide stress tests.
Institutions such as the European Central Bank (ECB), Bank of England (BoE), and Monetary Authority of Singapore (MAS) now assess how banks' exposures to high-emitting sectors and carbon credit positions could affect balance sheet resilience. The Central Bank of Kenya (CBK) has joined these efforts, embedding sustainability reporting into the financial sector's prudential framework and encouraging climate-related risk disclosures aligned with global standards.

ii Disclosure and transparency: TCFD and the ISSB

The **Task Force on Climate-Related Financial Disclosures (TCFD)**[4] established a global baseline for climate risk transparency. Its successor, the International Sustainability Standards Board (ISSB),[5] formalizes disclosure obligations around climate risk and exposure to carbon markets through IFRS S1 and S2.

Regulators are translating these principles into mandatory rules requiring banks, insurers, and investment funds to report their exposure to carbon credit assets, offtake contracts for carbon credits, and transition risks. Kenya's National Treasury and the Capital Markets Authority (CMA) have begun aligning sustainability reporting frameworks with TCFD principles, signaling the intent to integrate carbon market exposure into institutional climate disclosures.

[1] Task Force on Climate-Related Financial Disclosures | TCFD)

[5] IFRS - Introduction to the ISSB and IFRS Sustainability Disclosure Standards

iii Basel III, FRTB, and the prudential treatment of carbon assets

Under Basel III's revised market risk framework (Fundamental Review of the Trading Book – FRTB), banks must allocate capital based on the liquidity and price modelling of each traded asset. Carbon credits, particularly voluntary ones, pose a challenge due to limited price transparency and heterogeneous quality.

Global regulators are debating:

Risk-weighting

Whether high-integrity carbon credits (e.g., eligible under ICVCM's Core Carbon Principles and ICVCM Assessment Framework,[6] or Article 6.4) could carry lower capital charges than low-quality carbon credits.

Collateral eligibility

Some central banks are exploring whether carbon credits could qualify as repo collateral (securities or assets used as collateral to secure a repurchase agreement) under green lending facilities.

Market risk buffers

Under FRTB, thinly traded or non-modelable carbon credits – carbon credits which do not have enough reliable, transparent, and frequent market price data to build a validated internal model common in voluntary carbon markets – could attract high capital charges due to risk factors, discouraging speculation but incentivizing transparency and standardization.

This regulatory dialogue is crucial for defining how carbon assets are integrated into mainstream financial systems without compromising prudential soundness.

[6] ICVCM Carbon Credit Assessment Status

iv Private sector enablement and market readiness

The private sector, particularly financial institutions, is rapidly mobilizing around climate and carbon finance.

Global banks

Institutions such as HSBC, Standard Chartered, and Citi have established **net-zero portfolios** and launched **carbon trading desks**, linking financing to clients' transition strategies and carbon credit portfolios.

Regional banks

In Africa, **Absa, Equity Bank, and Stanbic** have each adopted **green finance frameworks,** setting targets for sustainable lending and developing internal ESG risk models aligned with TCFD. Absa's **Sustainability Financing Framework (2023)** explicitly supports carbon market participation through renewable energy and carbon credit-linked financing. In the **Kenyan financial sector**, the **Kenya Bankers Association (KBA)** launched the **Sustainable Finance Initiative (SFI)** – a platform that aligns local banks with ESG principles and green lending practices.

Several Kenyan banks are now integrating green financing, which may, in the future, incorporate carbon credits into project finance structures, especially for renewable energy and nature-based solutions.

Private investment funds

Impact and infrastructure investors (e.g., Acumen, BII, and FMO) are developing dedicated carbon finance funds to support high-integrity carbon market projects that generate both financial and environmental returns.

KEY INSIGHT

Financial regulators are no longer passive observers; they are active architects of carbon market integrity, bridging climate commitments with financial system stability.

1.2. RATIONALE FOR SANDBOX TESTING

A regulatory sandbox encourages the testing and launch of innovative products, services, and technologies by providing a platform for small-scale, controlled testing with real consumers in the live market. This helps both regulators and innovators assess the impact and safety of innovations while managing risks. Sandboxes are not "regulation-free" spaces. All tests must comply with existing legal and regulatory frameworks (for example, core consumer protection frameworks), unless specifically modified or waived for the testing period.

For innovators, it offers the chance to trial solutions with regulatory support, refine offerings, and gain valuable feedback from regulators and consumers, helping them navigate compliance and accelerate market entry. For regulators, it provides insights into the real-world benefits and risks of a particular innovation, providing practical feedback on how innovative approaches interact with existing rules and regulations, and, where necessary, catalyzing regulatory reforms to allow products to be rolled out to consumers with appropriate safeguards and protections.

Figure 3: Purpose of regulatory sandboxes

FOR INNOVATORS	FOR REGULATORS
Test innovations	Market insights
Regulatory clarity	Evidence-based insights
Fast-track licensing	Risk mitigations
Real-time feedback	Industry dialogue

For the government and the wider carbon market sector, sandbox testing offers a powerful top-down lever to align innovation with national climate and financial objectives. In Kenya, for example, it allows policymakers to gather real-world evidence to guide the implementation of the Carbon Trading Regulations (2025) and future carbon-market frameworks, while accelerating Kenya's progress toward its NDC targets. By providing a safe, supervised environment to pilot new carbon-finance initiatives, a sandbox can enable joint oversight between CMA, NEMA, and the Climate Change Directorate, allowing regulators to coordinate approvals and data-sharing in real time. This integrated approach will enhance regulatory coherence, generate credible performance data that builds investor confidence, and position the country as a regional hub for transparent, well-governed carbon-market innovation and sustainable finance.

In 2025, CCA published a policy brief exploring regulatory pathways to integrate carbon credits into mainstream finance.[7] The document outlines 15 potential policy interventions to address barriers and integrate carbon credits into mainstream financial markets. These interventions aim to enhance regulatory clarity, improve market transparency, mitigate risks, and foster greater participation in carbon markets, ultimately supporting clean cooking projects and broader climate finance goals.

1. ESTABLISHING A STABLE CARBON MARKET INFRASTRUCTURE

1.1 Regulatory guidance and risk management

Intervention 1: Issue guidance on the prudential treatment of carbon credit assets to standardize their financial treatment, valuation, risk weights, and collateral haircuts.

Intervention 2: Include carbon credits as mitigators in bank climate risk recommendations to enhance their acceptance in risk management frameworks.

Intervention 3: Cover carbon credits in ESG and climate disclosures to promote transparency and accountability in financial reporting.

[7] CCA, Financial regulatory pathways for scaling carbon markets, policy brief 2025

1.2 Market transparency and data integration

Intervention 4: Integrate carbon credit data into climate risk databases to improve risk assessments and lending decisions.

Intervention 5: Incorporate carbon credits in stress testing frameworks to evaluate banks' resilience to carbon price fluctuations and regulatory changes.

2. EXPANDING MARKET PARTICIPATION AND FINANCIAL INTEGRATION

2.1 Financial market expansion

Intervention 6: Support insurability for carbon credit value chains to mitigate investment risks and enhance confidence in the market.

Intervention 7: Classify / Incorporate projects in priority sections (e.g., clean cooking) within national green taxonomies to direct more finance toward such projects.

Intervention 8: Incorporate clean cooking projects in green bond frameworks to scale green bond issuances tied to clean cooking initiatives.

2.2 Financing mechanisms and standardization

Intervention 9: Incentivize loans for carbon credit-related projects by introducing financial incentives or regulatory reliefs for banks.

Intervention 10: Standardize listing, trading, and clearing criteria for carbon credits to enhance market efficiency and transparency.

3. ENSURING FINANCIAL STABILITY AND RISK MITIGATION

3.1 Investment security and product development

Intervention 11: Clarify carbon credits treatment in ESG mutual fund portfolios to promote their inclusion and investment.

Intervention 12: Incubate carbon-credit-linked bond instruments to stimulate early investment and unlock affordable project financing.

Intervention 13: Incubate securitized carbon transactions using longer-term Emission Reduction Purchase Agreements (ERPAs) to anchor securitization structures.

3.2 Risk mitigation and price stability

Intervention 14: Provide backstop guarantees to deliver minimum price support to reduce investment risks caused by carbon price volatility.

Intervention 15: Provide backstop guarantees to insurers covering carbon market investments to stabilize carbon credit prices and reduce risks for investors.

These interventions aim to enhance regulatory clarity, improve market transparency, mitigate risks, and foster greater participation in carbon markets, ultimately supporting clean cooking projects and broader climate finance goals.

Using these 15 interventions as examples, a regulatory sandbox can accelerate and support the introduction of new initiatives by:

- **Allowing firms with innovative ideas to clarify existing regulatory obligations through dialogue with authorities, thereby reducing regulatory uncertainty and improving compliance readiness.** Sandbox participation can help innovators such as carbon project developers, aggregators, and financial institutions understand how existing financial and environmental regulations apply to emerging carbon-linked business models. For example, regulators could test intervention 1 above by allowing selected financial institutions to model the balance-sheet implications of holding verified carbon credits or carbon-linked securities within defined limits.

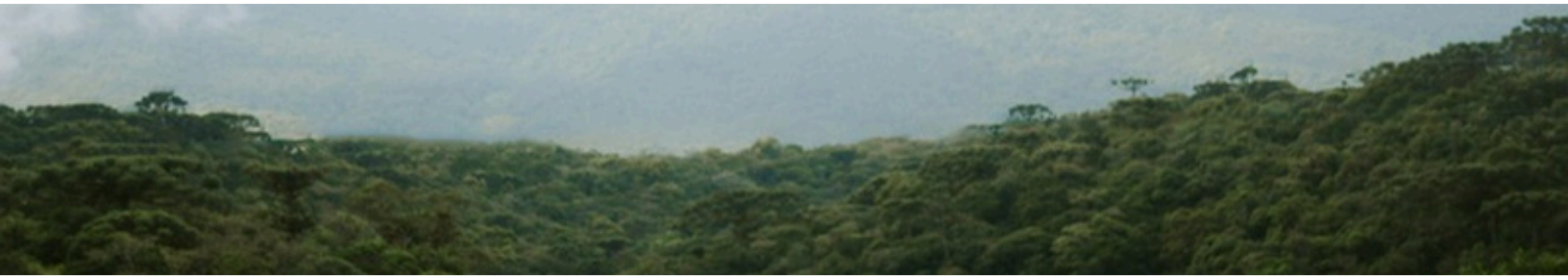
  Intervention 1 seeks to introduce explicit prudential guidance that clarifies how financial institutions should classify, value, risk-weight, and manage exposures linked to carbon credit assets. The absence of such guidance is currently the single largest regulatory barrier preventing banks and insurers from recognizing carbon credits as legitimate financial assets or collateral, thereby limiting their willingness to finance carbon-generating sectors such as clean cooking, forestry, renewable energy, and landscape restoration. The intervention addresses uncertainties around valuation, accounting recognition, capital adequacy, collateral eligibility, due diligence, verification, and ongoing monitoring of carbon-related exposures.

- **Providing a "fast track" licensing regime to allow products and services that require a license to get the necessary permissions to test in the live market.** The sandbox can create a controlled pathway where new carbon-linked financial instruments can operate temporarily before full approval. For example, Intervention 12 on incubating carbon-credit-linked bond instruments can be tested by granting a Testing Approval Letter (TAL) to a qualified issuer piloting a carbon-credit-linked bond.

  Intervention 12 proposes the development and incubation of carbon-credit-linked bond instruments (CCLBs) as an innovative, performance-based financing mechanism that channels private capital into carbon project enterprises. The intervention recommends using regulatory sandboxes to test how bond structures can integrate verified emission-

reduction outcomes into coupon or redemption features. By piloting CCLBs in a controlled environment, regulators can assess risks, refine disclosure and investor-protection rules, and determine how carbon-performance data can be credibly incorporated into financial instruments.

The intended outcome is to create a replicable model for regulated carbon-linked securities, mobilize upfront capital for priority sectors such as clean cooking, forestry, waste, and off-grid energy, and generate evidence to strengthen broader market infrastructure reforms.



- Similarly, Intervention 10 on standardizing listing, trading, and clearing criteria for carbon credits could grant trading platforms a temporary license to test a new trading platform under controlled conditions.

  Intervention 10 focuses on establishing clear, standardized rules for the **listing, trading, and clearing of carbon credits and carbon-linked financial instruments** in capital markets. The intervention recognizes that carbon credits are increasingly being treated as financial-adjacent assets but lack the regulatory clarity, exchange protocols, and investor-protection standards required for organized market participation. It proposes that capital markets regulators, in collaboration with the relevant institutions, develop rules for exchange-based trading, disclosure requirements, market conduct, price transparency, custody and settlement arrangements, and the interface between the National Carbon Registry and market infrastructure.

- **Addressing existing regulatory obstacles or barriers, for example, through rule waivers and modifications.** Sandbox tests can allow regulators to identify and temporarily relax outdated or conflicting rules that hinder innovation. For instance, Intervention 6 on supporting insurability for carbon-credit value chains can be tested by allowing insurers to design and price new risk transfer products without immediately meeting full prudential requirements.

- **Ensuring that risks to consumers and investors from new products or services are appropriately mitigated and controlled through bespoke safeguards.** Sandbox participation requires participants to put in place clear governance, transparency, and impact-reporting measures. For example, Intervention 9 on incentivizing loans for carbon-credit-related projects could be tested by allowing small-scale tests that lower existing regulatory obligations to incentivize the issuance of loans for projects to a small selection of borrowers, putting in place bespoke safeguards (such as enhanced disclosures and limiting loan amounts) to ensure borrowers are adequately protected.

- **Allowing regulatory authorities to gain insights into new products and services, to support evidence-based regulation and forward-looking policy making.** Testing carbon-linked financial instruments can generate empirical data that can guide policy-making. For example, Intervention 8 on incorporating clean cooking projects in green bond frameworks can be tested by collecting real transaction and performance data from sandbox pilots, helping regulators to understand the real-world benefits and risks to support future policy.

