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WORLD BANK GROUP

Carbon Crediting

A Results-based Approach to Mobilizing Additional Climate Financing

TCAF
TRANSFORMATIVE CARBON ASSET FACILITY

CLIMATE FOCUS

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FOREWORD

Carbon crediting is increasingly seen as a promising tool for mobilizing financing for development. In a world where development aid is shrinking, carbon crediting provides an alternative avenue for debt-neutral funding, helping countries achieve their climate goals while fostering long-term sustainable development.

This report takes a deep dive into various crediting approaches—from project-based to the more recent policy and other scaled-up crediting models. Whether you're involved in a specific mitigation project or working on larger-scale policy changes, this guide provides valuable insights into which approach might best support your objectives.

This report offers a practical look at the strengths, challenges, and applications of carbon crediting through a set of examples and a comparison of each crediting approach. It explores how different models can be used to incentivize actions across sectors, from landfill gas projects to forest conservation, and how they can help reduce the financing gap for climate projects.

As the landscape of carbon crediting evolves, this report serves as a reference for program entities, policymakers, and practitioners who are navigating the complexities of these financing mechanisms. It offers insights into how carbon crediting can be effectively integrated into development plans with climate benefits, ensuring that investments not only generate financial returns but also deliver real and measurable impact that benefits vulnerable people.

I hope you find the read insightful as we continue to build on and mainstream these innovative solutions.

Olivier Mahul, Global Manager Climate Finance Mobilization, Global Department for Climate Change, The World Bank

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ACRONYMS

AAU	Assigned Amount Units (AAUs)
ART-TREES	Architecture for REDD+ transactions
CDM	Clean Development Mechanism
CDR	Carbon Dioxide Removal
CER	Certified Emission Reductions
Ci-Dev	Carbon Initiative for Development
DACCS	Direct Air Carbon Capture and Storage
EAQIP	Energy Access and Quality Improvement Project
ER	Emission Reduction or Removal
ERPA	Emission Reductions Payment Agreement
ETS	Emission Trading System
FCPF	Forest Carbon Partnership Facility
GCFRP	Ghana Cocoa Forest REDD+ Program
GHG	Greenhouse Gases
HIAs	Hotspot Intervention Areas
iCRAFT	Innovative Carbon Resource Application for Energy Transition Project
IPs	Indigenous Peoples
ISFL	BioCarbon Fund Initiative for Sustainable Forest Landscapes
ITMOs	Internationally Transferred Mitigation Outcomes
JI	Joint Implementation
JCC	Joint Coordinating Committee
LCs	Local Communities
LULUC	Land Use and Land Use Change
MRV	Monitoring, Reporting, and Verification
NbS	Nature-based Solutions
NDC	Nationally Determined Contribution
OECD	Organisation for Economic Co-operation and Development
PoAs	Programme of Activities
RBCF	Results-based Climate Finance
RBP	Results-based Payments
REF	Renewable Energy Fund
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SCALE	Scaling Climate Actions by Lowering Emissions
SCF	Standardized Crediting Framework
SDGs	Sustainable Development Goals
SHS	Solar Home Systems
SIDS	Small Island Developing States
TCAF	Transformative Carbon Asset Facility
UNFCCC	United Nations Framework Convention on Climate Change
VCM	Voluntary Carbon Market
VCS JNR	Verified Carbon Standard Jurisdictional and Nested REDD+

GLOSSARY

Baseline	Counterfactual scenario of GHG emissions in the absence of mitigation activity.
Carbon crediting approach	Project-based crediting, programmatic crediting, policy crediting, jurisdictional crediting, sectoral crediting, and economy-wide crediting referring to the scope of the carbon crediting program.
Carbon crediting funding modality	The funding modalities are RBCF or carbon markets, which provide access to outcome-based climate finance based upon verifying the achievement of agreed-upon climate results.
Carbon crediting program	Complete set of arrangements allowing to generate carbon credits from a mitigation activity and receive respective carbon payments, implemented by a program entity under a standard, e.g., clean cooking carbon crediting program under Article 6 of the Paris Agreement, jurisdictional REDD+ program under FCPF.
Carbon credits	A standardized measure for a verified reduction/removal in emissions equivalent to one metric ton of carbon dioxide equivalent (tCO_2e) certified and issued in a registry.
Carbon markets	Trading systems for exchanging carbon credits (or other carbon assets). It can be classified into compliance and voluntary markets.
Corresponding adjustments	Accounting adjustments made by the buying and selling countries to their NDC accounting to reflect the transfer of the authorized ITMOs. The adjustments are intended to ensure that an authorized ER is not double-counted.
ERPA	Emission Reduction Payment Agreement. A legally binding contract between the provider and the recipient of payments for verified ERs.
Mitigation action/ activity	Investment, change in behavior, policy, or sectoral/jurisdictional/economy-wide transformation processes generating ERs.
Opportunity cost	Value of the options not taken when one alternative is chosen. In the context of carbon finance, opportunity cost refers to the potential benefits a project developer or land/resource owner forgoes when choosing to participate in carbon crediting instead of pursuing alternative, potentially more profitable land uses or economic activities. Opportunity cost also refers to the cost of still meeting a country's NDC after it has sold ITMOs to another country.
Program entity	The entity implementing the carbon crediting program.
RBCF	Results-based climate finance is provided upon verifying the achievement of agreed results but does not involve the transfer of assets from the recipient project. Results could be specified as any milestone (typically verified GHG emissions reduced or removed) that marks progress toward more significant climate mitigation.
RBP	Results-based payments are a financing modality or approach under which a donor or investor disburses funds to a recipient upon the achievement and independent verification of a pre-agreed set of results. RBP can be provided under RBCF or through carbon market transactions.
Standard	A crediting standard outlines a set of detailed requirements that must be met for a mitigation activity to generate carbon credits using that standard. These standards are typically maintained by independent bodies and are established using expert inputs. Examples include the UNFCCC's Clean Development Mechanism, the Gold Standard, Verra's VCS, and the World Bank's FCPF.
Verified ERs	A measurable and verified reduction in GHG emissions compared to a baseline. A third party usually conducts this process.

1. INTRODUCTION

Under the Paris Agreement, most countries have committed to Nationally Determined Contributions (NDCs) to reduce greenhouse gas (GHG) emissions. Many go further in their national development plans and sector strategies, outlining how these efforts can also advance low-carbon, resilient development.

However, developing countries face a substantial funding gap when it comes to implementing the full range of planned mitigation and adaptation measures. The Organisation for Economic Co-operation and Development (OECD) estimates that developing countries will need up to USD 2.4 trillion by 2030 to achieve these goals.[1] Without significantly scaling up investment and financing, countries will be unable to fully deliver on their climate and development plans.

Carbon crediting can play an important role in addressing this challenge. By channeling essential financial resources into climate mitigation and adaptation efforts, carbon crediting can help countries move from planning to implementation. It can also incentivize broader climate action with benefits for resilience, green growth, and sustainable livelihoods—such as improved land management, forest conservation, and access to clean technologies.

The World Bank has more than 20 years of experience supporting countries to develop carbon crediting programs and market infrastructure to help scale up financing for their development priorities. The Bank continues to pioneer innovative approaches to help countries originate, generate, and monetize high-integrity carbon credits linked to World Bank operations through a combination of technical assistance and results-based climate finance (RBCF). These solutions provide additional finance to help countries adapt to climate change, reduce emissions, and seize new opportunities for sustainable development.

How is carbon crediting framed in this report?

In the past, carbon crediting was equated with participation in carbon market mechanisms for GHG emission reductions or removals (ERs) at the project level, such as under the Clean Development Mechanism (CDM) of the Kyoto Protocol or the Voluntary Carbon Market (VCM), both of which focused on project-based (and programmatic) crediting.

More recently, the scope of carbon crediting has expanded beyond the project level under RBCF and the emerging carbon markets under Article 6 of the Paris Agreement, which established collaborative approaches for bilateral carbon market collaboration and a centralized United Nations Framework Convention on Climate Change (UNFCCC) crediting mechanism following in many aspects the model of the CDM.

Against this background, this report introduces carbon crediting as an important and versatile financial instrument to support climate mitigation action and low-carbon, resilient development. It quantifies GHG ERs resulting from clean investment and sustainable landscape projects, climate mitigation policies, or broader sectoral, jurisdictional, or economy-wide transformation processes along defined decarbonization pathways. It monetizes these mitigation outcomes by accessing funding from RBCF or carbon markets.

[1] OECD (2024). Finance and investment for climate goals.

What is this report about?

This report provides a comprehensive overview of carbon crediting approaches, focusing on the needs of entities in developing countries implementing climate mitigation actions through dedicated investments, policy programs, or advancement of sectoral, jurisdictional, economy-wide transformation processes (program entities) and being interested in accessing funding through carbon crediting.

The report offers guidance on when to use carbon crediting and how to select the most suitable approach for different mitigation actions across economic sectors and contexts. By outlining these key approaches and considerations, the report demonstrates how program entities in developing countries can effectively leverage carbon crediting to finance mitigation activities and low-carbon development priorities. It also provides links to additional resources for further exploring or developing carbon crediting programs or approaches in the outlined areas.