- **Promoting close collaboration and dialogue between industry and regulators to support the development of new and innovative solutions.** Sandbox participation fosters continuous learning between innovators and regulators. This collaboration ensures that regulators build expertise on carbon-market instruments while firms receive guidance on compliance pathways.

- **Catalyzing industry demand for policy- and regulatory-specific solutions to challenges.** Sandbox testing can stimulate innovation to address gaps in Kenya's carbon-finance ecosystem. For example, Intervention 15 on providing backstop guarantees or minimum price support can be piloted in partnership with the National Treasury and insurers to explore how such guarantees stabilize credit prices and attract institutional investors.

KEY INSIGHT

Sandboxes create a "test-and-learn" environment where innovation meets regulation, allowing carbon market solutionsto evolve with appropriate safeguards before full-scale deployment.

1.3. OVERVIEW OF SUPPORTIVE CARBON FINANCE AND CLEAN COOKING POLICIES

The successful implementation and scaling of clean-cooking carbon projects rely on a multi-tiered policy architecture spanning national and international levels. Together, these policies create the necessary demand, governance, and enabling environment for carbon finance to accelerate the adoption of clean cooking solutions.

1.3.1 INTERNATIONAL POLICY FRAMEWORKS

Various international agreements establish the foundational principles and market mechanisms that drive demand for carbon credits. These include:

a **The Paris Agreement (2016)**

This serves as a cornerstone of international climate policy. Its key provisions support carbon finance and clean cooking through:

- **Nationally Determined Contributions (NDCs):** Many African countries include clean cooking targets in the conditional portion of their NDCs, signaling a financing need rather than creating compliance demand. By framing clean cooking as a mitigation priority that relies on international support, these NDCs highlight a strong opportunity for mobilizing climate finance through carbon markets, where high-integrity clean-cooking credits can help countries achieve these conditional mitigation outcomes.

- **Article 6 mechanisms:** These provide the regulatory framework for international carbon trading, allowing countries to transfer carbon credits to help the buyer country meet its NDC targets.Recent developments in the EU, where the bloc has begun exploring the use of international credits to help meet future climate targets, demonstrate growing compliance-market appetite and signal a potential pathway for high-integrity clean cooking projects to access significant demand. This could create a significant compliance market opportunity for high-integrity clean cooking projects.

b **Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)**

This generates substantial compliance demand for high-quality carbon credits, with recent analyses estimating that Kenya could unlock between US$5-8 billion in carbon-market revenue through CORSIA and Article 6 pathways.[8] National projections further indicate a potential supply of up to 30 $MtCO_2e$ annually by 2030, equivalent to roughly US$600 million per year at a carbon price of US$20 per tonne.[9]

1.3.2 NATIONAL POLICY FRAMEWORKS IN AFRICA

National governments are establishing detailed regulatory regimes to govern carbon markets and promote clean cooking, ensuring local benefits and alignment with development goals.

a **Carbon finance regulations and policies**

The primary purpose of carbon finance regulation and policies is to create a structured, transparent, and credible market environment that supports investment in projects focused on the reduction and removal of greenhouse gas emissions. They are designed to align carbon market activities with national climate and development goals, prevent double-counting of emissions reductions and removals, and safeguard local communities by mandating equitable revenue sharing and ensuring projects deliver sustainable development benefits.

[8]https://carbon-pulse.com/403363/

[9]CHANGE THE STORY

Table 3: *Select national carbon market regulations in Africa*

COUNTRY	KEY REGULATION/POLICY	PRIMARY FEATURES
Kenya	Climate Change Act (Amendment), 2023[10]	Establishes the statutory basis for Kenya's carbon market framework. Empowers the Cabinet Secretary (Ministry of Environment, Climate Change & Forestry) to issue carbon market regulations. Defines institutional roles, including the Designated National Authority (DNA). Creates the legal foundation for benefit-sharing mechanisms. Mandates approval and authorization processes for carbon projects and Internationally Transferred Mitigation Outcomes (ITMOs).
	The Climate Change (Carbon Market) Regulations, 2024	Establishes criteria for eligible project types and participants. Provides procedures for validation, verification, project registration, project approval and hostcountry authorizations. Expounds on benefitsharing obligations, local community engagement requirements, and compliance with national carbon-market governance structures. Provides a framework for implementing carbon projects. Creates incentives to support greenhouse gas emissions reduction and removal targets in line with the Nationally Determined Contribution. Provides guidance on the annual social contribution for carbon projects.

[10] Climate Change Act - Kenya Law

[11] The Climate Change (Carbon Markets) Regulations, 2024 - Kenya Law

COUNTRY	KEY REGULATION/POLICY	PRIMARY FEATURES
Kenya	Draft Carbon Trading Regulations	Sets rules governing carbon credit transactions in Kenya, including licensing of trading platforms or intermediaries, oversight of exchanges/market facilitators, transaction reporting requirements, anti fraud and transparency obligations, and market-conduct standards. Defines permissible trading arrangements (domestic, voluntary, and international) and outlines protections for market integrity.
	Draft Climate Change (Carbon Registry) Regulations, 2025[12]	Provides for the design, setup, administration, and management of the National Carbon Registry. The proposed regulations apply to the recording, tracking, and management of information on carbon projects and Internationally Transferred Mitigation Outcomes (ITMOs).[13] Establishes a Designated National Authority (DNA), a National Carbon Registry, and detailed procedures for project approval and authorization, with emphasis on revenue sharing.
Rwanda	National Carbon Market Framework (2022)	Aligned with the Paris Agreement and overseen by the Rwanda Environment Management Authority (REMA); has a strong focus on sustainable development co-benefits. Rwanda has ambitious targets for universal access to clean cooking under its National Strategy for Transformation. This is supported by subsidies for technologies like improved cookstoves and biogas digesters.
Zimbabwe	Carbon Credits Trading Regulations (2023)	Specifies a clear revenue-sharing model (70% developer, 25% community, 5% state) to ensure local benefits.

[12] environment.go.ke/wp-content/uploads/2025/09/RIS-Carbon-Registry-Regulations-2025-12.9.25.pdf

[13] RIS-Carbon-Registry-Regulations-2025-12.9.25.pdf

COUNTRY	KEY REGULATION/POLICY	PRIMARY FEATURES
South Africa	Carbon Tax Act (2019)	Creates a compliance market by allowing companies to use domestic carbon credits to reduce tax liability, thereby driving local demand for credits.
Ghana	National Carbon Market Policy (2023)	Guides the development of carbon trading infrastructure and methodologies, including the establishment of a national registry.
	Clean Cooking Policy	The Ghana Clean Cooking Strategy (2020-2030) and LPG Promotion Policy utilize subsidies and public awareness campaigns.
Tanzania	Environmental Management (Carbon Trading) Regulations, 2022	Mandates project registration with a Designated National Authority and requires demonstration of community benefits.

2 Overview of Regulatory Sandboxes

2.1. INTRODUCTION TO REGULATORY SANDBOXES

Regulatory sandboxes are emerging as transformative instruments to bridge the critical gap between technological innovation and regulatory oversight in climate finance. The intersection of carbon markets and regulatory innovation has never been more critical as pressure mounts to deliver credible, scalable climate finance solutions under the Paris Agreement's Article 6 framework.

Regulators worldwide are recognizing that conventional regulatory approaches designed for established financial instruments may inadvertently stifle the very innovations needed to achieve global climate targets.

Regulatory sandboxes offer a sophisticated solution by creating "safe spaces" where initiatives such as carbon credit-linked bond instruments, as well as standardized listing, trading, and clearing criteria for carbon credits, can be rigorously tested under regulatory supervision before being rolled out in the wider market.

In the rapidly evolving landscape of carbon markets, regulatory frameworks often lag behind technological and product innovation.

A regulatory sandbox addresses this challenge by providing a structured pathway for testing innovative solutions under careful regulatory oversight. It offers a framework established by financial regulators that allows both established and emerging market participants, including carbon project developers, climate finance intermediaries, verification entities, technology providers, and investors, to test new products, services, and business models in a controlled environment.

These innovations may include advanced Monitoring, Reporting, and Verification (MRV) tools, such as satellite-based monitoring, real-time IoT data collection, digital MRV platforms, and AI-driven analytics, all of which aim to improve transparency and integrity.

The sandbox can also support experimentation with new aggregation business models, which are particularly relevant for distributed project types such as clean cooking, where thousands or millions of households must be grouped into a single crediting program to achieve scale and reduce transaction costs.

By allowing regulators to observe these innovations in practice, sandboxes help ensure that market rules evolve in step with technological progress while safeguarding environmental and financial integrity.

This chapter explores how regulatory sandboxes are reshaping carbon market development globally, from Singapore's tokenization experiments to South Africa's digital MRV integration with compliance markets. As jurisdictions compete to position themselves as climate finance hubs, those that master the delicate balance of innovation facilitation whilst safeguarding social and environmental integrity through well-designed sandboxes are emerging as leaders in the global carbon economy.

2.1.1 CORE FEATURES OF REGULATORY SANDBOXES

Controlled environment

The regulator provides temporary, tailored regulatory relief (e.g., waivers from specific rules) for the duration of testing. In carbon markets, this might include temporary exemptions from the full public offer documents when issuing a carbon-credit-linked bond, exemptions from full MRV (monitoring, reporting, and verification) requirements while digital solutions are being piloted, or relaxed disclosure rules for tokenized carbon credits during trial phases.

Live testing with real participants

Some central banks are exploring whether carbon credits could qualify as repo collateral (securities or assets used as collateral to secure a repurchase agreement) under green lending facilities.

Close regulatory supervision

Participants are continuously monitored and must report to the regulator, ensuring market risks linked to social and environmental integrity can be controlled.

2.1.2 PURPOSE OF REGULATORY SANDBOXES

Regulatory sandboxes are established to achieve a delicate balance between two often competing objectives:

- **Promote innovation and competition in carbon markets:** Reduce the time and cost of launching innovative climate finance solutions, encourage new carbon project developers and technology providers, and foster a dynamic ecosystem. This is essential for mobilizing the finance needed to meet Paris Agreement targets and achieving SDG 13 (Climate Action).

- **Manage risk and protect market integrity:** Ensure innovation occurs within boundaries where environmental risks (e.g., non-additional credits or permanence issues), social risks (e.g., weak benefit sharing or lack of FPIC/community consultations), and financial risks (e.g., price volatility or fraud) can be identified and mitigated. Consumer and investor protection remains paramount, as does maintaining the integrity of carbon credits as genuine emission reductions and removals.

2.1.3 SPECIFIC REGULATORY OBJECTIVES

In the context of carbon markets, regulators can use sandboxes to:

- **Understand emerging carbon market products and services:** Gain firsthand knowledge of innovations such as carbon credit-linked bonds and insurance products tailored to carbon-credit-related risks. These insights inform future carbon market policy and standards.

- **Make regulations evidence-based:** Use real-world data from sandbox tests to design appropriate, agile regulations fit for digital carbon markets, thus avoiding premature rules that stifle innovation or overly permissive approaches that compromise integrity.

- **Remove barriers to entry:** Help smaller carbon project developers, climate tech startups, and community-based initiatives navigate complex regulatory landscapes originally designed for large financial institutions or multinational corporations.

- **Build trust and transparency:** Demonstrate regulatory commitment to market integrity by actively overseeing innovation, thereby enhancing confidence among corporate buyers and investors.

2.1.4 BENEFITS FOR KEY STAKEHOLDERS

For innovators

Reduced time and cost

Faster route to market than full licensing; critical for early-stage climate tech startups.

Regulatory clarity

Direct dialogue reduces uncertainty around carbon credit classification, disclosure requirements, and compliance.

Investment and partnerships

Sandbox endorsement signals regulatory validation, attracting impact investors and corporate buyers.

Real-world validation

Test carbon credit products, pricing mechanisms, and verification technologies with actual users and transactions.

Iterative learning

Refine MRV accuracy, permanence guarantees, and additionality claims based on regulatory and market feedback.

For regulators

Proactive oversight

Stay ahead of carbon market innovation trends and emerging risks.

Risk-based supervision

Identify greenwashing, double-counting, and permanence risks in controlled settings before market-wide harm.

Improved policy

Design smarter carbon market regulations based on evidence from digital MRV pilots, tokenization experiments, etc.

Market development

Actively cultivate a vibrant, credible carbon market ecosystem that can attract international capital.

International credibility

Demonstrate robust oversight to IOSCO, World Bank, and Article 6 negotiators, enhancing the jurisdiction's reputation.

For the carbon market and society

Accelerated climate finance

New products mobilize capital for mitigation and adaptation projects.

Enhanced market integrity

Controlled testing ensures that only credible, high-integrity carbon solutions reach scale.

Financial inclusion and equity

Innovative benefit-sharing models tested in sandboxes can ensure that indigenous communities and smallholders benefit from carbon revenues.

SDG alignment

Sandboxes support SDG 13 (Climate Action), SDG 17 (Partnerships), and contribute to just tranitions.

Consumer and investor protection

Risks managed before products scale, protecting buyers from fraudulent or low-quality carbon credits.

2.2. EXAMPLES OF REGULATORY SANDBOXES

The regulatory sandbox model has been strategically adopted by both developing and developed nations to accelerate carbon market infrastructure, test climate finance innovations, and build credibility in voluntary and compliance markets. It is important to note that regulatory sandboxes do not have to support carbon markets exclusively. Typically, they support innovative and emerging business models across several sectors and policy priorities. Existing sandboxes are likely to support carbon market products and services with minimal structural changes.

a

Kenya (Capital Markets Authority – CMA)

Kenya has positioned itself as a leader in Africa's carbon markets, with projects spanning forestry, renewable energy, and agriculture. The Capital Markets Authority (CMA) has expressed interest in enabling the trading of carbon credits on regulated platforms, linking climate finance to broader financial market development.

A country-specific feature is Kenya's Amended Climate Change Act (2023),[14] which introduces obligations for carbon-market projects to enter community development agreements and earmark substantial social contributions for impacted communities (at least 40 % for land-based, 25 % for non-land-based projects). This emphasis on equity and local benefit-sharing reflects Kenya's context, where land rights and community involvement are crucial to project sustainability. The principles of transparency, environmental integrity, and regulatory involvement in market oversight are generalized, applying across all jurisdictions seeking to build trust in carbon credits. Sandbox testing could help the CMA pilot trading platforms before full regulatory adoption.

Sandbox features

Focus: Deepening and broadening Kenya's capital markets.

Scope: Open to companies incorporated in Kenya or licensed in equivalent jurisdictions. The innovation must not be clearly addressed under existing laws or regulations.

Progress: Has admitted 12 firms since 2019, with several successful exits.

[14] Climate Change (Amendment) Act (2023)

b

South Africa (Intergovernmental Fintech Working Group - IFWG)[15]

South Africa has taken a distinct approach to carbon markets by embedding them within its broader climate and fiscal policy architecture. The country implemented a carbon tax in 2019,[16] making it the first African country to do so. The carbon tax system includes an offset mechanism that allows regulated entities to purchase carbon credits to reduce their tax liabilities, thereby creating a domestic demand for carbon credits.
The regulatory ecosystem around this tax has required strong oversight to ensure environmental integrity, price stability, and compliance. In this context, the Intergovernmental Fintech Working Group (IFWG) has played a key role in exploring how technology and innovation can support sustainable finance, including carbon markets.

The IFWG is a collaborative initiative that brings together the South African Reserve Bank (SARB), the Financial Sector Conduct Authority (FSCA), the National Treasury, and other regulators to test fintech solutions through its regulatory sandbox. While the IFWG's sandbox is not exclusively focused on carbon markets, it has admitted projects that intersect with sustainability finance and green innovation. This positions South Africa well to integrate carbon market infrastructure, such as digital MRV systems, blockchain registries, and carbon credit exchanges, into its broader fintech ecosystem.

- **Focus:** A collaborative approach across multiple financial regulators (banking, securities, etc.).
- **Scope:** Open to regulated and unregulated innovators, including adjacent industries like telecoms.
- **Example: Testing crypto-asset services and crowdfunding platforms:** This allows regulators to grapple with the cross-border and regulatory boundary challenges these innovations present.
- **Progress:** Its first cohort (2020) saw 9 firms selected from 52 applications; many focused on payments.

KEY INSIGHT

Sandboxes create a "test-and-learn" environment where innovation meets regulation, allowing carbon market solutionsto evolve with appropriate safeguards before full-scale deployment.

[15] IFWG

[16] South Africa Carbon Tax Act

c Singapore (Monetary Authority of Singapore - MAS)

Singapore has positioned itself as Asia's carbon trading and services hub, hosting exchanges like the Climate Impact X (CIX) and developing infrastructure for international Article 6 trading under the Paris Agreement.

Focus: Singapore's "regulatory clarity first" approach provides clear guidance on carbon credit classification (commodity vs. security), taxation, and cross-border flows, reducing uncertainty for sandbox participants and accelerating innovation.

Scope: Financial institutions (FIs), professional services firms partnering or providing support to financial institutions and fintech firms, as well as any interested firm seeking to provide financial services likely to be regulated by MAS.

Example: The MAS regulatory sandbox has been used to pilot:

- Digital MRV Platforms: AI-driven systems for continuous monitoring of carbon projects, reducing verification costs, and improving credibility.
- Carbon Credit Derivatives: Financial instruments allowing hedging of carbon price risk, essential for attracting institutional investors.
- Tokenized Carbon Credits: Fractional ownership and trading of carbon credits via blockchain, lowering barriers for retail and SME participation.

d

Brazil (Multi-Regulator Approach)

Brazil's Securities and Exchange Commission (CVM) launched a regulatory sandbox in 2020[17] to promote innovation in financial services. Among the projects admitted were fintech solutions designed to facilitate carbon trading and green finance.
This sandbox approach reflects Brazil's broader efforts to align its financial system with sustainable development while safeguarding investor protection. The CVM sandbox has provided valuable insights into how digital platforms can support transparent carbon trading.

On 23 January 2024, the CVM authorized Vórtx QR Tokenizadora, under temporary sandbox rules, to negotiate carbon credits and other non-securities on its platform. This initiative is significant because it represents an explicit test of the infrastructure for the financial trading of carbon credits, moving beyond traditional securities, using a DLT-based, tokenized platform.[18]

Focus: The Central Bank (BCB) focuses on payments, credit, and foreign exchange innovations. Its first cycle selected projects for testing new payment solutions. The Securities Commission (CVM) focuses on innovative capital market instruments and services. It requires directors to have a clean legal background.

Scope: Open to legal entities engaged in innovation who seek to develop and test innovative business models, products, services, or experimental techniques and technologies within a controlled and supervised real environment.

Securities Commission (CVM): Focuses on innovative capital market instruments and services. It requires directors to have a clean legal background.

Example: The Insurance Regulator (SUSEP) is a leading example of policy-driven sandboxing. It explicitly prioritizes and scores applications that are "sustainable" (aligning with environmental goals) or "technological." This directly targets innovations that serve public policy goals.

[17] Regulatory-sandbox-reference-guide.pdf

[18] Request for additional authorization within the scope of the regulatory sandbox - vórtx qr tokenizadora s.a. – proc. 19957.001605/2021-80

2.3. COMMON CHALLENGES IN IMPLEMENTING REGULATORY SANDBOXES

While regulatory sandboxes offer a powerful tool for fostering innovation in carbon markets, their design and operation come with a distinct set of challenges that regulators must anticipate and manage. Some of these include:

- **Resource intensity:** Carbon markets and boxes require not only financial regulatory expertise but also environmental science capacity (understanding additionality, permanence, leakage). Many regulators lack climate specialists, making supervision challenging. Including officials from relevant environmental and climate change ministries in both the design and operation of the sandbox (for example, scrutinizing applicant business models and testing plans) is likely to be beneficial.

- **Risk of controlled failure:** Not all pilots succeed. Regulators must be comfortable with some sandbox participants failing to demonstrate viability – a culturally difficult shift in risk-averse regulatory environments.

- **Potential market distortions:** Incumbent carbon project developers or traditional financial institutions may argue that sandboxes give climate solution startups unfair advantages (e.g., temporary relief from full licensing requirements). Careful sandbox design must balance innovation support with competitive fairness, for example, ensuring selection criteria for sandbox support are transparent and clear, and decision-making structures are robust.

- **Scalability barriers:** Successfully transitioning a carbon innovation from sandbox to full market deployment often requires broaderregulatory reforms (e.g., amending securities laws to accommodate tokenized credits, updating tax codes for carbon-linked bonds). Without commitment to such reforms, sandbox learnings may not translate into market transformation.

- **Environmental integrity risks:** Relaxing certain rules during sandbox testing (e.g., abbreviated MRV protocols) could inadvertently allow low-quality or non-additional carbon credits into the market. Robust safeguards, including independent verification and clear environmental baselines, are essential and should not deviate from integrity best practice – ICVCM CCPs and Article 6 PACM.

- **Cross-border complexity:** Carbon credits often involve cross-border transactions (e.g., credits generated in Kenya sold to European buyers). Sandboxes must navigate international standards (ICVCM, Article 6 rules) and coordinate with foreign regulators—adding diplomatic and legal complexity

KEY INSIGHT

Successful carbon market sand boxes require a "triple mandate" approach that combines financial regulation expertise, environmental science rigor, and technology fluency. Jurisdictions that invest in cross-disciplinary sandbox teams and international coordination mechanisms see the highest success rates.

2.4. WHEN AND WHY TO USE A REGULATORY SANDBOX

2.4.1 WHEN TO USE A SANDBOX

A regulatory sandbox is the right tool to use when an innovative product, service, or business model faces a genuine regulatory obstacle that prevents it from being tested or launched under the existing regulatory framework. It is specifically designed for situations characterized by high innovation, high regulatory uncertainty, and manageable risk.

Regulators typically deploy sandboxes in contexts where **innovation is emerging faster than regulation,** and where traditional frameworks may stifle experimentation. A sandbox is particularly relevant when:

i **New or unproven technologies are emerging**

When markets see disruptive technologies such as blockchain, tokenization, or AI-driven monitoring tools, regulators may not yet have the frameworks to evaluate risks. Sandboxes allow innovators to test such tools while regulators learn how to supervise them.

ii **Markets are nascent or evolving**

In areas like carbon trading, digital payments, or green finance, markets may still be under development. A sandbox offers a "safe space" for experimentation before large-scale deployment, minimizing systemic risk.

iii **There is high uncertainty around risks and benefits**

For example, tokenized carbon credits or digital MRV (monitoring, reporting, and verification) tools can reduce costs and improve transparency but may pose cybersecurity or fraud risks. Sandboxes let regulators observe and control these trade-offs in real time.

iv **Regulatory capacity is still building**

In emerging economies where regulatory institutions are still strengthening; a sandbox provides a structured approach for capacity building and evidence-based policymaking.

v **Cross-sectoral innovation is occurring**

Many new products blur the boundaries between finance, technology, and sustainability (e.g., carbon credits traded as financial instruments). Sandboxes provide a mechanism for multiple regulators to collaborate and align oversight.

2.4.2 WHY USE A SANDBOX

The value of sandboxes extends beyond just protecting consumers. They also create a learning and innovation ecosystem. The main rationales for sandbox use include:

- **Promoting innovation without compromising stability:** Sandboxes allow innovators to test products in a limited scope, enabling creativity while maintaining safeguards. For regulators, this reduces the risk of "innovation flight," where firms move to unregulated markets.

- **Improving regulatory learning and responsiveness:** Data and insights from sandbox pilots inform policymakers on how to update or refine regulatory frameworks. This evidence-based approach is more adaptive than traditional rulemaking.
- **Enhancing consumer protection and trust:** By requiring safeguards such as disclosure, reporting, and consumer redress mechanisms during sandbox testing, regulators ensure that users are protected even as innovations are trialed.
- **Building market confidence and attracting investment:** Firms tested in sandboxes often gain credibility and investor confidence. For example, many fintechs in the UK FCA sandbox went on to scale commercially and raise significant funding.
- **Supporting Sustainable Development Goals (SDGs):** In the context of climate finance and carbon markets, sandboxes can accelerate the testing of solutions that address SDG 13 (Climate Action) while ensuring market integrity.
- **Encourage new market entrants:** Sandboxes can minimize regulatory uncertainty and ambiguity while offering customized, proactive support to firms, reducing the time and cost of launching innovative ideas.

2.5. SANDBOX SUITABILITY ASSESSMENT CHECKLIST

A sandbox suitability assessment checklist is a structured decision-making tool that regulators use to determine whether implementing a regulatory sandbox is appropriate, given their specific legal, institutional, and market contexts. The checklist includes several detailed phases and criteria to ensure that the sandbox aligns with regulatory objectives and capacity constraints. Below is a summary of a suitability assessment checklist.

Table 4: *Sandbox suitability checklist*

	CRITERIA	KEY QUESTIONS/INDICATORS	DECISION CONSIDERATIONS
1	Regulatory objective	Is there a clear, mandate-aligned objective for a sandbox?	If unclear, consider alternatives.
2	Regulatory barriers	Are there costly compliance, uncertainty, or prohibitions?	Can barriers be resolved without live testing?
3	Innovation benefit	Does the innovation promise significant consumer or market benefits?	Evaluate the potential impact and risks.
4	Legal authority	Does the regulator have a mandate/legal authority for the sandbox?	Evaluate the need for legislative changes.
5	Market demand and conditions	Is there sufficient innovation activity and interest?	Tailor sandbox design to market maturity.
6	Regulatory capacity	Are the resources and expertise adequate?	Capacity limits may preclude full sandbox.
7	Necessity of live testing	Is live testing essential to assess risks and benefits?	Sandbox is justified only if evidence cannot be gathered otherwise.

8	Exit strategy clarity	Are exit options legally and operationally clear?	Avoid launching sandboxes without exit clarity.
9	Stakeholder engagement	Have market participants and peers been consulted?	Engagement improves design and buy-in.
10	Alternative tools considered	Have alternatives been sufficiently explored?	Sandbox as a last resort for complex regulatory challenges.

KEY INSIGHT

For carbon markets, criterion #6 (Regulatory Capacity) is often the binding constraint. Unlike traditional fintech sandboxes, carbon market supervision requires an understanding of environmental science, i.e., additionality assessment, permanence risk, andleakage quantification alongside carbon finance and technological expertise. Jurisdictions should invest in building this triple capacitybefore launching sandboxes, potentially through partnerships with environmental ministries, climate researchinstitutions, or international bodies like the UNFCCC Secretariat.

The sandbox suitability assessment checklist is thus not a simple yes/no tool but a sophisticated decision-making framework that guides regulators in thoroughly evaluating the necessity, feasibility, and anticipated outcomes of implementing a sandbox. It helps prevent common pitfalls such as over-investing in resource-intensive programs that may sidetrack foundational regulatory reforms or cause market distortions.

By adhering to this checklist, regulators can align sandbox initiatives with strategic objectives, ensure legal compliance, and optimize resource allocation while fostering innovation and financial inclusion responsibly.

This approach underscores that regulatory sandboxes are specialized instruments best deployed after other innovation facilitators and regulatory alternatives have been considered. To support regulators in selecting the most appropriate tool for their context, the following section outlines key alternatives that can complement or substitute a regulatory sandbox.