Who is the audience for this report?

This report is primarily intended for program entities and policymakers in developing countries. Program entities are any agencies or institutions directly administering a carbon crediting program. This may include, for instance, a country's rural energy agency or forestry department, or private sector companies developing or managing a carbon crediting program. Policymakers may include elected officials, ministers, or regulators.

The report aims to guide these actors and their development partners, including World Bank teams working with such entities, in assessing opportunities and informing robust decision-making about which carbon-crediting approaches may be most appropriate for which kinds of policies, projects, or other interventions. In this sense, the report serves as a comprehensive upstream resource and reference guide for those interested in assessing potential carbon crediting approaches. It can be complemented by more in-depth technical resources on how to apply such approaches in different sectors and contexts. The report is also of interest to a broader climate mitigation and development audience, including developing country climate policymakers, carbon market regulators, climate practitioners in development organizations, climate finance providers, and buyers of carbon credits.

How is this report structured?

Chapter 2 is the core of the report, providing a detailed explanation of carbon crediting—what it is, how it works, when to use it, and the various approaches available. Subsequent sections delve deeper into each approach, including project-based, programmatic, jurisdictional, policy-based, sectoral, and economy-wide carbon crediting. The concluding chapter 3 provides a summary of the key features of each carbon crediting approach.

2. CARBON CREDITING APPROACHES

What is carbon crediting?

Carbon crediting is a financial instrument that supports climate mitigation actions aimed at reducing or removing GHG from the atmosphere. These actions can take the form of individual projects, larger programs, or policy initiatives across various sectors or jurisdictions aligned with specific decarbonization strategies.

Carbon crediting provides funding to support such activities through carbon markets or RBCF. In both cases, funds are disbursed only after achieving pre-agreed, measurable, and verified ERs that are issued as carbon credits, improving the financial viability of investments or policies.

Carbon crediting is based on the principle of additionality, i.e., that such mitigation activities would not proceed in the absence of the crediting program. As a result, carbon crediting serves as a critical tool for governments and private entities to secure financial resources to help implement and sustain climate action. When converted into carbon credits, these ERs can help countries achieve climate targets, such as those outlined in their NDCs, or enable companies to comply with climate-related regulations or voluntarily reduce their GHG emissions.

How does carbon crediting work?

The process of carbon crediting begins with a mitigation activity designed to generate ERs.[2] The ERs undergo a rigorous certification process, including independent third-party verification, to ensure these are real, measurable, and verifiable. Once verified, ERs can be issued as carbon credits. Each carbon credit represents one metric ton of carbon dioxide equivalent (tCO_2e) reduced or removed from the atmosphere.

What sets carbon crediting apart from other instruments is that the ERs are quantified by comparing the difference between a baseline scenario and a project scenario after implementing the mitigation activity. The baseline serves as a reference scenario, estimating the emissions that would have occurred without the mitigation activity. As the primary element to quantify ERs, a conservative baseline setting is essential to avoid overcrediting and ensure carbon credits' environmental, economic, and regulatory integrity (see Box 1).

[2] In the following and for simplicity, what is said about emission reductions (ERs) also applies to removals. Aspects specific to removals will be noted accordingly.

BOX 1. BASELINE SETTING

Establishing a conservative baseline is crucial for preserving the integrity of carbon crediting approaches. It ensures that carbon credit issuance does not exceed the volume of achieved ERs, preventing over-crediting.[3] Baselines can be set up ex-ante, ex-post, or using a combination of both approaches to optimize accuracy and practicality. The key differences are:

- **Ex-ante:** the baseline determined before the intervention begins, using projections or assumptions about future emissions. This approach provides certainty on baseline emissions upfront but may fail to account for the impact of external variables over time, such as economic shifts or technological advancements. If ERs are overestimated, the project could receive credits for reductions that weren't actually achieved.
- **Ex-post:** the baseline is adjusted after the intervention has been implemented, based on relevant indicators, e.g., changes in fuel prices, changes in NDC ambition, etc., observed over the crediting period. This approach allows for more accurate measurements, reflecting real-world conditions and changes during the project's duration. Ex-post baselines, however, reduce the predictability of the carbon credit flow over time at the time the mitigation action is planned and implemented. Shifting from an ex-ante baseline to an ex-post baseline may, therefore, require higher risk premiums to compensate for uncertainties related to the number of ERs that the intervention can achieve.

There are key differences between carbon crediting in carbon markets and RBCF. While both provide financial incentives for verified ERs, their mechanisms differ:

- **RBCF** directly rewards results through payments for ERs. The ERs and resulting carbon credits typically remain in the host country and are not transferred to the RBCF provider. This allows host-country governments to count them toward their NDCs. From a policy perspective, RBCF is covered under Article 9 of the Paris Agreement and referenced in Article 5 for Reducing Emissions from Deforestation and Forest Degradation (REDD+).[4]

  In RBCF, funding depends on the availability of public climate finance and broader development aid. It is typically channeled through dedicated climate funds, such as the World Bank's Scaling Climate Actions by Lowering Emissions (SCALE) umbrella trust fund.

- **Carbon markets**, on the other hand, involve buying and selling carbon credits through market transactions to help entities meet emissions targets. In the VCM, transactions occur between private buyers and sellers. Host-country involvement is optional but possible. These ERs cannot be used against a buyer country's NDC unless they include a 'corresponding adjustment' in emissions balances authorized by the host country. In compliance carbon markets, credits are accompanied by such authorization committing to corresponding adjustment. This means the ERs cannot be used for host country NDC compliance and thus create opportunity costs for host countries that must be reflected in credit prices, which are typically higher than prices of credits transacted on the VCM. Compliance markets are covered under Article 6 of the Paris Agreement.[5]

  Carbon market funding has the potential to grow significantly, depending on the evolution of voluntary and compliance carbon markets. For instance, between 2020 and 2023, independent carbon standards issued 150–350 million carbon credits annually, with about 150 million per year being retired (i.e., used).[6] Meanwhile, the compliance market recorded its first transactions under Article 6.

Each of the six crediting approaches covered in this report can, in principle, access both funding sources. For instance, the VCM is primarily focused on project-based and programmatic crediting. Jurisdictional and policy crediting are mainly supported by RBCF, though there is growing interest in jurisdictional crediting in the VCM and early-stage piloting of policy crediting under Article 6. This landscape, however, may evolve over time.

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[3] Overcrediting occurs when more carbon credits are issued for a mitigation activity than the actual ERs achieved. This can undermine the integrity of climate mitigation efforts because it misrepresents the true climate benefits delivered by the activity. Overcrediting can also result from poor monitoring or verification processes, non-ensuring additionality (see Box 2), or leakage (when emissions are reduced in one area but increase elsewhere due to the mitigation activity, reducing the net impact).

[4] World Bank. (2022). Defining Results-Based Climate Finance, Voluntary Carbon Markets and Compliance Carbon Markets.

[5] Ibid.

[6] World Bank, State and Trends of Carbon Pricing 2014.

Carbon crediting generates revenue streams for mitigation activities regardless of the funding source. These revenues can, i) close cost and viability gaps in investment projects, ii) cover operational or policy costs and, iii) provide rewards and incentives for mitigation actions. It is important to note that carbon revenues are not upfront investment financing. However, they can help secure financing by de-risking investments and may be integrated into financial products such as outcome bonds, which allow some of the expected revenue stream to be frontloaded.[7]

When to use carbon crediting?

Carbon crediting can be used wherever the climate outcomes of a mitigation action or sectoral, jurisdictional, or economy-wide transformation can be monitored, reported, and verified with sufficient accuracy and certainty. Carbon crediting is of interest if any of the following holds reflecting purpose and/or opportunity:

- Operational or opportunity costs are high relative to investment costs (e.g., avoided deforestation) – cost structure.
- The goal is to establish or scale a market for clean technologies (e.g., atmospheric carbon dioxide removal (CDR) technologies)—market creation.
- The goal is to support the implementation of climate mitigation policies and increasing ambition - incentive setting.
- The benefits of carbon crediting outweigh the cost of monitoring, reporting, and verification (MRV) – transaction costs.
- Program entities can take advantage of available funding sources from RBCF or carbon markets – funding sources.

Cost structure

Carbon crediting provides a payment stream over time. For example, a program entity might receive USD 1 million annually for delivering 100,000 t of ERs each year as carbon credits for USD 10 per credit over 10 years.

Purely from the perspective of covering costs, this makes carbon crediting interesting where costs are mainly opportunity costs or operational costs and less so upfront investment costs (or where these upfront costs are covered by other means) and where the mitigation impact per dollar spent is large. Following this logic, carbon crediting has become a prime financial instrument to support forest protection (REDD+) or clean cooking programs, which have rather low upfront investment costs compared to, e.g., renewable energy solutions.

Beyond individual projects, mitigation policies can have similar cost structures, such as mandatory energy efficiency standards generating annual costs for equipment testing, custom controls, and equipment labeling. The cost structure is one reason policy crediting can be an attractive way to enable policy implementation.