2.6. KEY ALTERNATIVES TO A REGULATORY SANDBOX

While regulatory sandboxes offer a valuable mechanism for controlled experimentation, they are not the only tool available to regulators seeking to balance innovation with market integrity. Depending on the maturity of the innovation, the regulatory context, and resource constraints, several alternative approaches may offer more suitable or complementary pathways. The key alternatives to a regulatory sandbox include:

a **Test-and-learn approach (ad hoc testing)**

This is a less formal, more flexible framework where regulators allow limited live testing of specific innovations without establishing a permanent sandbox program. It suits situations where a single innovation is promising, but the regulator needs more information before making a regulatory decision. Test-and-learn frameworks are often quicker to set up and less resource-intensive. For example, mobile money pilots in Kenya and the Philippines benefited from such an approach.

b **Innovation offices or innovation hubs**

These are structured but informal mechanisms for ongoing regulatory engagement with the financial industry without live testing. They provide guidance, advice, and support to innovators navigating the regulatory environment. Innovation hubs are scalable, cost-effective, and foster continuous dialogue, helping regulators understand market developments and emerging risks. Examples include innovation hubs in France, Uganda, and the United Kingdom.

c **Wait-and-see or regulatory forbearance**

With this approach, regulators monitor emerging innovations passively before deciding on regulatory treatment. In some cases, forbearance is exercised, where regulators tolerate certain noncompliant behaviors temporarily to observe market evolution or until legal clarity is achieved. This approach is suitable for early-stage innovations with high regulatory uncertainty, such as cryptocurrencies or person-to-person lending models in their infancy.

d **Regulatory changes (rulemaking or licensing reform)**

Instead of live testing, regulators may update or clarify existing rules, issue guidance, or create new licensing regimes to accommodate innovations. This approach is often more efficient when the innovation's risks and benefits are reasonably understood or when the innovation can be enabled by rule amendments or new licenses without additional live evidence. For instance, remote customer identification regulations in Malaysia or fintech-specific licensing regimes in Australia, Colombia, and Switzerland illustrate this approach.

e **A combination of the above**

The above alternatives can be used in combination or as complementary tools alongside sandboxes. For example, innovation hubs can serve as preliminary channels to assess market needs and reduce unnecessary sandbox applications. Regulatory changes can be informed by insights gained through innovation hubs or test-and-learn pilots.

2.6. 1 WHY CONSIDER ALTERNATIVES?

Regulatory sandboxes are resource-intensive and may not be suitable in all contexts. They require clear regulatory objectives, legal mandates, and sufficient capacity. Alternatives like innovation hubs or test-and-learn frameworks are less costly, can engage a broader range of innovators, and help regulators build market intelligence without the operational complexities of a sandbox. Additionally, regulatory changes can resolve barriers more broadly and rapidly than case-by-case sandbox tests.

Ultimately, the suitability of a regulatory sandbox depends on a deliberate, evidence-based framework that balances regulatory goals, legal and institutional readiness, market realities, resource limitations, and the specific benefits of live testing. This ensures sandboxes are used as targeted, outcome-focused tools rather than default solutions, empowering regulators to encourage innovation in a responsible and inclusive manner.

3 Types of Sandbox Models

3.1. INTRODUCTION TO SANDBOX MODELS

Over time, different sandbox models have emerged to address varying policy objectives, market needs, and regulatory challenges. The diversity in sandbox designs reflects the recognition that innovation occurs across different dimensions - from product development and policy evaluation to cross-sectoral collaboration and international expansion.

Understanding these different models is crucial for regulatory authorities to select and design the most appropriate framework that aligns with their specific policy goals, market context, and regulatory capacity. Each model offers distinct advantages and addresses different aspects of the innovation ecosystem, from fostering competition and market entry to facilitating regulatory learning and international cooperation.

3.2. TYPES OF SANDBOX MODELS

PRODUCT-TESTING SANDBOX

Designed to increase competition through encouraging innovation and lowering the cost of entering regulated marketplaces. They generally test use-cases and the viability of new technologies and business models that require licenses and hasten the route to market.

Example of how this could support carbon markets: Supporting firms looking to issue a carbon credit-linked bond by issuing temporary licenses or regulatory forbearance and clarifying areas of regulatory uncertainty.

POLICY-PROMOTING SANDBOX

These sandboxes seek to test or evaluate potential new regulations. This could make the scope for accepting firms into the sandbox more focused,for example by only accepting applicants that can help evaluate a specific regulatory hypothesis.

Example of how this could support carbon markets: Work with commercial banks to understand how carbon credits could be integrated as assets to align with Basel III standards to understand the real-world impacts of any new regulatory guidance.

CROSS-SECTOR SANDBOX

This sandbox subtypeapplies to product, policy, or digital sandboxes which operateacross several sectors, either within financial services (e.g. payments, insurance and securities), or across broaderindustries (e.g. financial services, energy, utilities, telecommunications).

Example of how this could support carbon markets: A collaborative sandbox involving banking, capital markets, and insurance regulatory authorities to develop ESG disclosure guidelines for firms that reflect carbon credits.

CROSS-BORDER SANDBOX

Designed to encourage and support cross-border testingand operation of firms, seeking to enable firms to scale more rapidly on a regionalor global basis. A cross-border sandbox may either link multiple existing sandboxes together or providea common testing platform for a group of regulatory authorities.

Example of how this could support carbon markets: Development of harmonized classifications of clean cooking projects within national green taxonomies.

3.3. SANDBOX DESIGN OPTIONS

Depending on regulatory objectives and market dynamics, sandbox programs can be designed as either cohort-based or always-open.

COHORT-BASED SANDBOX

Key Advantages:

- Provides clear timelines for application, testing and evaluation.
- Helps regulators plan and allocate resources more efficiently.
- Provides communication opportunities to spotlight the sandbox and encourage market demand.
- Enables batch processing of applications for efficiency.

ALWAYS 'OPEN' SANDBOX

Key Advantages:

- Allows applicants to apply when they believe they are ready.
- Eliminates waiting periodsfor next cohort cycles.
- Provides flexibility for firms with urgent market entry needs.
- Continuous intake supports ongoing innovation pipeline.

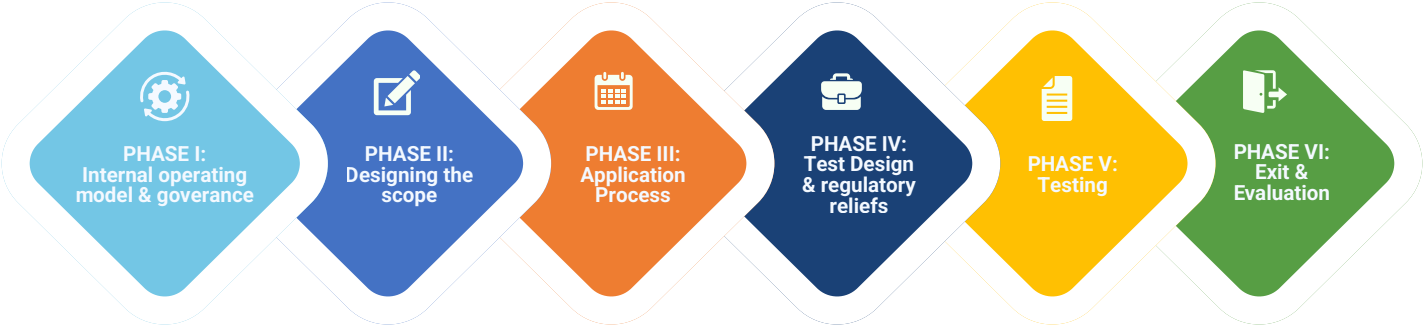
Hybrid Approach: Some sandboxes combine both approaches by offering clearly defined application windows while also remaining open to direct engagement from firms.

4 Regulatory Sandbox Design Process

4.1. SANDBOX DESIGN PHASES

Designing a regulatory sandbox requires a structured and deliberate approach that balances innovation support with market integrity, consumer protection, and regulatory accountability. The phases outlined below provide a comprehensive framework to guide regulators through this process.

Figure 4: Sandbox design phases



4.2. INTERNAL OPERATING MODEL AND GOVERNANCE

This phase sets out the internal operating structure of the sandbox, roles and responsibilities, and key operational processes. Design choices could include setting up a **specialized sandbox unit** or a **hub-and-spoke** (a central point of contact coordinating sandbox inquiries with other units) option. Consideration should always be given to how any dedicated team works with the wider organization to ensure sufficient expertise is obtained to successfully support the sandbox, for example, business model expertise, regulatory expertise (licensing, legal, supervision, etc.), and expertise in carbon markets.

Governance and decision-making processes should also be developed, for example, by setting up a dedicated **"sandbox panel"** to make key decisions. The panel will generally be staffed by the primary regulatory authority overseeing and supervising the test but should also include staff from other relevant bodies to ensure sandbox design and implementation is supported by a broad group of subject matter experts (such as the Climate Change Directorate), and other third-party experts.

4.3. DESIGNING THE SCOPE

The scope of the sandbox determines the types of firms, business models, and technologies eligible to participate. It should be published so that potential applicants can clearly determine whether the sandbox is suitable for their firm and proposition.

The policy or regulatory priorities for support should also be clearly identified, for example, by inviting applications that look to support the issuance of carbon credit-linked bonds. This can help catalyze market demand by proposing models that support specific carbon market interventions.

The scope should be as broad as possible to encourage sufficient demand], so it may benefit from being open to firms that are currently regulated (e.g., existing banks and insurance firms), those who may need to be regulated (e.g., clean cooking carbon start-ups), or those organizations who will need to partner with a licensed financial services firm to conduct a sandbox test (e.g., carbon project developers).

4.4. APPLICATION PROCESS

It is generally preferable to operate the sandbox on a **cohort basis**, with clear application windows and deadlines for firms to apply to the sandbox. This both provides "hooks" to communicate about the sandbox (encouraging demand) and allows regulatory authorities to **most effectively manage internal resources.**

For example, all applications can be assessed and taken through governance processes as a batch, and it provides predictability as to when particular resources and expertise are required. An application window should therefore be determined. Prospective applicants should be encouraged to contact the regulatory authority with any questions or clarifications during this period.

An **online application form** should be created. The application form should strike a balance between requesting sufficient information for meets the eligibility criteria, whilst not requiring an undue amount of information that risks both stifling demand and making the review of such information extremely resource-intensive. The minimum questions an application form should include are contained in Annex 1.

During the period when the sandbox is open for applications, regular communications to the market are beneficial to encourage as many good-quality applications as possible. This can include social media activity, engagement with relevant climate industry bodies and trade associations to promote the sandbox to their members, and utilizing existing communication vehicles (e.g., speeches) to raise awareness.

4.4.1 ELIGIBILITY CRITERIA AND APPLICATION ASSESSMENT

Eligibility criteria determine which applications can be supported in the sandbox.

Table 5: Proposed eligibility criteria

CRITERIA	DESCRIPTION	ADDITIONAL GUIDANCE
In scope	The applicant is looking to test a solution that addresses carbon markets and is eligible to apply to the sandbox.	N/A
Genuine innovation	The applicant is looking to test a new product or service, or utilize a technology or delivery channel, that is new or novel, or significantly different from existing offerings.	Some aspects of the proposition must be significantly different from existing products and services.
Benefit to consumers	The applicant is looking to test a product or service that offers benefits to consumers (either individuals or businesses).	"Consumers" should be considered in their widest sense (individuals, businesses, markets).
Ready to test	The applicant is ready to test its proposition with real customers in the live market.	Expectation that the firm's product or service should be fully tested and operational, and able to fulfil any regulatory obligations, within a reasonable time period once accepted.
Need for a sandbox	The applicant or regulatory authority will benefit from support from the sandbox.	For example, it is unclear how or if the product or service fits within existing regulatory frameworks, a license is required to undertake a test, no regulatory framework currently exists, and/or guidance is sought to understand regulatory expectations.
Scalability	The applicant must have a plan to deploy the proposition on a commercial scale if testing is successful.	This prioritizes solutions that can grow beyond a pilot and have the potential to benefit many customers/firms, and informs broader market development.

These criteria are purposely broad so as not to create undue barriers to entry, and to allow a judgment-based assessment of whether an applicant meets them. All criteria should be met for an applicant to be accepted into the sandbox.

All applications received by the application deadline should be considered by the regulatory authority, using the following suggested process:

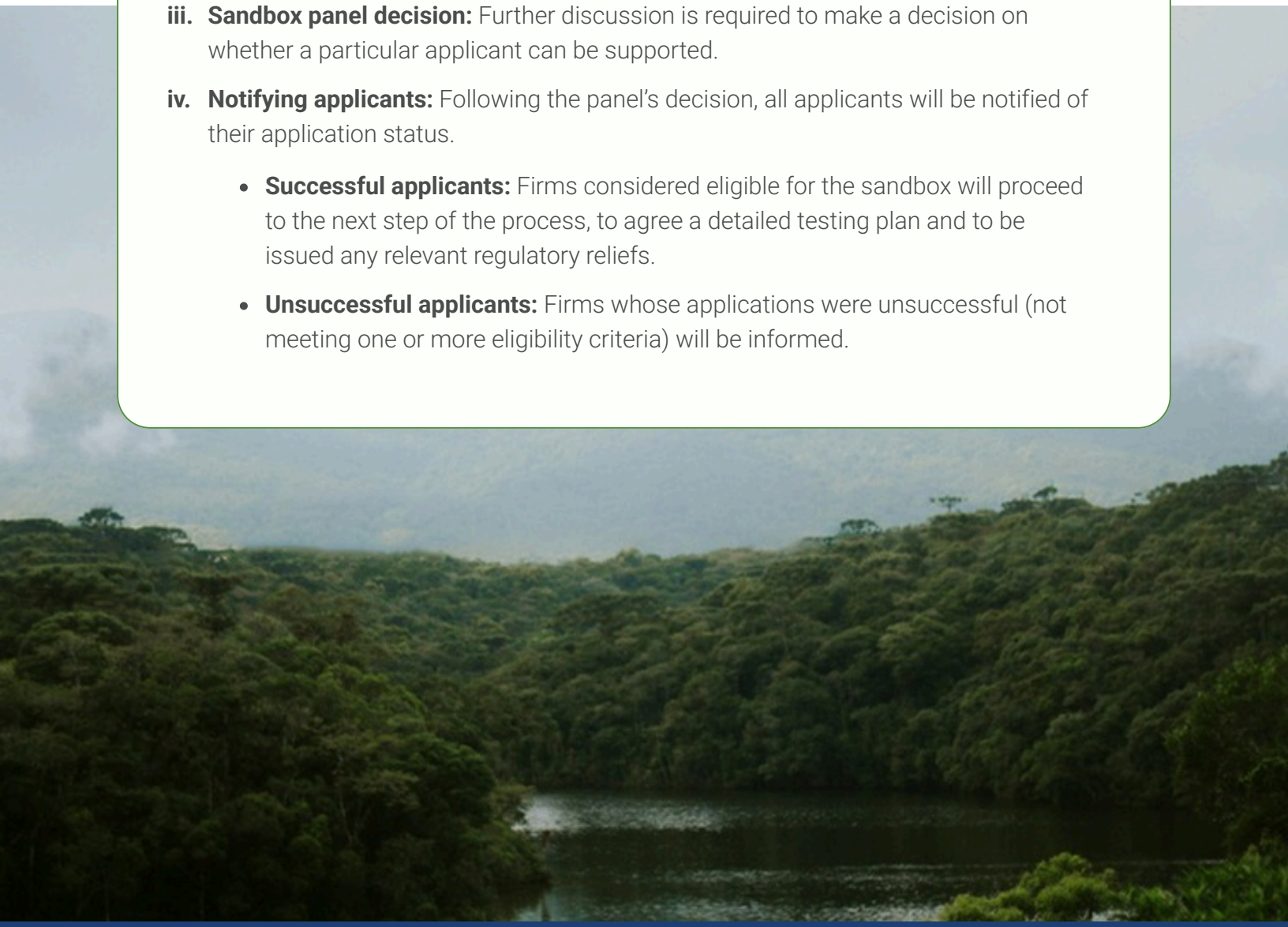
i. **Initial screening:** All applications are initially assessed against the 'in scope' criteria – it is likely that some applications will not be in scope for a particular sandbox cohort (for example, they are not proposing solutions that address carbon markets). Those considered out of scope are not considered further.