Carbon crediting is of interest for projects with high upfront costs as well improving the financial viability of such projects. This can facilitate access to investment financing by lowering the risk for the lender because of the improved capability of the borrower to pay debt services.

Market creation

Renewable energies are the prime example of creating a clean technology market through results-based payments (RBP)—carbon crediting is a modality of RBP—. Renewables have a cost structure unfavorable to RBP, with high upfront costs and low operating costs.

If the objective was to finance just an individual windmill, the cost gap to implementation would be best covered through a concessional loan or grant. Closing it by paying x per MWh of wind power produced (as has been done in most countries through feed-in tariffs) will cost the finance provider more as it must compensate for the windmill's performance risk.

If the objective is, however, to create a market for windmills and aim for hundreds or thousands instead of one to be installed, an RBP scheme at the national level can be an instrument of choice. It pays for this technology's environmental (climate) service and allows overtime – to leave the upfront financing to commercial finance providers. Together with cost reductions through economies of scale, allowing the tariff premiums to be phased out over time allows for creating a sustainable, clean technology market.

[7] For more detail on blending carbon crediting in financial product see: Pengwern Associates, Integrating RBCF in financial products, 2024.

Following the example of renewables, many other use cases exist to promote capital-intensive mitigation action through RBP. Technology-based CDR, such as Direct Air Carbon Capture and Storage (DACCS), is an emerging new area. CDR has a similar cost structure as renewables, and the potential creation of a CDR market could learn from the experience made with renewables.

For CDR, which does not generate any commercial good but is a pure waste removal technology to clean up the atmosphere of harmful excess CO_2e, carbon crediting is the obvious instrument of choice if the objective is to create a CDR market. At the same time, it is a good example of the need to combine several instruments: Given the early stage of CDR, program entities would find it challenging to secure commercial upfront financing even if they could receive very high carbon revenues. Concessional loans and/or grants, in addition to RBP, will be critical to developing a CDR market, as has been the case for renewables.

Incentive setting

Carbon crediting can be used to incentivize good practice by following simple performance logic: the more verified results are delivered, the more money is paid. This positive incentive-setting effect can be used in practically all use cases, including incentivizing sound policy implementation or enforcement, incentivizing implementation of least-cost solutions, or supporting good practice in operating equipment.

In setting crediting thresholds below business-as-usual baselines, carbon crediting can be used to set incentives for increasing the ambition of all types of program entities. For instance, baselines can be set at certain technology benchmark levels, incentivizing fast adaptation of more efficient technologies.

Transaction Costs

Transaction costs are a limiting factor when using carbon crediting. Depending on the mitigation activity type and underlying emissions drivers, quantifying ERs and undertaking MRV can be prohibitively expensive or even impossible, e.g., for climate awareness or education programs. Typically, these costs are fixed, i.e., per ton of carbon credit, and they decline in credit volume. While even micro activities such as clean cookstoves can qualify for carbon crediting if aggregated in large quantities, size thresholds exist for reasonably deploying carbon crediting.

Based on experiences made with this instrument, a crediting activity should at least reach an expected volume of tens of thousand tons a year and, in more complex cases, hundreds of thousands. As indicated above, this does not disqualify small and micro activities provided they can be aggregated into larger programs.

Funding opportunities

Finally, carbon crediting can be of interest simply because of the availability of funding. What then matters most is comparing benefits with carbon crediting transaction costs. For instance, VCMs have created opportunities for nature-based solutions (NbS) that can complement traditional funding from development finance.

High-integrity carbon crediting

Carbon credit integrity is key to market credibility, fostering trust by ensuring authenticity, transparency, and social responsibility. Integrity is important to achieve the crediting program's desired impact, secure a funding source, and avoid unintended side-effects or reputational risks. The concept of high-integrity carbon credits has multiple dimensions and can vary by sector, context, and crediting standard, but generally adheres to three main characteristics:[8,9]

- **Environmental integrity:** Ensuring that mitigation outcomes are real and verified. This requires carbon credits to demonstrate that they are:
  - Additional, namely that the emissions would not otherwise have been reduced in the absence of the crediting program;
  - Permanent, with mitigation measures in place to prevent the ER from being reversed;
  - Measurable, using clear and acceptable standards;
  - Not double-counted by the buyer and seller; and

[8] World Bank. (n.d.). High Integrity, High Impact: The World Bank Engagement Roadmap for Carbon Markets.

[9] See also: Integrity Council for the Voluntary Carbon Market (ICVCM) Core Carbon Principles (CCPs); Voluntary Carbon Market Initiative (VCMI) Claims Code of Practice; International Institute for the Unification of Private Law (UNIDROIT); International Emissions Trading Association (IETA) Guidelines for High Integrity Use of Carbon Credits.

  * Do not lock in activities or investments that are incompatible with a country's net-zero targets or with international climate goals in line with the Paris Agreement.

- **Social integrity:** Ensuring that local people and communities, including Indigenous Peoples (IPs) and Local Communities (LCs), can participate in and equitably benefit from mitigation outcomes. This includes but goes beyond safeguarding against unacceptable practices such as non-compliance with safety standards for workers or child labor and focuses on inclusion of affected stakeholders in decision making processes related to a carbon crediting program and fair sharing of proceeds.

- **Financial, market, and policy systems integrity:** Ensuring clear and transparent legal nature of carbon credits and the governance of the trading market architecture, transparent pricing, and rules to prevent fraudulent activities. For instance, sellers need to be assured their efforts will be fairly rewarded, and buyers need to have confidence in their purchase. This aspect looks beyond the boundary of the crediting program to confirm the program's eligibility with the host country's legal system and policy priorities. Legal aspects include the right of title of ERs. In case credits are transacted as ITMOs, host country authorization and conformity with the host country's climate policy ambitions and strategies are essential.

Country readiness for engaging in high-integrity carbon crediting can differ significantly by sector and context. The readiness of the governance and market systems can significantly influence the preparation time and effort for engaging in carbon crediting and often requires up-front resources to ensure a conducive enabling environment. Likewise, at the project, program, or sectoral level, and amongst program entities, developing functional MRV systems, robust social engagement and risk management systems, and market transaction frameworks and infrastructure also require attention and investment for optimal functioning of carbon crediting programs within these wider governance and market systems.

Criteria for carbon crediting programs

Standards that govern how carbon credits are generated, verified, and issued define the criteria for carbon crediting. Standard setters can be regulators of international or domestic carbon market mechanisms or providers of RBCF, defining eligibility criteria and requirements for accessing RBCF funds. While each standard has its own objectives and requirements, each must define a set of minimum criteria that determine which mitigation actions to fund and the rules, methodologies, and processes to issue carbon credits. Table 1 presents each criterion.

Table 1 Criteria defined by carbon crediting standards.

CRITERIA	DEFINITION
Sector and eligible mitigation activities	A crediting standard may target one or several sectors. Each sector includes mitigation activities defined within its scope. The eligible mitigation activities represent the interventions that can issue carbon credits according to the respective standards.
Scale	The scale defines the expected volume of emission reductions (tCO_2e) or other measures, such as energy production (kWh) or intervention area (ha). The scale is often tied to different requirements.
Boundary	The geographic boundaries eligible under a standard determine whether ERs can be generated at the local, jurisdictional or national level.
Crediting period	The crediting period sets the length of time for which credits are issued for a specific mitigation activity. It guarantees that actions do not issue carbon credits after a period during which the activity was deemed eligible. Crediting programs may include an option for renewing or extending a crediting period.
Methodology	The methodology details the rules and methods a mitigation activity must implement to generate carbon credits. It sets the rules for eligibility, quantification of ERs (including the criteria for setting up the baseline), demonstrating additionality (Box 2), minimum criteria to meet social and environmental safeguards and monitoring processes.
MRV systems	The MRV ensures that the ERs resulting from the mitigation activity are real and measurable and comply with the carbon crediting program's standards monitoring, reporting, and third-party verification processes.

CRITERIA	DEFINITION
Social and environmental safeguards	Safeguards are measures designed to ensure that the climate mitigation activity respects and protects the rights of communities and the environment. These safeguards aim to prevent unintended negative impacts and maximize co-benefits.
Eligibility and alignment with national regulations	Standards can impose obligations related to alignment with national policies (non-objection from authorities), respect of national regulations, and managing alignment with the procedures of Article 6 of the Paris Agreement, as well as the rules regarding double issuance/double claiming.
Issuance	Standards are issuing carbon credits to stakeholders' registry accounts in the crediting program.

Types of carbon crediting approaches

Carbon crediting programs can operate under different approaches. Some approaches started with activities at the project level (e.g., renewable energy plants). However, it has evolved to increase the scope and drive ERs at scale, with several carbon crediting programs already generating carbon credits from broader policy and jurisdictional interventions.

The choice of a crediting approach depends on the mitigation activity a program entity seeks to implement, its scope, financial requirements, and the jurisdiction's context. Each approach has distinct methodological requirements, with specific details depending on the respective carbon crediting standard.

Table 2 presents the scope and key characteristics of different carbon crediting approaches.

Table 2. Types of carbon crediting approaches.[10]

CREDITING APPROACH	SCOPE	TYPICAL PROGRAM ENTITY	BASELINE EMISSIONS	MRV	EXAMPLE
Project	Individual projects or technologies	Private or public enterprises (e.g., steel producers, municipal landfill operators)	Counterfactual estimate of emissions at a specific site(s) based on historical, technology, economic, or performance analysis	Monitor emissions or other drivers of emissions at the project site(s); ex-post data may be used to calculate baseline emissions	Renewable energy power plants
Programmatic	Large number of similar projects, often small and micro-scale within a program	Public agencies (e.g., for rural energy access), national development banks, or specialized enterprises (private or public)	Counterfactual estimate of emissions at a specific site(s) based on historical, technological, economic, or performance analysis	Monitor emissions or other drivers of emissions at the project site(s); ex-post data may be used to calculate baseline emissions; sampling approach, i.e., a random sample of project devices are periodically selected for MRV	Installation of cookstoves at the household level at multiple locations in a country
Jurisdictional	National, provincial, or municipal jurisdictions; overachievement of jurisdictional mitigation targets	Specialized public agency (e.g., env. agency or forestry dept or several agencies)	Total projected emissions in the jurisdiction fixed ex-ante	Detailed bottom-up jurisdiction-level GHG inventory with clear boundaries	REDD+ programs at the jurisdictional level

[10] The World Banks Group (2019) Different approaches to carbon crediting and TCAF blueprint synthesis report.

CREDITING APPROACH	SCOPE	TYPICAL PROGRAM ENTITY	BASELINE EMISSIONS	MRV	EXAMPLE
Policy	Policy interventions	National government represented by a designated agency	Based on economic modelling of economy-wide emissions or sectoral emissions without policy (e.g., carbon tax, performance standards, regulation), in some cases simplified approaches are possible	Monitoring of market penetration rates or modelling baseline and project emissions using ex-post input parameters (e.g., GDP, sectoral GDP, fuel prices)	Energy subsidy reform or carbon pricing policies
Sectoral	Overachievement of sectoral mitigation benchmarks or targets	Specialized public agency (e.g., energy agency)	Total projected sector emissions, fixed ex-ante	Detailed bottom-up sectoral inventory with clear boundaries	Transport emissions standards
Economy	Overachievement of a national mitigation target	National government represented by a designated agency	Total projected emissions of the economy fixed ex-ante	Economy inventory of GHG emissions	Supporting a small country that can only achieve on an economy-wide level sizeable mitigation

A helpful way to differentiate these crediting approaches is by whether the ERs can be attributed to the entities carrying out the mitigation activities. This kind of attribution works well for project-based and programmatic crediting, as well as some policy crediting approaches, like feed-in tariffs for renewable energy. In contrast, attribution isn't possible for price-based policies like subsidy reforms, and it usually doesn't apply to jurisdictional, sectoral, or economy-wide crediting. This distinction has methodological implications, as outlined in Table 2, but also important operational implications—such as determining who holds the rights to the ERs, which can require different levels of domestic regulation.

The following chapters present the main characteristics of each carbon crediting approach.

2.1 Project-based crediting

Introduction

Project-based carbon crediting is the most common approach. It supports individual projects or technologies that result in measurable ERs and delivers carbon credits that can be sold primarily in carbon markets to generate revenue.[11]

Project-based crediting is of interest for large point sources of ERs such as waste management (e.g., methane capture from landfills) or mitigation in the industrial sector (e.g., transition to clean steel production). Project-level mitigation activities often generate revenue through the sale of carbon credits to private sector buyers on the VCM. The emerging compliance carbon market holds potential for project-level mitigation as well. Proceeds (carbon revenues) from project-based crediting are typically used to close cost/viability gaps of low-carbon technologies and/or to reward mitigation behaviors and outcomes.

Background

Project-based carbon crediting mechanisms have evolved from the Kyoto Protocol, which introduced two market-based mechanisms to help countries meet ER targets: the Joint Implementation (JI) and the CDM. The CDM was the most prominent of these mechanisms, allowing developed countries (known as Annex I countries) to finance ER projects in developing countries (non-Annex I countries) and receive Certified Emission Reductions (CERs) in return. The developed countries could use these CERs to meet their ER targets under the Kyoto Protocol. The CDM was crucial in establishing the principles and methodologies for carbon crediting, including MRV systems, and it provided a concept of additionality that became a model for other carbon market standards (see Box 2).

BOX 2. HOW WAS ADDITIONALITY DEFINED UNDER THE CDM?

ERs must be proven additional, meaning that they would not have occurred without the financial support from the crediting program. Proof of additionality can be built on legal, financial, and technological arguments, and can be demonstrated on a case-by-case basis or for a whole category of mitigation activities.[12]

Several tests are employed to ensure additionality:

- **Regulatory surplus test.** It ensures that a project's activities exceed what is already required by existing laws, policies, or regulations.
- **Financial or investment test.** It evaluates whether a project is economically viable without the revenue from carbon credits.
- **Barrier test.** It identifies non-financial obstacles, such as technological, institutional, or market challenges, that can only be overcome with the support of carbon credits.
- **Common practice test.** It evaluates whether the proposed project activity is widely adopted in similar contexts. If the activity is already common it represents standard practice.

In parallel with compliance-driven markets like the CDM, the VCM emerged as an alternative route for project-based carbon crediting. The VCM has grown significantly over the past decade, driven by corporate climate commitments and the creation of new methodologies and standards for the generation of carbon credits.

Carbon credits issued by project-based activities have grown exponentially in recent years, especially for renewable energy and NbS (led primarily by REDD+ projects) (see Figure 1). However, in 2022, the volume and value of carbon credits began to decline in tandem with growing scrutiny over their integrity, quality, and transparency. Concerns were raised about whether certain projects, such as REDD+ activities,

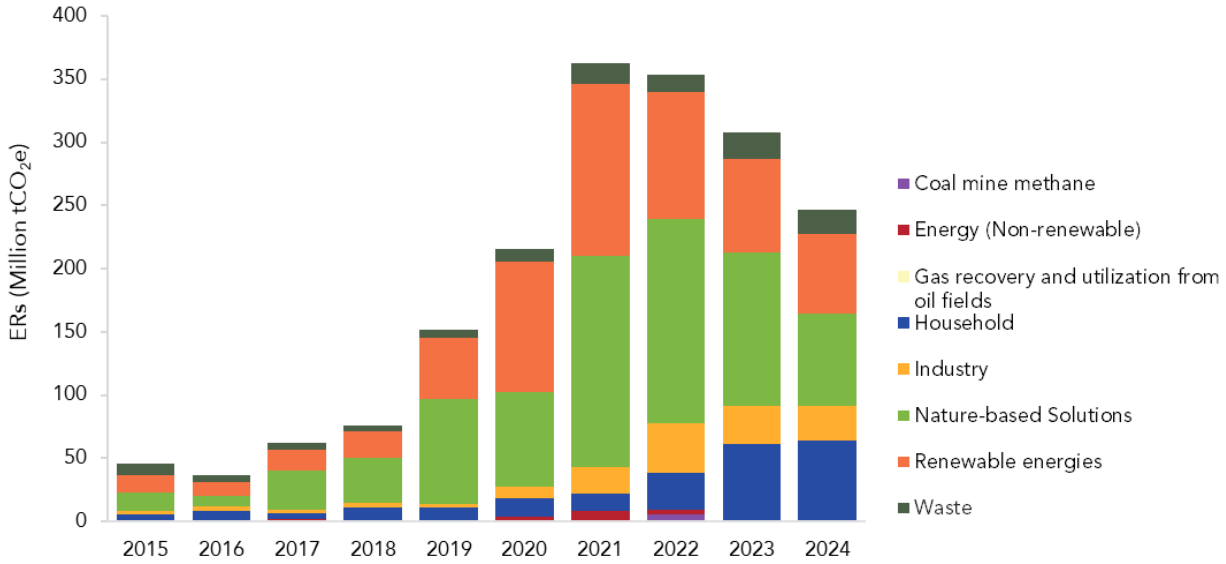
[11] Each carbon credit represents one metric ton of CO_2 equivalent reduced or removed from the atmosphere by climate change mitigation projects or programs.

[12] Partnership for Market Readiness (2021) A Guide to Developing Domestic Carbon Crediting Mechanisms. Synthesis: Developing methodologies.

genuinely achieve ERs, alongside allegations of rights violations involving IPs and LCs (including inequitable benefit-sharing from project revenues among actors involved), as did doubts about the additionality of some renewable energy projects. This has impacted project types preferred by buyers of carbon credits.

Conscious of these challenges and risks, several carbon market standards are updating and improving their methodologies to increase the integrity of carbon credits. Changes include adopting more rigorous tools to calculate and verify ERs, strengthening the evaluation of additionality, and integrating social and environmental safeguards, including benefit sharing. In addition, the shift to jurisdictional approaches in REDD+ seeks to address some of these challenges, especially those related to leakage[13], inequitable benefit sharing, and lack of government buy-in (see Chapter 2.3).