ii. **In-depth review:** Those applications considered in-scope are then reviewed in detail.

iii. **Sandbox panel decision:** Further discussion is required to make a decision on whether a particular applicant can be supported.

iv. **Notifying applicants:** Following the panel's decision, all applicants will be notified of their application status.

- **Successful applicants:** Firms considered eligible for the sandbox will proceed to the next step of the process, to agree a detailed testing plan and to be issued any relevant regulatory reliefs.
- **Unsuccessful applicants:** Firms whose applications were unsuccessful (not meeting one or more eligibility criteria) will be informed.



4.5. TEST DESIGN AND REGULATORY RELIEFS

For those applicants considered eligible, the next stage is to develop and agree bespoke **sandbox testing plans** and **issue any regulatory reliefs.** Given the complexity of carbon markets, where innovations may affect environmental integrity, MRV processes, credit issuance or pricing transparency, the design of testing plans must be rigorous and reflect risks unique to carbon-linked instruments and services.

a Testing Plan

Testing plans define the scope and boundaries of the sandbox test, articulate safeguards, and outline precisely how the innovation will be trialed under real-market conditions. For carbon-market innovations, all testing plans should include:

- A detailed description of the innovation and its intended climate, environmental, and market outcomes, such as improving MRV accuracy, reducing verification costs, enhancing credit traceability, enabling tokenized trading, or strengthening benefit-sharing with communities.
- A clear breakdown of the testing methodology, including the types of carbon projects, buyers, investors, or intermediaries involved; permissible transaction volumes (e.g., number of credits issued, transferred, or retired); the use of digital MRV or registries; and the duration and geographic scope of testing, considering the cross-border nature of many carbon markets.
- Identification of key risks unique to carbon markets, such as risks of over-issuance, weak additionality assessments, MRV data errors, double-counting, leakage, environmental or social harms, or misaligned Article 6 authorizations. Each risk should be paired with targeted mitigation strategies, including verification protocols, environmental-integrity safeguards, data-validation procedures, and grievance-redress requirements.
- Clearly defined success indicators/KPIs, tailored to the specific carbon innovation being tested. These may include environmental-integrity KPIs (accuracy of MRV data, variance against baseline), financial KPIs (transaction costs, liquidity), integrity KPIs (alignment with ICVCM Core Carbon Principles, interoperability with Article 6 registries), and user-adoption KPIs.

Testing plans are bespoke to each test, and regulatory authorities should be encouraged to adopt a flexible approach based on the specific risks of a test and what the firm is looking to achieve. Suggestions regarding what should be included in a testing plan, at a minimum, are provided in Annex 2.

b Regulatory reliefs

Regulatory reliefs are **mechanisms and concessions** provided by the regulator to enable firms to test carbon-market innovations under controlled conditions while maintaining appropriate safeguards for environmental integrity, market credibility, and consumer protection. Such reliefs help overcome legacy rules that were not designed for these emerging models.

- **Testing Approval Letters (TALs) or similar:** Upon admission, sandbox participants may initially be issued a Testing Approval Letter, signaling that the regulatory authorities have allowed the agreed-upon tests to be conducted within the sandbox, under specified conditions and for a limited time. They are particularly helpful in setting testing parameters and requirements in areas where no explicit regulatory framework yet exists (e.g., Pilots involving digital MRV). TALs formalize testing boundaries, environmental-integrity safeguards, and alignment expectations with frameworks such as ICVCM CCPs and Article 6 reporting requirements.
- **Modified licensing requirements:** Modified licenses are regulatory reliefs where the carbon-linked innovation falls under an existing licensing regime that the applicant does not yet meet (e.g., issuing carbon-linked bonds, operating a carbon registry, or facilitating trading of tokenized credits). Regulators may provide a time-limited, conditional license. These licenses allow controlled testing while imposing restrictions to ensure that risks such as mispricing, over-issuance, or inaccurate environmental claims are appropriately managed.
- **Rule waivers and modifications:** Rule waivers are regulatory reliefs used when specific regulatory rules pose challenges to testing an innovation, for example, where an existing rule inhibits the roll-out of a solution because it did not foresee the development of a particular innovative proposition. For example, relaxing stringent documentation requirements where digital MRV tools provide alternative evidence, lowering risk weightages, consideration of ERPAs against collateral for financing carbon projects, etc. However, any waiver should explicitly require that environmental integrity standards remain uncompromised.
- **Individual guidance:** Regulatory authorities may provide tailored guidance to sandbox participants. This guidance may clarify regulatory requirements, compliance obligations, risk management practices, and consumer protection standards specific to each participant's innovation. For example, regulators could issue guidance clarifying how firms could use carbon credit assets in their capital adequacy calculations.

4.6. TESTING AND SUPERVISION

Effective supervision of tests within a regulatory sandbox is critical to safeguarding environmental integrity, market credibility, and consumer protection, particularly given the technical complexity of carbon-market innovations. Testing and supervision should therefore incorporate mechanisms that go beyond traditional financial-sector monitoring and explicitly account for carbon credit quality, MRV reliability, environmental safeguards, and claims integrity.

i

Firm Reports

Participants should be required to submit periodic reports that capture operational, environmental, and market-integrity dimensions of their activities, in line with KPIs defined in the testing plan. These reports should include:

- **Operational activity updates**, such as the number of carbon-credit transactions, volumes issued or retired, pricing information (where applicable), user adoption rates, and any technical or system issues encountered (e.g., digital MRV system failures, registry interoperability problems).
- **Environmental performance insights**, including updates on MRV data collection, verification outcomes, baseline adherence, additionality assessments, and any issues related to permanence, leakage risks, or community benefit-sharing obligations.
- **Progress against sandbox KPIs**, covering environmental KPIs (e.g., accuracy of emissions-reduction estimates, MRV validation rates), financial KPIs (e.g., liquidity, transaction costs, investor uptake), and integrity KPIs (e.g., conformity with ICVCM Core Carbon Principles, Article 6 reporting requirements, or host country authorization procedures).
- **Risk management updates,** highlighting newly identified risks such as data manipulation, credit over-issuance, MRV inconsistencies, environmental or social grievances, or cyber/technology vulnerabilities. Firms should also outline mitigation actions and any revisions to internal controls.
- **Regulatory compliance and safeguards**, reporting on adherence to conditions set out in the test plan, including any regulatory reliefs granted (e.g., temporary waivers on licensing or disclosure requirements) and demonstrating how environmental safeguards remain uncompromised during testing.
- **Feedback from buyers, investors, and other market participants**, capturing insights on credit quality, pricing transparency, usability of the innovation (e.g., digital MRV or tokenized credits), and overall trust and adoption barriers.

ii **Pre-Exit Period and Preparations**

The sandbox team should initiate the pre-exit process by coordinating with the participating firm to review the progress of the test. This includes evaluating the firm's performance against the established key performance indicators (KPIs) and identifying any remaining tasks or issues that need to be addressed before exiting the sandbox.

4.7. EXITING FROM THE SANDBOX

To ensure consistency and facilitate analysis, all exiting firms should be required to submit a final report. This report will cover the following key areas:

- **Innovation description:** A detailed overview of the carbon-market innovation tested, such as a carbon-linked bond structure or digital MRV tool, including its core functionalities and the specific market or integrity gap it aimed to address (e.g., reducing verification costs, improving credit traceability, or enabling investor confidence).
- **Testing methodology:** A clear description of the testing approach, including the types of carbon credits involved, target user or investor segments (buyers, project developers, fund managers), permitted transaction volumes, number of participants, and the data-collection methods used, particularly MRV monitoring, registry tracking, or credit-issuance validation processes.
- **Testing results:** Key findings from the testing phase, supported by data and KPIs. This includes environmental-integrity outcomes (e.g., accuracy of emissions-reduction estimates, MRV validation rates), operational performance, adoption metrics, financial results (pricing spreads, liquidity), challenges encountered, and any unexpected environmental or market-integrity issues (e.g., double-counting risks, discrepancies in MRV data).
- **Learnings and recommendations:** Practical insights on what worked, what did not, and what adjustments may be necessary either to improve the innovation itself or to strengthen the regulatory sandbox framework (e.g., improvements in approval processes, guidance needs, or integrity safeguards).
- **Exit strategy:** For firms transitioning to wider-market deployment, a detailed plan outlining the regulatory approvals required, steps to meet full licensing or environmental-integrity standards, and any additional controls needed to ensure the safe and compliant scaling of the innovation.

4.7.1 EXIT PROCESSES FOR DIFFERENT SCENARIOS

Sandbox testing may not always lead to a clear-cut outcome, and there are various scenarios that are likely to be encountered at the end of testing.

Regulatory changes needed: In instances where the firm is undertaking activities where there are no existing regulatory frameworks in place, or existing frameworks need to be amended by the regulatory authority, i.e., the tested solution falls under the regulator's mandate but cannot be permitted without changes to the regulatory framework.

- The firm could be given permission (via a "no objection letter") to continue to undertake business on a small scale, with certain sandbox testing restrictions relaxed or removed. In this scenario, the impact on competition (i.e., allowing the sandbox firm to continue to operate, but other firms may not be permitted to enter the market) should be considered.
- In the meantime, the regulatory authority develops new regulatory frameworks or amends existing frameworks. Once these have been developed, the firm would then apply for a license (if appropriate) and be required to comply with all relevant regulatory obligations.

Full license required: In instances where the firm has a) either been issued with a temporary license to undertake their sandbox test, or b) it is clear through the sandbox test that the firm is undertaking an activity that is subject to an existing licensable activity.

- The firm will need to demonstrate it can fully comply with all legal and regulatory requirements.
- The regulatory authority may support the firm in the licensing process, providing guidance and support to assist the firm in navigating the regulatory requirements that apply to it.

Other formal approval: In instances where a firm is undertaking regulatory activities but there is either a regulatory barrier or regulatory ambiguity that requires the regulatory authority to issue (or extend a sandbox-specific) waiver/rule modification or guidance:

- The sandbox firm can roll out the innovation in the market in compliance with regulatory requirements, subject to exemptions and/or waivers granted.
- Some regulators use powers of discretion to authorize temporary operations until specific regulatory barriers have been addressed.

Test extension required: In cases where additional testing is necessary to gather conclusive data, a predetermined extension may be granted for the testing phase within the sandbox environment.

5 Institutional Roles and Governance in the Sandbox

5.1. GOVERNANCE

Effective governance underpins the success of a regulatory sandbox. Because sandboxes convene diverse actors, a clear institutional framework is vital to define roles, manage expectations, and protect the public interest. Without it, sandboxes risk becoming fragmented pilots that generate insights but fail to deliver impact. Governance roles evolve throughout the sandbox learning cycle, with each actor contributing differently at each stage. Linking governance directly to this cycle embeds monitoring, learning, and feedback into the process, turning short-term experiments into structured, evidence-based pathways for regulatory innovation and sector-wide transformation.

For the governance system to work, it must be anchored in four guiding principles:

Accountability

Regulators remain the ultimate custodians of consumer protection and policy alignment.

Transparency

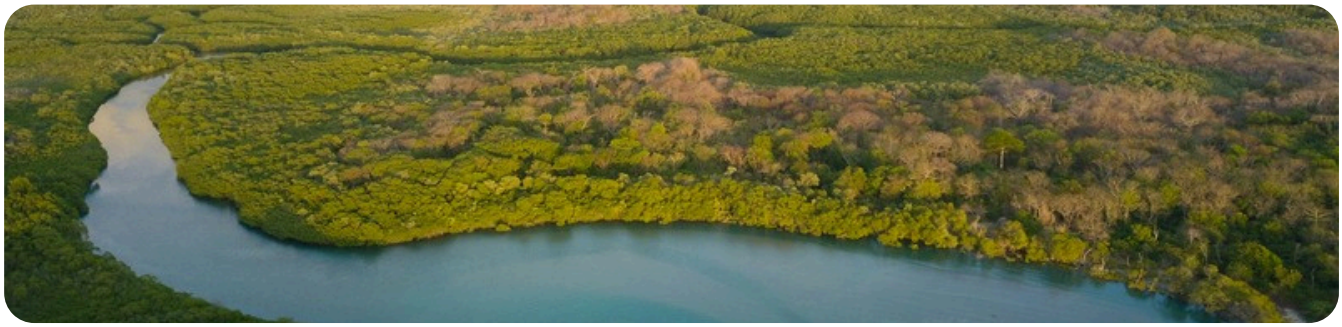
Processes are documented, reporting is standardized, and findings are openly shared with stakeholders.