Figure 1. Credits issued by carbon standards by project type.



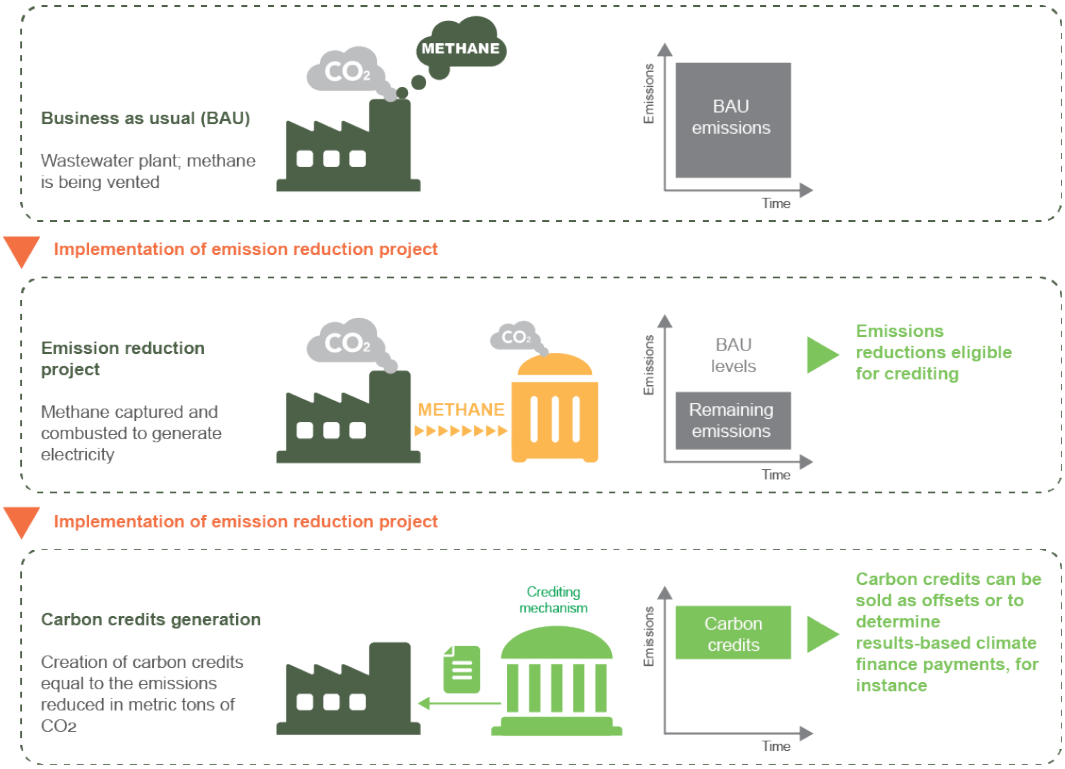
Data source: Climate Focus (2024) VCM Dashboard. 2024 includes data until October 2024.
**This figure includes credits issued in the CDM and under VCM standards: VCS, Gold Standard, ACR, CAR, Plan Vivo, GCC, Climate Forward, BioCarbon, Cercarbono and ART.*

How does project-based carbon crediting work?

A project-based carbon crediting begins with the identification of a technology that has the potential to reduce or remove emissions. The baseline is tailored to the specific project and involves calculating the ERs that would have occurred if the specific project had not been implemented. Figure 2 presents the case for the installation of a wastewater plant.

[13] Leakage in carbon crediting occurs when actions to reduce emissions in one place lead to increases elsewhere. In the forestry sector, for example, efforts to reduce deforestation in one area may lead to increased deforestation in other areas outside of project boundaries. By encompassing larger project areas, jurisdictional approaches help reduce the risk of leakage as compared to smaller project-based approaches.

Figure 2. Carbon crediting under a project-based approach.



Source: based on state and trends of carbon pricing 2018

Box 3 presents an example of a typical Landfill Gas Power Generation Project.

BOX 3 EXAMPLE LANDFILL GAS POWER GENERATION PROJECT TYPE

Overview

The project involves the installation of a gas capture and power generation system at a municipal landfill located in a mid-sized city in a developing country. The main components include a gas collection system, compressors, and power generation units that convert the captured methane into electricity. The project aims to reduce GHG emissions in two ways: 1) by destructing methane before it escapes into the atmosphere and 2) by using methane as a renewable energy source. Landfills present a significant source of methane emissions. The project aims to mitigate GHG emissions and produce renewable energy to feed into the city's power grid.

Approach

The project follows a project-based carbon crediting approach under the VCM methodology for landfill gas capture and utilization.

Impacts

- **Mitigation impacts:** GHG ERs,
- **Technology:** MWh of renewable energy generated per year,
- **Economic impacts:** revenue generated from carbon credit sales over the payment period and full-time jobs created during construction and permanent positions for operation and maintenance,
- **Environmental benefits:** reduces methane emissions and improves local air quality,

The project establishes a model for sustainable landfill management, encouraging replication in other regions.

Strengths and weaknesses

CRITERIA	RATIONALE
Environmental and social integrity	• Risk of non-additionality: ensuring that projects are genuinely additional (i.e., would not have happened without the carbon crediting) can be challenging. • Risk of leakage and non-permanence, especially for REDD+ projects.
Scalability	• Low scalability potential.
Uncertainties and complexity	• High transaction costs: the process of verifying, and maintaining a project can be expensive and time-consuming, particularly for smaller projects. • However, the large number of methodologies and standards for different project types provides more flexibility, which is a strength.

Further resources

- World Bank (2021). A Guide to Developing Domestic Carbon Crediting Mechanisms.
- EDF, WWF, and Öko-Institute e.V. (2020). What makes a high-quality carbon credit?
- FMO (2024). Estimating Carbon in Forestry Investments: A Guide to available tools for climate-focused investors.
- Climate Focus (2023). VCM Primer.
- Climate Focus (2024). VCM Dashboard.

2.2 Programmatic crediting

Introduction

The programmatic carbon crediting approach emerged to address the challenges faced by small-scale projects, particularly their inability to achieve scale and the high transaction costs associated with traditional project-based carbon crediting.

Programmatic crediting allows for the aggregation of smaller projects based on the same technology under a single mechanism, making it easier to manage, monitor, and finance mitigation activities, such as deploying small-scale solar systems or clean cookstoves in rural areas. Programmatic crediting acts similarly to project-level mitigation activities in the sense that it often attracts private-sector financing by generating revenue through the sale of carbon credits on carbon markets.

Programmatic carbon crediting is suitable for activities that can be consistently replicated across multiple locations or sectors. The eligible activities need to share certain characteristics that allow them to be grouped together. Sampling reduces the administrative burden and transaction costs; instead of verifying each small project separately, programmatic approaches allow for sampling during MRV. This means that a random sample of project devices, e.g., cookstoves in households, is periodically selected for MRV. These samples are representative of the entire population.

An important characteristic of programmatic crediting approaches is that they tend to be more flexible in that they allow activities to start even if the specific number of devices and their locations are not clearly identified yet. Additional activities can also be included over time.[14] These activities often tend to be small or even micro-scale and at the household level, where scale does not necessarily relate to the size of a device but rather the program boundaries or a number of different implementation sites. The program must define the scale.[15]

Programmatic crediting generates payments for carbon credits from RBCF or carbon market sources (both voluntary and compliance market). Entities implementing programmatic crediting programs typically use the proceeds to fund incentive payments, concessionality, or price discounts for low-carbon technology.

Background

Programmatic crediting became widely known under the CDM of the Kyoto Protocol. While the CDM proved that a concept of scale – in particular through private sector participation – was possible for project-based activities, supply and demand for small-scale projects were low due to high transaction costs and regulatory complexity.[16] This was paired with low participation in low-income countries. The programmatic approach under the CDM, namely the Programme of Activities (PoAs), was part of a reform process to increase and broaden participation. Programmatic crediting approaches under the CDM have been a turning point for small and micro mitigation activities that were previously difficult to undertake.

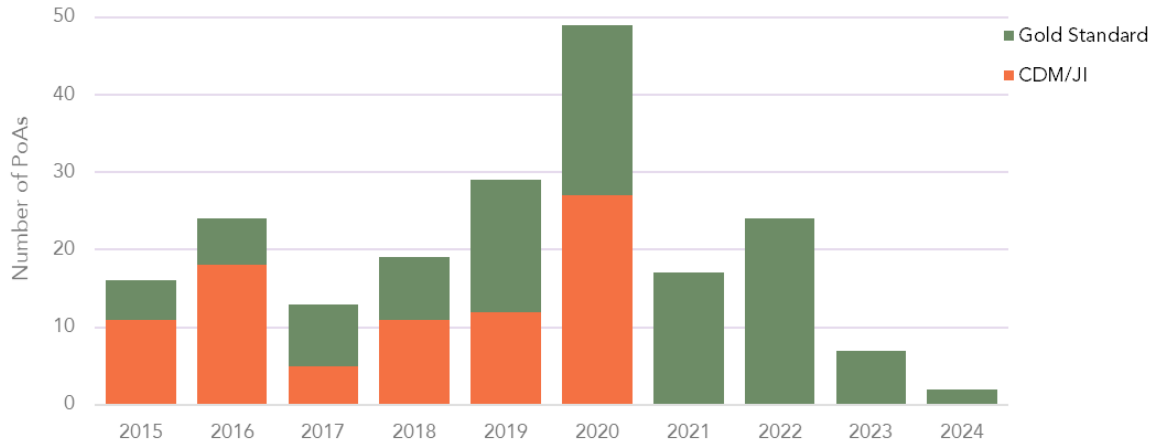
The following figures present the type of mitigation activities funded under programmatic carbon crediting and how they have evolved over time.

[14] World Bank (2021). A guide to developing domestic carbon crediting mechanisms.

[15] Ibid.

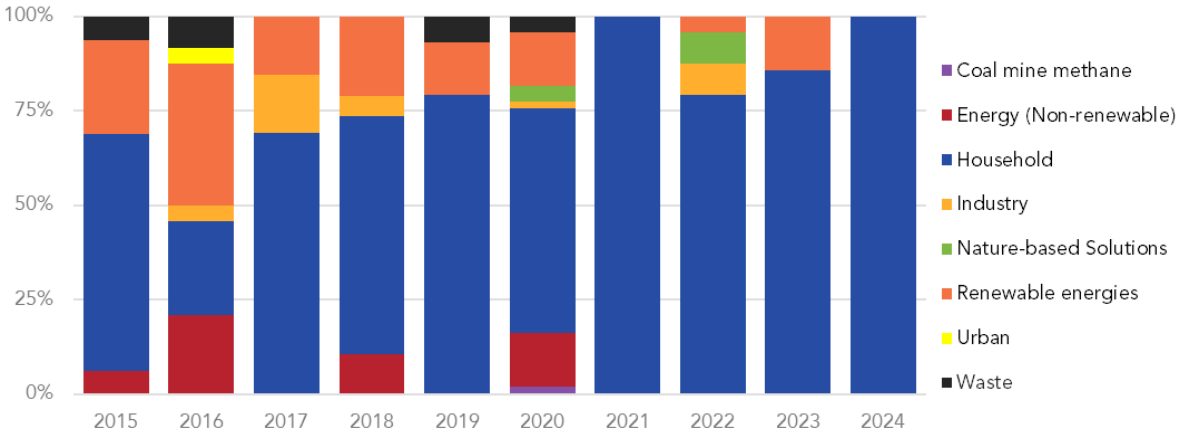
[16] World Bank (2018). Carbon markets under the Kyoto Protocol – Lessons learned for building an international carbon market under the Paris Agreement.

Figure 3. Number of PoAs registered.



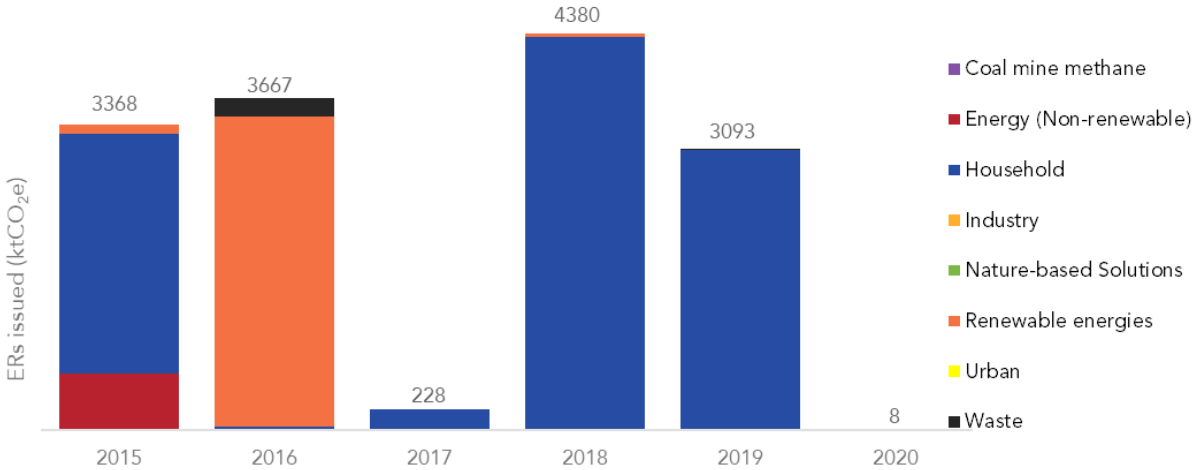
Data source: CDM Pipeline (October 2024) and Climate Focus (October 2024) VCM Dashboard. Other PoAs registered under other standards may be missing from this chart as these are categorized differently in their respective registries.

Figure 4. Share of PoAs registered by sector.



Data source: Climate Focus (October 2024) VCM Dashboard.

Figure 5. Credits issued by PoAs under the CDM.



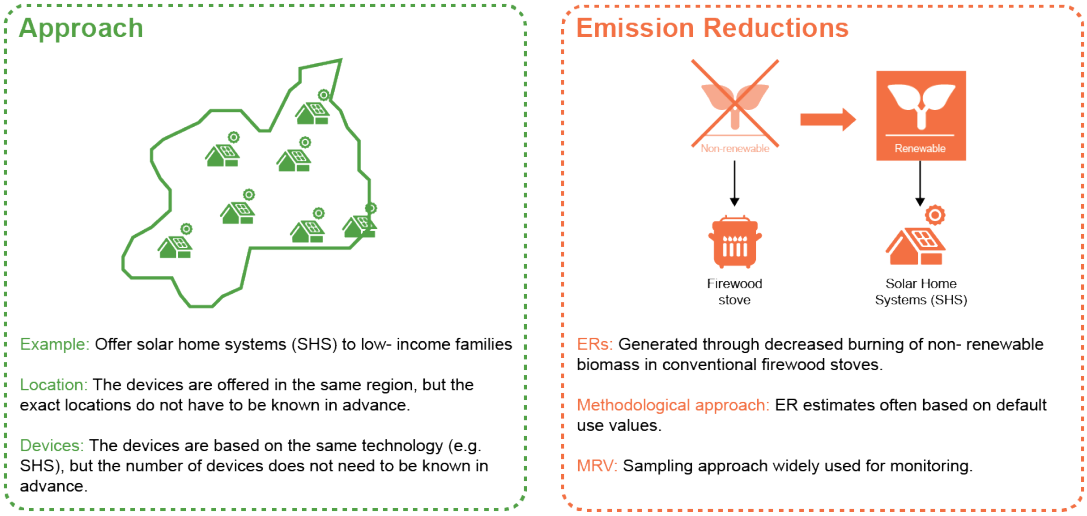
Data source: CDM Pipeline (October 2024).

* *The CDM Pipeline only publishes total issuances per PoA but is not disaggregated by year. In this figure, each PoA's total issuances are associated with the project's registration year date.*

How does programmatic crediting work?

The baseline setting in programmatic crediting is mostly based on technology. Figure 6 illustrates the programmatic crediting approach, using the example of cookstoves offered at the household level. The cookstoves (i.e., the device) are offered to low-income families (i.e., at the household level) at multiple locations in a country. The cookstoves are based on similar technologies (e.g., ethanol as renewable fuel) replacing non-renewable fuel, such as firewood, which generates ERs. The methodology used to estimate the ERs often uses default values for the estimation of baseline non-renewable biomass consumption and applies a sampling approach for monitoring purposes.

Figure 6. How does programmatic crediting work?



Source: Own elaboration.

Box 4 presents a case study describing how programmatic crediting has worked in practice.

BOX 4 ENERGY ACCESS AND QUALITY IMPROVEMENT PROJECT (EAQIP) IN RWANDA UNDER THE STANDARDIZED CREDITING FRAMEWORK (SCF)

The SCF is a streamlined and country-owned ER crediting framework. It is developed and supported by the Carbon Initiative for Development (Ci-Dev), a World Bank trust fund that supports clean energy access in low-income countries. The SCF allows for more comprehensive geographic coverage, flexibility, and lower transaction costs through a simplified, systematic, and standardized approach that uses local parameters for determining ERs. It gives governments the opportunity to create national standards for carbon crediting, including under Article 6.2 of the Paris Agreement. The SCF supports programmatic crediting with many similar projects at small or micro-scale levels (e.g., renewable fuel cookstoves or SHS). Through the SCF, Ci-Dev builds on CDM methodologies and supports existing PoAs to generate ERs post-2020 and transition to approaches that are compliant with the Paris Agreement.

Brief overview

The EAQIP in Rwanda,[17] launched in 2020, aims to improve energy access for households, enterprises, and public institutions while enhancing electricity service efficiency. The parent project, approved for USD 150 million, includes four components:

- increasing access to grid electricity,
- enhancing electricity service efficiency,
- increasing access to off-grid electricity and,
- clean cooking solutions and,
- technical assistance for capacity building.