Independence

Expert panels and observers provide impartial oversight, reducing risks of regulatory capture or bias.

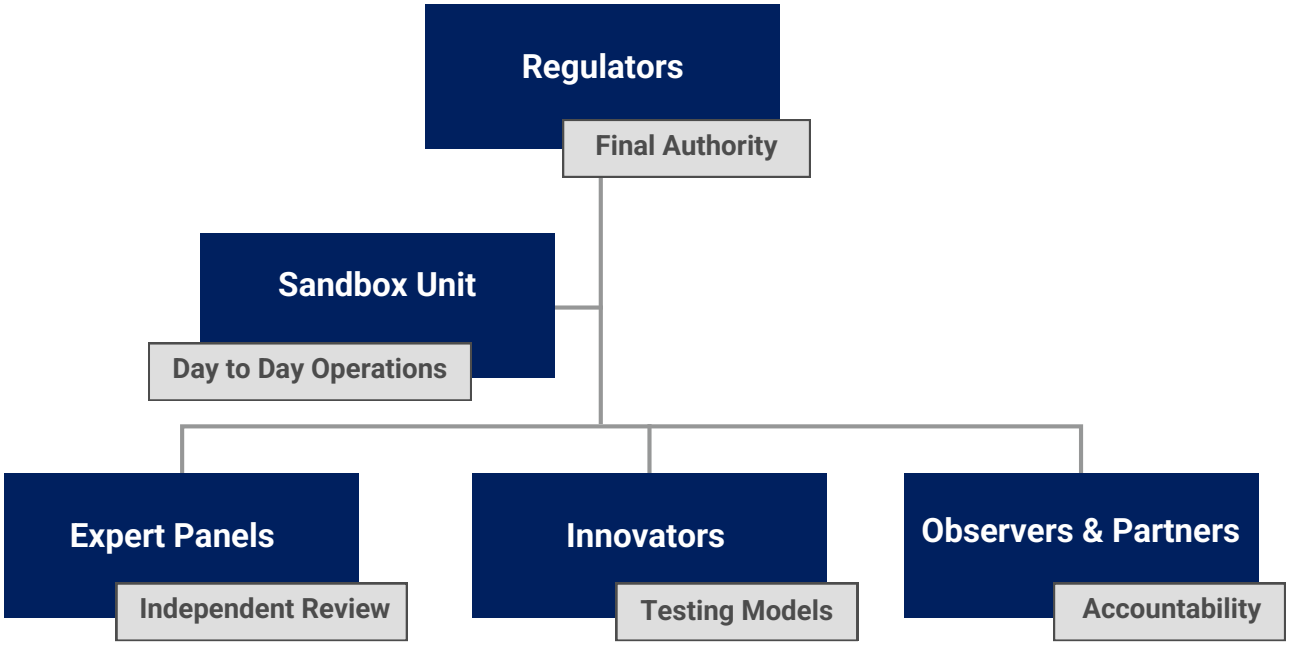
Collaboration

Enterprises, regulators, financiers, and civil society co-create knowledge, ensuring that sandbox learning benefits the wider sector.



The infographic below highlights the governance roles of various actors, aligned with their respective institutional mandates:

Figure 5: *Governance structure*



5.2. INSTITUTIONAL ROLES

The section below provides a deep dive into the institutional roles of various actors and how these roles connect to the sandbox learning cycle.

Table 6: *Institutional roles*

ACTOR	CORE FUNCTIONS	ROLE IN SANDBOX LEARNING CYCLE
Regulators (financial regulators, securities authorities, central banks)	1. Regulators are the apex authority of the sandbox and hold ultimate responsibility for supervising the controlled testing of carbon-linked financial products and ensuring that market innovations do not compromise investor protection, environmental integrity, or systemic stability. 2. Their role is both enabling and protective as they not only allow enterprises to test innovative models but also ensure that consumer protection, market stability, and policy coherence are never compromised. The core functions of regulators include: 3. Authorize entry/exit of carbon-market innovations (e.g., carbon-linked bonds, digital MRV solutions, exchanges). 4. Setting temporary waivers, safeguards, and limits specific to carbon-linked products. 5. Ensuring carbon data used in the test meets minimum integrity standards (MRV, verification, transparency). 6. Converting sandbox evidence into regulatory guidance or future frameworks.	**Monitoring** - approving and overseeing the design of indicators. **Data reporting** - ensuring comparability and validation of evidence. **Policy learning** - endorsing recommendations and aligning them with broader policy goals. **Iterations** - approving regulatory adjustments, ensuring they remain legally consistent. **Feedback loop** – communicating policy changes back to enterprises and consumers.
Sandbox unit (host regulator's operational team, innovation office)	1. The sandbox unit is the operational backbone of the sandbox. It operates as the operational manager coordinating all day-to-day testing activities involving financial innovations linked to carbon assets. The sandbox unit is typically located in and staffed by the regulator with primary responsibility for the sandbox. The sandbox unit ensures efficiency, consistency, and continuity. Its core functions include:	**Monitoring** - tracking enterprise activities and collecting performance data. **Data reporting** - compiling raw data into structured outputs. **Policy learning** - translating evidence into accessible reports for decision-makers.

ACTOR	CORE FUNCTIONS	ROLE IN SANDBOX LEARNING CYCLE
	2. Managing applications, onboarding, and eligibility checks for carbon-market pilots. 3. Collecting financial and carbon-performance data from participants. 4. Preparing dashboards and tracking KPIs linked to verified emission reductions. 5. Coordinating communication between participants, regulators, carbon-market specialists, and observers.	**Iterations** - implementing revised sandbox guidelines approved by regulators. **Feedback loop** - ensuring enterprises and financiers receive documented guidance.
Expert panels (carbon-market experts, MRV specialists, VVBs, registry actors, climate-finance experts, legal experts, market-integrity bodies such as ICVCM/VCMI)	1. Expert panels provide the sandbox with **independent validation** and analytical support. Carbon-market innovation hinges on accurate MRV, credible crediting methodologies, and robust environmental integrity. This expert panel provides this technical assurance. 2. Their core functions are: 3. Provide independent technical and methodological validation. 4. Review carbon-credit eligibility, MRV systems, and environmental integrity. 5. Identify global best practices and assess new methodologies. 6. Evaluate financial structures linking returns to carbon outcomes. 7. Advise regulators on risk, innovation, and technical feasibility.	**Monitoring** - guiding the development of robust indicators. **Data reporting** - ensuring that reporting methods meet global best practices. **Policy learning** - synthesizing evidence into actionable insights. **Iterations** - stress-testing proposed regulatory reforms before adoption. **Feedback loop** - providing independent review of lessons fed back into policy and practice.
Innovators/ enterprises (carbon project developers, digital MRV providers, financial institutions)	1. Innovators generate the real-time operational, financial, and carbon-performance data required for sandbox learning. Their sandbox obligations include: 2. Piloting the carbon-linked innovation (e.g., CCLB issuance, carbon marketplace prototype, MRV platform). 3. Collecting emissions-reduction data and submitting verified carbon-credit information. 4. Ensuring consumer and investor protection during the test. 5. Reporting risks, operational challenges, and regulatory barriers encountered.	**Monitoring** - supplying raw operational data. **Data reporting** - submitting structured reports via agreed templates. **Policy learning** - sharing experiential insights during workshops and dialogues. **Iterations** - testing revised rules and compliance frameworks. **Feedback loop** - receiving regulatory readiness assessments and scaling guidance.

ACTOR	CORE FUNCTIONS	ROLE IN SANDBOX LEARNING CYCLE
Observers and partners (development agencies, carbon standards, NGOs, academia, consumer groups, TA providers)	1. Observers enhance sandbox credibility, transparency, and capacity, helping ensure that sandbox results are trusted across the carbon market ecosystem. They play the following roles: 2. Providing technical assistance, funding, or tools to participants. 3. Offering neutral oversight and external validation of results. 4. Ensuring lessons are shared across international carbon-market networks. 5. Supporting scale-up strategies beyond the sandbox phase.	**Monitoring** - observing processes to strengthen credibility. **Data reporting** - validating published reports and outputs. **Policy learning** - participating in multi-stakeholder workshops. **Iterations** - supporting the design and piloting of regulatory innovations. **Feedback loop** - funding and facilitating scaling pathways for high-performing enterprises.

6 Legal, Regulatory, and Risk Management Considerations

6.1. LEGAL MANDATE

The establishment of a sandbox generally does not require amendments to existing legislation. Most can be set up within the current legal remit of the regulatory authority by leveraging existing tools (such as waivers, guidance, and temporary licenses) to support innovation. The extent of support a sandbox can provide depends on what the authority is already empowered to do under its normal operations.

In some cases, however, sandboxes are placed on a statutory footing, requiring the development of a formal sandbox directive or guideline before launch. These directives typically outline the sandbox's scope, eligibility criteria, governance structure, and the aspects of existing regulatory frameworks that cannot be modified during testing. Where such instruments are required, they should be factored into early planning, as their approval may involve internal reviews and public consultation processes.

A clear legal mandate to facilitate innovation can be helpful to ensure the aims of a sandbox are met and implemented without contravening existing legal and regulatory frameworks, thereby reducing reputational and institutional risks.

Financial authorities should also assess how their mandate may overlap with other authorities' remits: for instance, activities that span multiple regulatory domains. **In such cases, collaboration across agencies is critical to avoid gaps or duplication.**

Mandates to support carbon markets can be **explicit** (e.g., statutory authority to regulate carbon trading) **or implicit** (derived from general regulatory powers). Explicit mandates generally make it easier for authorities to establish and operate sandboxes, providing greater legal certainty to both regulators and participants.

IN SUMMARY

A sandbox is most effective when grounded in a clear and well-communicated legal basis that enables innovation, safeguards regulatory integrity, and fosters inter-agency collaboration.

Regulatory alignment and scope of regulatory relief

Sandboxes are generally not "deregulatory" mechanisms. Participants are required to comply with all existing rules relevant to their activities unless specific provisions are temporarily modified or waived by the regulatory authority. A core feature of many sandboxes is to guide participants to understand and comply with applicable regulations while testing innovative solutions.

Regulatory reliefs can only be issued for rules that fall within the authority's own jurisdiction. Requirements set by other entities, such as carbon market regulations under relevant Climate Change Acts, anti-money laundering (AML) or know-your-customer (KYC) regulations, company law, criminal law, or taxation, cannot be waived or modified through the sandbox. In such cases, some regulators collaborate informally with other agencies to provide coordinated guidance or advisory support to participants.

Within their own remit, regulators typically identify **core rules that cannot be waived under any circumstances** to protect consumers and maintain market integrity. These often include provisions on:

Within their own remit, regulators typically identify **core rules that cannot be waived under any circumstances** to protect consumers and maintain market integrity. These often include provisions on:

- Confidentiality of customer information
- Safeguarding of client funds and assets
- Fitness and propriety of key personnel
- Accuracy and fairness in financial promotions

In practice, sandboxes often introduce additional safeguards during testing — rather than relaxing standards — to ensure risks are properly managed. These may include enhanced disclosures, higher capital buffers, or specific consumer compensation mechanisms in case a test fails.

IN SUMMARY

Effective sandbox regulation balances flexibility with accountability. It provides room for innovation while maintaining strong consumer protection and prudent risk management.

6.2. GRADUATION FRAMEWORK

When a participant successfully completes sandbox testing, a structured graduation process is essential to ensure a smooth transition to full market operations. In principle, once a firm exits the sandbox, it should be subject to the same regulatory obligations as any other entity undertaking similar business. This prevents market distortion and preserves a level playing field.

If a firm operated under a **rule waiver** during testing, the regulator should assess whether that waiver merits broader application. This may involve issuing a general waiver or, if appropriate, amending existing regulations to reflect lessons learned from the sandbox. Such actions enhance regulatory coherence and support innovation across the wider market.

At exit, the regulator should undertake a **comprehensive assessment** against all standard conditions before lifting any restrictions or approving scale-up. This ensures that only firms meeting full prudential and conduct requirements are permitted to operate commercially.

IN SUMMARY

A clear graduation framework ensures that sandbox participants transition responsibly into the regulated market, translating innovation into mainstream practice without compromising fairness, consumer protection, or market stability.

6.3. RISK MANAGEMENT CONSIDERATIONS

Sandbox tests typically involve new and innovative products, services, and technologies, which can introduce unfamiliar risks for consumers, markets, and regulators. It is therefore critical to ensure that risks to consumers are thoroughly identified, monitored, and mitigated before and during a sandbox test. This occurs in two main stages:

Pre-testing

Identifying all key risks and defining mitigation strategies before approval to test; and

Live supervision

Continuously monitoring the test to ensure that identified risks do not crystallize and that any emerging risks are addressed promptly.

While each sandbox test carries its own risk profile—depending on the nature of the innovation and the customer base—certain common risks apply universally. These include risks of fraud, financial loss, operational failure, and cybersecurity breaches. To manage these consistently, regulators should require all participants to apply a core set of safeguards.

These essential safeguards, which should apply to all tests, include:

- Customer caps defining the number and type of clients permitted during testing
- Segregation of client funds through ring-fenced accounts
- Transparent disclosures explaining the product, the nature of the live test, and potential risks; for higher-risk activities, this may include obtaining informed consent from customers
- Robust complaint-handling and redress mechanisms, including clear arrangements for compensation in case of loss, and
- An exit plan outlining how services will be wound down and customer funds returned if the test is unsuccessful.

IN SUMMARY

Strong risk management and consumer-protection protocols are what give the sandbox its legitimacy. By embedding safeguards, supervision, and clear exit procedures, regulators can encourage innovation while maintaining trust, integrity, and stability in the financial system.