[17] Word Bank (2022) Rwanda – Energy Access and Quality Improvement Project: Additional financing.

The additional financing in 2022 included a USD 10.5 million Emission Reduction Purchase Agreement (ERPA) for ERs generated through activities financed by the Renewable Energy Fund (REF) Project, Component 1, Window 5 and the Rwanda Energy Access and Quality Enhancement Project (EAQIP) Component 3 - Increasing Access to Off-Grid Electricity and Clean Cooking Solutions (including Component 3(a) for SHS and EAQIP Component 3(b) and (c) for efficient cookstoves), as described in respective project appraisal documents and project papers.

EAQIP was approved in September 2020 and became effective in March 2021. The parent project is expected to run until December 2026, with major activities such as grid connections, clean cooking solution deployment, and off-grid solar installations progressing throughout this period. The additional financing was approved in June 2022.

Key information on the timeline and impact in ERs of the program:

- **Expected annual ERs (tCO_2e):** The crediting period is five years as the following:

	SHS	Cookstoves
2021	1,098	0
2022	6,322	6,165
2023	13,420	161,410
2024	20,027	404,275
2025	26,650	609,375

- **Length of the payment period:** 2021-2024
- **Volume of ERs paid for:** Expected to include a firm purchase of ERs up to USD 10.51 million.

Approach

EAQIP follows an RBCF approach to finance subsidies via the private sector for households to purchase off-grid solar and efficient and clean cooking products. The Bank funds RBCF through grants and loans. Revenue from the Ci-Dev ERPA will be used to replenish the RBCF funding.

The calculation of GHG ERs is based on methodologies approved under Rwanda's SCF. The project uses MRV protocols to track and verify the ERs.

The Ministry of Finance and Economic Planning holds primary responsibility for carbon operations, and the Rwanda Environment Management Authority oversees the national carbon crediting framework, including the listing of programs, approval of methodologies, and the issuance of ER credits. The Energy Development Corporation Limited is responsible for the implementation of MRV, including preparing annual GHG ER monitoring packages and ensuring that an accredited GHG ER verifier is hired to verify ERs.

Impacts

The project is expected to achieve the following impacts:

- **Mitigation results:** GHG mitigation of 2.73 $MtCO_2e$,
- **Community development:** 200,000 households gaining access to clean cooking solutions and 150 schools benefiting from modern, efficient cooking technologies,
- **Health:** enhanced health outcomes by reducing exposure to indoor air pollution, particularly in households and schools that currently rely on traditional cooking methods,
- **Long-term benefits:** these include the reinvestment of carbon revenues to support further off-grid energy projects and the transition of subsidy mechanisms into revolving funds, which will sustain the scaling of energy access solutions.

Strengths and Weaknesses

CRITERIA	RATIONALE
Environmental and social integrity	• Programmatic crediting approaches are very similar to project-based approaches when it comes to baseline settings and MRV. Both are based on the technology underlying the activities. • Similar to project-based crediting, there is also i) risk of leakage and ii) perverse incentives undermining environmental integrity when a) programs could displace ERs into non-program areas and b) when the government avoids implementing ambitious climate policies that might negatively affect carbon revenue generation. MRV can be challenging for a large number of dispersed activities.
Scalability	• A key strength of programmatic crediting is the possibility of scaling up mitigation by replicating projects. While the projects must use the same technology, it is not necessary to know the number of project devices in advance since any additional devices can be added to the program. • Programmatic crediting can reach small- and microscale activities that would otherwise not materialize due to prohibitive transaction costs.
Uncertainties and complexity	Overall, the uncertainties and complexity of project-based crediting can also be observed with programmatic approaches, with a key difference: • As projects are added to the program over time, achievable ER volume is highly uncertain compared to project-based crediting. • Ensure consistency of technology application, MRV methods, and sampling strategies across different project sites and contexts may involve additional program governance and management complexities.

Further resources

- World Bank (2021). A guide to developing domestic carbon crediting mechanisms.
- World Bank (2018). Carbon markets under the Kyoto Protocol – Lessons learned for building an international carbon market under the Paris Agreement.
- Foundation Future of the Carbon Market (2022). PoA Mapping and Reporting.

2.3 Jurisdictional crediting

Introduction

Jurisdictional carbon crediting refers to the quantification and issuance of carbon credits from climate mitigation activities across a designated area, usually delimited by the administrative boundaries of a national or subnational government.

In contrast to project-based crediting approaches, which target a specific location or (limited) geographical area, or to programmatic crediting approaches, which target a distinct set of project sites or devices within an area, jurisdictional approaches target net ERs from specified activities across an entire city, province, region, or country. They are usually implemented with a high level of government involvement.[18]

Jurisdictional approaches were first pioneered in the context of REDD+, and they continue to account for the vast majority of jurisdictional approaches implemented to date. Their application has, in some instances, been extended to broader sustainable agricultural land management activities, such as climate-smart agriculture. Jurisdictional approaches could also potentially be applied in urban contexts to accelerate climate mitigation and finance infrastructure projects aligned with city or regional targets. However, city-wide crediting has yet to be implemented or tested at scale.[19]

Jurisdictional approaches were initially developed to address shortcomings identified in project-based REDD+ approaches. They are well-suited for governments aiming to finance large-scale mitigation activities, particularly related to emissions from Land Use and Land Use Change (LULUC), aligned with their climate goals or broader environmental and economic development policies. Table 3 presents the main objectives of jurisdictional carbon crediting approaches.

Payments for carbon credits from jurisdictional approaches can come from RBCF and carbon market sources. Jurisdictional REDD+ started with an RBCF phase[20] and now sees increasing interest in carbon markets. Proceeds are typically used to reward and incentivize payments to a broad range of stakeholders including farmers, LCs, IPs, and governmental authorities.

Table 3. Objectives of jurisdictional approaches.

ELEMENT	RATIONALE
Scalability	• A primary motivator for the development of jurisdictional approaches was to scale REDD+ beyond the project level.
Government involvement	• Government involvement is essential for successful, well-tailored forest and climate interventions across a jurisdiction.
Lower risk of leakage	• By monitoring emissions across a broader geographic area and engaging multiple stakeholders, jurisdictional approaches can reduce the risk of emission-generating activities spreading to areas outside the intervention boundary, while tackling a broader range of deforestation drivers.
Engagement and ownership opportunities for key stakeholders	• REDD+ jurisdictional crediting aims to involve key stakeholders such as local and subnational governments, civil society groups, and IPs and LCs in the program implementation cycle, as well as provide a platform for dialogue among these actors. The participatory approach and typically high level of government involvement tend to ensure better transparency and equity in the development of benefit-sharing agreements.

[18] See, e.g., Tropical Forest Alliance (2023) Company Action in Collective Efforts for Sustainable Land Use at Scale, CDP (2022) Landscape and Jurisdictional Approaches: Opportunities to finance a nature-positive net-zero transition.

[19] The World Bank's Carbon Partnership Facility (CPF) developed a crediting methodology for city-wide mitigation actions, with credits potentially supporting NDC targets or attracting private and international investment. More information available here.

[20] Article 5 of the Paris Agreement encourages parties to the agreement to take action on REDD+ including through results-based payments. Article 6 of the Paris Agreement on carbon markets and non-market approaches is in principal open to REDD+ activities broadening the potential funding basis from carbon markets beyond voluntary carbon markets.

Background

In the context of REDD+, jurisdictional approaches were first explored at scale under the World Bank's Forest Carbon Partnership Facility (FCPF),[21] which created a mechanism to compensate developing countries for their efforts to conserve tropical forests while simultaneously reducing GHG emissions. Its applicability for REDD+ interventions was later formalized under the Warsaw Framework for REDD+,[22] a framework that defines the international criteria for developing countries to reduce emissions from deforestation and forest degradation and enables the delivery of RBCF for the associated (verified) ERs. At the time, avoided deforestation was not an eligible project type under the CDM, and there was a desire from forest country governments for new opportunities to scale up finance for climate mitigation in the forestry sector and from contributor country governments to fund these efforts.

In addition to their uptake and advancement by multilateral climate funds, jurisdictional approaches have more recently been adopted by carbon standards certifying forest-based carbon credits for compliance markets, and have been endorsed by relevant sector initiatives, such as the Tropical Forest Credit Integrity Guide.[23] While this represents a new avenue for jurisdictional REDD+ and creates a new avenue for private finance, RBCF remains the principal funding source for jurisdictional REDD+ initiatives.

A variety of funds and standards have been developed for implementing jurisdictional REDD+ and sustainable land management programs, including public sector funds and VCM standards (see Table 4).

Table 4. Overview of Jurisdictional REDD+ programs.