The table below provides an indicative view of some common risks and mitigation strategies for sandbox tests broadly.

***Table 7:** Risk management considerations*

RISK CATEGORY	RISK DESCRIPTION	POTENTIAL MITIGATION STRATEGIES
(A) REGULATOR-FACING RISKS		
Operational risk	Lack of specialized knowledge on carbon markets, such as methodologies, MRV, carbon-linked instruments, Article 6 architecture, and project finance, leading to weak assessment or supervision of tests.	• Engage early with firms proposing complex innovations to understand their propositions through demonstrations and technical audits. • Consulting outside experts from government, climate finance units, and industry. • Include external experts on the sandbox panel to input into eligibility assessments and testing plans. • Joint workshops with sandbox participants to build mutual understanding of the benefits and risks of the proposition.
	Delays, bottlenecks, or inefficiencies in the sandbox's internal processes that hinder timely decision-making and testing.	• Define clear timelines for each stage of the sandbox process (e.g., application review, feedback loops, decision-making) and ensure compliance with these timelines. • Create a dedicated sandbox team with clear roles for reviewing applications, managing testing processes, and providing feedback to participants.
	Poor alignment and collaboration among different stakeholders involved in the sandbox process.	• Utilize the Sandbox Panel as a platform for cross-department meetings for critical decision points to ensure alignment among internal teams.
Reputational risk	Risk of adverse media attention from failures involving sandbox participants, damaging the sandbox's credibility and public trust in the program.	• Establish a proactive media engagement strategy to provide transparent updates on sandbox successes and challenges. • Create a crisis communication plan to address adverse incidents promptly and effectively.

RISK CATEGORY	RISK DESCRIPTION	POTENTIAL MITIGATION STRATEGIES
(A) REGULATOR-FACING RISKS		
	Risk that the sandbox fails to showcase viable innovations, leading to skepticism about its ability to drive meaningful advancements in carbon markets.	• Prioritize applications with high innovation potential during sandbox entry. • Publicize case studies of successful tests, demonstrating the sandbox's value in driving financial innovation.
Reputational risk	Perception that the regulator is endorsing low-integrity carbon credits or exaggerated climate claims, damaging trust in the regulator and the sandbox.	• Require use of high-integrity standards (e.g., recognized registries) or equivalent safeguards. • Require strict disclosure rules on claims. • Publish clear public guidance explaining that sandbox admission is not an endorsement of environmental performance.
Strategic risk	Risk of admitting participants whose innovations lack significant potential or fail to align with the sandbox's vision, wasting resources and undermining program credibility.	• Design a rigorous participant selection process with clear criteria emphasizing innovation, scalability, and alignment with national climate priorities. • Conduct a thorough pre-admission review of business models and technical solutions.
	Risk that the sandbox program cannot adapt to changes in technology, market needs, or regulatory priorities, reducing its effectiveness over time.	• Establish periodic policy and framework reviews to adapt to emerging trends. • Incorporate flexibility in sandbox guidelines to accommodate novel technologies and business models.

RISK CATEGORY	RISK DESCRIPTION	POTENTIAL MITIGATION STRATEGIES
(B) CONSUMER-FACING RISKS		
Financial risk	Risk that sandbox participants mishandle consumer funds, either intentionally or due to poor financial practices, leading to losses.	• Mandate the submission of periodic financial reports by participants for regulators to review. • Ensure customer funds are held in segregated bank accounts. • Compensation and redress procedures, and requiring firms to hold funds to compensate customers in the event that losses occur due to malpractice.
	The risk that carbon projects underperform, leading to lower or delayed cashflows, and/or the volatility of carbon market pricing, is not understood by participants.	• Develop clear risk disclosure requirements for sandbox participants, potentially requiring informed consent from participants. • Require issuers/platforms to disclose price history and volatility scenarios.
	Risk that sandbox participants engage in fraudulent activities, leading to financial losses for consumers.	• Conduct stringent due diligence and background checks on participants before entry. • Where appropriate, implement real-time transaction monitoring and fraud detection systems during testing.
Technology risk (data privacy)	Risk of unauthorized access to or disclosure of sensitive consumer data during sandbox testing.	• Mandatory encryption of sensitive data in transit and at rest. • Require sandbox participants to implement strict access controls.
	Risk of sandbox participants collecting or storing more consumer data than necessary, increasing exposure in the event of a breach.	• Enforce data minimization principles, requiring participants to justify data collection and retention practices. • Conduct regular audits to ensure unused data is securely deleted.

RISK CATEGORY	RISK DESCRIPTION	POTENTIAL MITIGATION STRATEGIES
(B) CONSUMER-FACING RISKS		
Technology risk (cybersecurity)	Threats to system and data security, including unauthorized access and cyber-attacks.	• Implement robust cybersecurity measures; conduct regular security assessments; establish incident response plans.
	Risk of malicious actors exploiting system vulnerabilities or social engineering to compromise sandbox participants' platforms.	• Implement mandatory minimum cybersecurity standards, e.g., two-factor authentication, and real-time monitoring. • Conduct periodic cybersecurity training for participants.
Legal and compliance risk	The risk that participants in the sandbox fail to comply with the existing laws, guidelines, or any regulatory standards set by the regulatory authority.	• Clear communication and dissemination of legal and regulatory requirements during onboarding. • Providing guidance or informal advice on meeting specific requirements. • Follow Escalation Paths to pause or terminate tests.
Consumer protection risk	Risk that customer complaints about sandbox products or services are not resolved adequately or in a timely manner, leading to dissatisfaction and loss of trust.	• Require sandbox participants to log and resolve customer issues within pre-agreed timelines.
	Risk of customers being unable to access funds or services due to system outages, technical errors, or operational failures during sandbox testing.	• Require participants to establish contingency plans for operational failures.
	Risk that sandbox participants fail to provide customers with clear, accurate, and accessible information about their products, services, risks, and benefits.	• Mandate a product transparency policy requiring clear disclosure of all terms, conditions, fees, and risks. • Review key marketing materials and onboarding processes for clarity and accuracy.

7 Monitoring, Learning, and Feedback Loop

7.1. INTRODUCTION

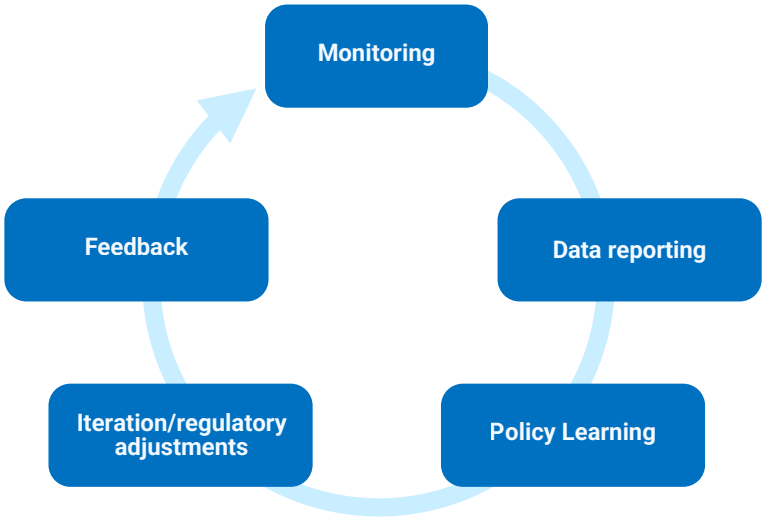
A regulatory sandbox is designed as a **controlled environment** where innovative enterprises can test solutions such as carbon-credit-linked financial products under the oversight of a regulator. Its value lies not only in enabling experimentation but also in creating a structured pathway for **learning, evidence generation, and adaptive policymaking** in a rapidly evolving market. Unlike traditional pilots, the sandbox links enterprise performance directly to regulatory decision-making, reducing uncertainty for both innovators and regulators. Experience from various global sandboxes shows that success depends on three key factors:

- Continuous monitoring of enterprise performance against success indicators.
- Systematic data reporting to generate reliable and comparable evidence.
- Structured feedback loops that allow rules and policies to be adjusted in real time.

Successful sandboxes are anchored in the **sandbox learning cycle**, which is a feedback-driven approach that ensures that enterprises' experiences inform better policies and scale-up pathways.

This cycle ensures that the sandbox remains dynamic, evidence-driven, and responsive, enabling the regulators to support innovation while safeguarding consumers and advancing the national development priorities. The diagram below provides a visual representation of the Sandbox Learning Cycle and its interconnected stages:

Figure 6: Stages of the sandbox learning cycle



The sections below explain how the Sandbox Learning Cycle is applied, highlighting the specific processes, indicators, and outputs at each stage.

7.2. MONITORING

Monitoring serves as the foundation for accountability and learning. Each enterprise admitted into the sandbox will agree to a tailored set of performance indicators aligned with sandbox objectives and carbon-market goals, such as credit verification accuracy, emission reductions or removals achieved, financial performance, affordability of end-user solutions (e.g., clean cooking), consumer adoption, gender inclusion, and verified environmental outcomes.

Regulators will complement enterprise self-reporting with structured oversight measures such as periodic site visits, checks to confirm that third-party validation of emission reductions or removals has been completed, and investor or consumer feedback surveys. This dual approach ensures that monitoring goes beyond compliance checks to generate actionable market intelligence, reveal consumer behavior patterns, and identify emerging risks.

The resulting insights will not only validate individual business models but also equip regulators and policymakers with credible, comparable data to, for example, inform the design or improvement of a country's Carbon Market Framework, improve transparency in carbon-credit transactions, and strengthen investor confidence in emerging carbon-finance instruments.

Monitoring success will be measured through the following indicators:

70%+
ACHIEVE AGREED PERFORMANCE METRICS

90%
COMPLIANCE

- At least 70% of sandbox pilots achieve agreed performance metrics (e.g., verified emission reductions, investor participation targets, repayment performance, or data integrity benchmarks) within the testing period.
- Minimum 90% compliance with quarterly reporting and disclosure requirements.
- Publication of at least 3 consolidated dashboards or progress reports annually, summarizing pilot performance, regulatory learnings, and market insights, accessible to regulators, participating enterprises, investors, and development partners.

7.3. DATA REPORTING

For the sandbox to effectively inform carbon market policy and regulatory adjustments, raw enterprise data must be systematically converted into structured evidence. Standardized reporting templates and digital platforms should be used to ensure comparability across all participating enterprises.

Data reporting will capture:

- **Consumer and investor outcomes** such as adoption levels, willingness to pay for carbon-linked products, satisfaction rates, and investor participation in pilot instruments such as carbon-credit-linked bonds or carbon-backed loans.
- **Technical and environmental performance** focusing on credit verification accuracy, project durability, and verified emission reductions or removals achieved through underlying carbon projects (e.g., clean cooking or reforestation).
- **Financial sustainability** with emphasis on affordability, cost structures, liquidity, and private investment mobilization linked to carbon revenues or carbon assets.
- Equity and inclusion through gender-disaggregated data and the participation of vulnerable and rural groups and equitable benefit-sharing mechanisms within carbon-financed value chains.

Regulators will validate enterprise submissions through **independent audits and cross-referencing with carbon registries**. The validated findings will be compiled into thematic reports and real-time dashboards. These outputs will serve as credible reference points for policymakers, investors, and other stakeholders. Indicators of data reporting success include:

100%
ENTERPRISES ONBOARDED

90%+
COMPLETE SUBMISSIONS

- 100% of enterprises onboarded with standardized reporting templates.
- At least 90% of enterprises submit complete and timely data each quarter, verified against registry and MRV sources.
- A minimum of two thematic reports published annually, highlighting key regulatory lessons, product performance, and market-readiness insights for carbon-linked financial innovations.

7.4. POLICY LEARNING

Policy learning will ensure that evidence generated through the sandbox directly informs regulatory and policy decision-making. Data and insights from sandbox pilots such as carbon-credit-linked bonds, securitized carbon portfolios, or insured carbon assets will be synthesized into **policy briefs, case studies, and targeted recommendations** tailored to regulators and policymakers. The learning process will be inclusive and participatory. Multi-stakeholder workshops and dialogues will provide **platforms for enterprises, regulators, financiers, and consumer representatives** to validate findings and co-create practical regulatory responses. This collaborative approach is expected to strengthen institutional trust, promote transparency, and accelerate the uptake of evidence-based policy recommendations, particularly those underpinning the development of *Carbon Market Frameworks* and *Carbon Trading Regulations*.

POLICY LEARNING SUCCESS WILL BE MEASURED BASED ON THE FOLLOWING INDICATORS:

- At least two multi-stakeholder workshops, held annually to disseminate sandbox learnings and co-develop regulatory pathways.
- A minimum of four policy briefs or case studies were published and disseminated to decision-makers.
- At least three regulatory recommendations tested or adopted annually directly influencing carbon market supervision, disclosure standards, or green-finance regulations.

7.5. ITERATIONS

Iteration represents the sandbox's commitment to adaptive and evidence-based regulation. Each cycle will conclude with a structured review of **monitoring results, reporting outputs, and stakeholder feedback from pilots such as carbon-credit-linked bonds**. Insights from this review will inform revisions to sandbox guidelines, entry and exit criteria, and compliance pathways, ensuring that regulatory approaches evolve alongside market realities.

This stage would also provide an opportunity to trial innovative regulatory approaches, relevant to carbon markets, including **streamlined licensing for carbon-credit-linked instruments, risk-based disclosure requirements, and incentive mechanisms for high-impact, verified emission projects**. These approaches will first be tested within the sandbox before being considered for broader sector-wide adoption.

Iteration success will be determined based on the following indicators:

- Sandbox guidelines **updated at least once annually** based on empirical insights from carbon-finance pilots.
- A minimum of two new regulatory approaches piloted in each sandbox cycle, such as accelerated approval for verified carbon instruments or proportional supervision models for smaller issuers.
- At least 80% of stakeholders report satisfaction with the sandbox's responsiveness, inclusiveness, and ability to adapt to emerging carbon-market trends.

7.6. FEEDBACK

The regulatory sandbox is intended to function as a **continuous living system rather than a one-off pilot**. This means maintaining dynamic feedback loops that enable constant learning and adaptation across enterprises, regulators, financiers, and communities as follows:

- **Enterprises** will receive regulatory readiness assessments, scale-up guidance, and linkages to financing partners, helping transition successful pilots such as **carbon-credit-linked bonds or carbon-revenue-backed loans** into mainstream capital markets.
- **Regulators** will integrate lessons into national strategies, emerging carbon market policy frameworks, and consumer protection measures.
- **Financiers and development partners** will use sandbox evidence to inform investment priorities and de-risk funding for scaling.
- **Consumers and communities** will provide feedback through surveys, focus groups, and other mechanisms, ensuring their perspectives shape future innovation.

Indicators of feedback success will include the following:

- At least 70% of enterprises receive documented feedback and clear exit pathways.
- At least 50% of enterprises secure financing for scale-up following sandbox participation.
- Consumer and community insights incorporated into subsequent sandbox cycles.

KEY INSIGHT

The monitoring, learning and feedback loop will transform the sandbox from a simple testing ground into a policy engine. By embedding structured evidence, participatory learning and adaptive regulation, the sandbox will function as a dynamic mechanism that builds regulatory confidence, supports enterprise growth and protects consumers interests.

8 Generic Log Frame

This section presents a customizable log frame for a regulatory sandbox. It outlines indicative outcomes, activities, and indicators across the sandbox cycle, from enterprise entry to exit. The structure is designed to guide implementation while allowing flexibility for adaptation to specific policy priorities, stakeholder needs, and emerging lessons.

Table 8: *Generic Log Frame*

SANDBOX CYCLE STAGE	OBJECTIVES/OUTPUTS	ACTIVITIES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS/RISKS
1. Entry (Enterprise selection phase)	• Sandbox framework established. • Clear eligibility, entry, and exit criteria defined. • Cohort of enterprises and financial institutions. selected.	• Develop sandbox framework, including the entry and exit criteria. • Define eligibility for carbon-credit-linked financial instruments. • Establish inter-agency steering committee (e.g., CMA, NEMA, Climate Change Directorate). • Recruit and screen enterprises, aggregators, and financiers.	• Sandbox guidelines published • At least 10 enterprises or financial institutions onboarded within 2 years.	• Official sandbox documentation, Signed testing agreements, and testing plans	• Strong pipeline of innovators. • Transparent selection and screening process. • Alignment between financial and environmental regulators.

SANDBOX CYCLE STAGE	OBJECTIVES/OUTPUTS	ACTIVITIES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS/RISKS
2. Testing and support (pilots, mentoring)	• Carbon-credit-linked bonds tested safely under sandbox rules. • Technical and regulatory mentorship provided. • Number of pilots run safely under sandbox rules.	• Provide technical support on carbon verification, MRV, and disclosure standards. • Conduct live issuance of carbon-credit linked bonds instruments (e.g., bonds, loans, or securitized portfolios). • Offer mentorship on investor engagement and compliance.	• At least 70% of pilots meet agreed metrics: safety, affordability, verified emission reductions, investor adoption, and gender inclusion. • Zero consumer or investor complaints.	• Enterprise progress reports • Site visit reports • User surveys	• Pilots are adequately funded. • Carbon-credit linked bonds verification and registry processes function efficiently. • Cooperation from enterprises and project partners.
3. Data reporting (Dashboards and KPIs)	• Standardized data templates developed for carbon-finance pilots. Quarterly data submissions ensure comparability and transparency.	• Develop standardized reporting templates and carbon-finance KPIs (e.g., tCO_2e verified, bond performance, investor uptake). • Set up real-time dashboards. • Collect and validate enterprise and registry data.	• At least 90% compliance with quarterly data submission. • At least 3 sector thematic reports produced annually.	• Sandbox monitoring dashboards • Verified MRV records. • M&E reports	• Enterprises are willing to share commercial and emissions data. • Reliable access to third-party verification and registry data.

SANDBOX CYCLE STAGE	OBJECTIVES/OUTPUTS	ACTIVITIES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS/RISKS
4. Policy learning (Workshops, Briefs)	• Policy learning dialogues held inform regulation and market frameworks. • Learnings/insights across regulators and financiers. • Regulatory recommendations developed and tested.	• Organize workshops with regulators and stakeholders. • Produce briefs and case studies. • Hold multi-stakeholder dialogues to co-create adaptive regulation.	• §At least 2 policy learning workshops annually. • 4 policy briefs or case studies published. • At least 2 regulatory recommendations adopted. Zero instances of breaching the existing rules/laws.	• Workshop minutes and reports • Published briefs & recommendations. • Stakeholder validation reports	• Regulators open to adaptive regulation. • Sustained political and institutional buy-in. • Timely policy feedback loops.
5. Iteration (Adopt sandbox rules)	• Sandbox guidelines revised annually based on lessons learned. Regulatory recommendations developed and tested.	• Conduct annual review of sandbox findings. • Pilot new regulatory approaches (e.g., simplified disclosure for carbon instruments, flexible licensing). • Update sandbox procedures and criteria.	• Sandbox rules updated annually • At least 2 regulatory adjustments tested per cycle. • At least 80% stakeholder satisfaction with iteration.	• Updated sandbox framework • Regulatory updates • Meeting minutes • Stakeholder surveys	• No policy reversals/changes. • Timely feedback loops.

SANDBOX CYCLE STAGE	OBJECTIVES/OUTPUTS	ACTIVITIES	INDICATORS	MEANS OF VERIFICATION	ASSUMPTIONS/RISKS
6. Exit/scale up (Regulatory pathway)	• Successful enterprises transition out with relevant regulatory approval. • Market linkages and financing secured. • Models scaled to market.	• Conduct exit assessments and final evaluations. • Facilitate regulatory approvals for scale-up (e.g., bond listing, securitization). • Link enterprises with investors, DFIs, and green funds for expansion.	• 70% of enterprises exit with viable regulatory pathways. • 50% of pilots achieve post-sandbox adoption within 12 months. • 50% of enterprises secure scale-up financing.	• Exit assessments • Regulatory approvals • Market data	• Financing for scaling remains available.[19] • Consumers willing to adopt proposed solutions. • Stable carbon pricing and investor confidence.

[19]While scale-up funding is outside the direct control of the sandbox, participation typically enhances enterprise credibility with investors and lenders, making financing more attainable as an indirect outcome

9 Annexes

ANNEX 1: SANDBOX APPLICATION FORM

Sandbox application form contents

At a minimum, applicants for a regulatory sandbox should provide the following information:

- Basic firm details – name of firm, contact details, etc.
- Size of firm, sector, information about any existing licenses, and business registration
- Names of key individuals/management/controllers of the firm
- A description of the innovation that is being proposed for the sandbox
- Explain the anticipated benefits of the solution (including climate and environmental outcomes)
- Describe the main risks that consumers are exposed to, and how you mitigate these (including financial risks and environmental risks)
- Describe the user journey
- Explain who the target market is for the proposed solution
- Describe what is innovative/novel about the product or service in the context of existing carbon market practices in the jurisdiction.
- Explain what support you need from regulatory authorities to launch your product (including what regulatory reliefs you are requesting)
- Describe the current stage of development for your proposed solution and outline a clear timeline for achieving a Minimum Viable Product (MVP) ready for live-testing in the sandbox
- Explain the purpose of the test you wish to run in the sandbox
- How long will the test last?
- Detail your risk mitigation framework
- Explain what type of customers will participate in the test, and how they will be sourced
- Outline your next steps if the test is successful.

ANNEX 2: SANDBOX TESTING PLAN

Sandbox testing plan contents

At a minimum, the following information should be included in a sandbox testing plan:

- Description of the innovation and test
- Details of any regulatory reliefs provided (e.g., rule waivers or modifications)
- Test objectives and intended outcomes (including both market performance and environmental objectives), and corresponding Key Performance Indicators
- Duration of the test
- Customer types (e.g., institutional investors, retail investors)
- Volume and customer limits – including individual transaction limits
- Testing milestones/timeline
- Bespoke disclosures and approach to customer consent, including those tailored to carbon-specific risks.
- Key risks and how these will be mitigated (including financial, environmental integrity, operational and technology, legal, and regulatory risks)
- Reporting requirements
- Exit plan/wind-down arrangements if testing is concluded early
- Transition plan

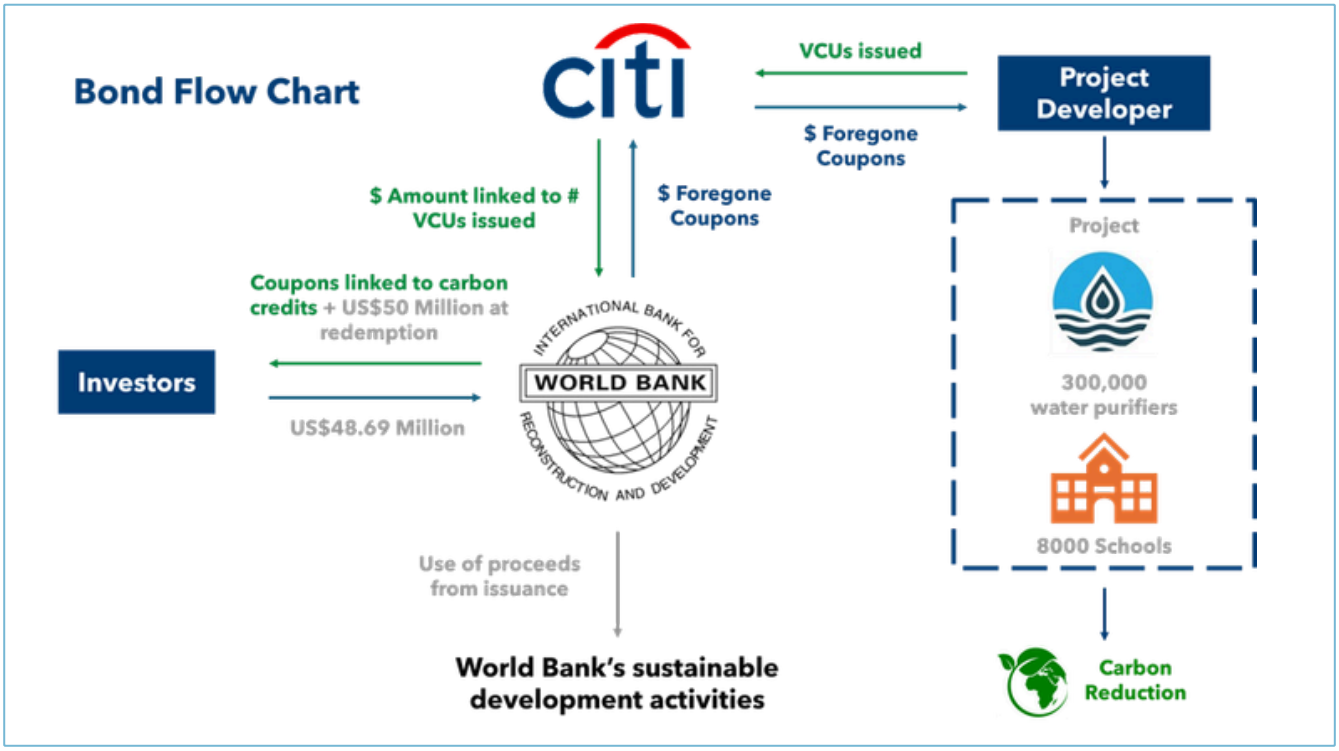
ANNEX 3: GLOBAL CASE STUDIES

Case study 1: Emission Reduction-Linked Bond in Vietnam

The World Bank (International Bank for Reconstruction and Development, IBRD) issued an **Emission Reduction-Linked Bond** that will help provide clean drinking water to two million children in Vietnam. Each year in Vietnam, an estimated 9,000 people die, and another 250,000 people are hospitalized, due to a lack of clean water and sanitation. Millions are also exposed to dangerous indoor air pollutants from boiling water over an open flame to make it safe. The solutions available such as water purifiers are inexpensive; however, there are significant challenges to manufacturing these

products and distributing them to the millions of people who need them. These purifiers avoid emission reductions or removals, as each water filter replaces a metric ton of carbon that would have otherwise entered the atmosphere every five years. In recent years, carbon markets have been supporting projects like this one. For this project, a carbon credit would result from the replacement of traditional biomass, such as wood used for cooking, with a more efficient system — less wood is chopped down, and therefore less carbon dioxide is released into the atmosphere. However, for it to be successful, the project first needs to be financed, implemented, and operated (often for a year or more) before it can be verified and carbon credits issued. To solve this timing issue in the water purifier project, a new emission reduction-linked bond was launched.

This **five-year US$50 million Sustainable Development Bond** is an outcome-based financial instrument. Investors support the **up-front financing** required to manufacture and distribute water purifiers, and rather than receive regular coupon payments they receive **semi-annual coupon payments linked to the issuance of Verified Carbon Units (VCUs)** by the Water Purifier Project on the Verra Registry. An amount equal to the cash flows that would have been paid as coupons on a regulated basis are "frontloaded" and through a hedge transaction with Citi — used to support the financing of the project.



Case study 2: Green FinTech Challenge

The Green FinTech Challenge launched by FCA in 2018 to support innovations that advance sustainable finance and climate risk management. Over 20 firms shortlisted, with 9 accepted into sandbox testing.

The interventions supported include:

a. Carbon offset and credit trading platforms (using blockchain).
b. Green investment robo-advisors to channel retail savings into sustainable assets.
c. Data analytics tools to assess firms' exposure to climate risk.
d. ESG disclosure tools for investors and asset managers.

Key outcomes:

e. Several firms scaled commercially with FCA support.
f. Insights informed the FCA's Climate Financial Risk Forum (CFRF) guidance.

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CLEAN COOKING ALLIANCE

VCMI Voluntary Carbon Markets Integrity Initiative

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