FUND/STANDARD	REACH	RESULTS
FCPF Carbon Fund	The Carbon Fund has signed ERPAs with 15 countries. It is closed to new programs but operational on its existing portfolio (until 2028).	By the end of 2025, FCPF expects to achieve or exceed its target of 144 $MtCO_2e$, generating a total of 167.8 $MtCO_2e$ in ERs.[24]
BioCarbon Fund Initiative for Sustainable Forest Landscape (ISFL)	The Biocarbon Fund has signed ERPAs with two countries; ERPAs for three other countries are under development.	By 2030, aims to reduce more than 40 $MtCO_2e$ across its target countries.[25]
ART-TREES: Architecture for REDD+ transactions	Currently, 23 programs are listed under the ART-TREES Standard, covering 47 jurisdictions across 16 countries.[26]	To date, TREES credits have only been issued to Guyana, a total of 33.47 million credits in 2022.[27]
VCS JNR: Jurisdictional and Nested REDD+	Eligible VCS REDD+ projects may now transition and register under the JNR framework, but according to the Verra Registry, none have completed this process yet.	No information available.

[21] The World Bank's FCPF was established in 2007.

[22] REDD+ stands for Reducing emissions from deforestation and forest degradation in developing countries. The '+' stands for additional forest-related activities that protect the climate, namely the sustainable management of forests and the conservation and enhancement of forest carbon stocks. (UNFCCC, 2024, What is REDD+?)

[23] See Tropical Forest Credit Integrity Guide

[24] Forest Carbon Partnership Facility (2024) Pioneering Climate Finance for Forest Conservation

[25] BioCarbon Fund ISFL (2024) 2024 Annual Report.

[26] See ART Registry

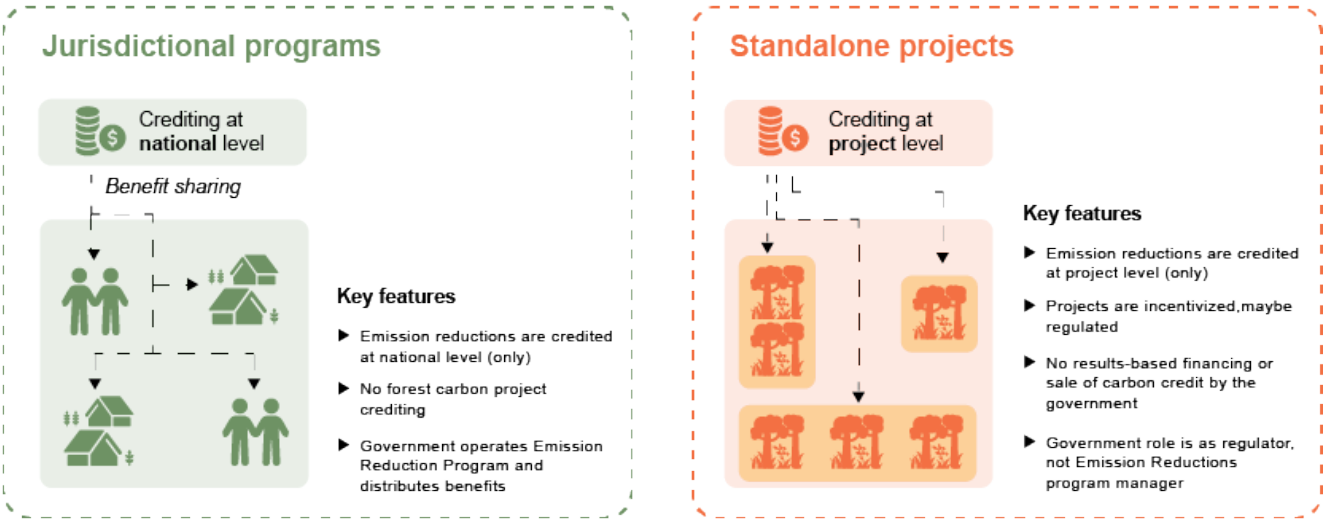
[27] See ART (2022) ART Issues World's First Jurisdictional Forestry TREES Carbon Credits to Guyana.

How does jurisdictional carbon crediting work?

Under jurisdictional approaches, ERs are quantified relative to a baseline set at the national, state, or provincial level, which can include one or more economic sectors (often related to LULUC, such as forestry and agriculture).[28] Jurisdictional approaches are typically used to support the achievement of jurisdictional climate mitigation targets. The World Bank elaborated on jurisdictional approaches for carbon crediting on a city-level as well, but no program experience outside REDD+ is available so far.

In jurisdictional REDD+ approaches, crediting is conducted based on net carbon stock changes over the whole jurisdiction, with baselines and MRV systems developed accordingly. It depends on the legal and regulatory context in the respective jurisdiction and country, technical requirements for ER quantification defined by the crediting standard used, and requirements relating to safeguards and benefit sharing typically defined by the fund or standard supporting the crediting program. Compared to project-based crediting approaches where development and implementation are typically led by an independent entity, regional or national governments are centrally involved in the operation and implementation of jurisdictional approaches, following from the need for broad stakeholder inclusion and scale of the effort (see Figure 7).[29]

Figure 7. Jurisdictional program compared to standalone projects.



Source: VCM Primer[30]

[28] Schwartzman, S.; Lubowski, R.N.; Pacala, S.W.; Keohane, N.O.; Kerr, S.; Oppenheimer, M.; Hamburg, S.P. (2021): Environmental integrity of emissions reductions depends on scale and systemic changes, not sector of origin. Environmental Research Letters 16(9). DOI: 10.1088/1748-9326/ac18e.

[29] For further guidance, see also World Bank. 2021 Nesting of REDD+ Initiatives: Manual for Policy Makers. © World Bank.

[30] Climate Focus (2023) VCM Primer

Box 5 presents an example of a jurisdictional program.

BOX 5 GHANA COCOA FOREST REDD+ PROGRAM (GCFRP)

Brief overview

The Ghana Cocoa Forest REDD+ Program (GCFRP) is an initiative funded by the FCPF Carbon Fund. The FCPF provides results-based payments to countries that have achieved verifiable ERs in their forest and broader land-use sectors through jurisdictional programs.

The GCFRP aims to reduce deforestation and forest degradation while supporting sustainable cocoa farming and sustainable landscape management. In the target area, deforestation is driven by a variety of activities linked to agricultural expansion, including permanent land cultivation, shifting cultivation, and slash-and-burn techniques. For over a century, cocoa production has been a primary deforestation driver.[31] The GCFRP was the first program developed under Ghana's National REDD+ Strategy.

The program facilitates community-based landscape governance and multistakeholder collaboration. The GCFRP was accepted into the FCPF pipeline in April 2014, and the REDD+ Readiness process and all administrative requirements were finalized, including signing an ERPA in 2019.[32]

Key information on the impact in ERs of the program:[33]

- Annual ERs (tCO_2e):

Period	ERs
Jun 2019 - Dec 2019	300,000
Jan 2020 - Dec 2021	2,700,000
Jan 2022 - Dec 2023	4,500,000
Jan 2024 - Dec 2024	2,500,000
Total	10,000,000

- **Payment period:** 2019-2024
- **Volume of ERs paid for:** 10,000,000 ERs
- **Price of ERs:** USD 5/tCO_2e

Approach and stakeholder engagement

The GCFRP is nested within the national REDD+ framework and targets Hotspot Intervention Areas (HIAs), which are prioritized based on cocoa production levels, forest threats, and stakeholder presence. Each HIA is governed by a multi-tiered structure that includes governance bodies that facilitate landscape-level coordination. The MRV system for the GCFRP includes annual performance monitoring and biennial independent verification of ERs.

The program supports farmers to increase cocoa production through agroforestry, sustainable intensification, and increased premium payments. These methods – primarily the implementation of cocoa agroforestry systems – are intended to increase cocoa production per hectare on existing plots, which helps to prevent encroachment onto nearby protected forest areas.[34]

[31] Ghana Forestry Commission (2010) REDD Readiness Preparation Proposal submitted to Forest Carbon Partnership Facility.

[32] Ghana Forestry Commission (2020) Final Benefit Sharing Plan Ghana Cocoa Forest REDD+ Programme

[33] Ghana Cocoa Forest REDD+ Program (2019) Emissions Reduction Payment Agreement (ERPA)

[34] Dugasseh, F. A., Adams, M. A., & Zandersen, M. (2024). Actor perceptions of the governance framework and non-carbon benefits from the Ghana cocoa forest REDD+ program: An extended Q-study of the Juabuso-Bia hotspot intervention area. Environmental Management, 1-21; Hawkins, J. W., Gallagher, E. J., van der Haar, S., Sevor, M. K., Weng, X., Rufino, M. C., & Schoneveld, G. C. (2024). Low-emissions and profitable cocoa through moderate-shade agroforestry: Insights from Ghana. Agriculture, Ecosystems & Environment, 367, 108961.

Key activities involve the following:

- Forest monitoring,
- Reporting ERs to stakeholders,
- Ensuring compliance with safeguards and grievance redress mechanisms,
- Evaluation of the program's adherence to environmental and social management frameworks and ensure proper use of funds through regular audits.[35]

The program required the engagement of diverse stakeholders, including a wide range of public and private institutions, such as national and local governments, NGOs, the private sector, civil society, research organizations, and donors. Over 40 institutions were consulted throughout the design and planning stages. These consultations included the following characteristics:

- They were hosted by the Joint Coordinating Committee (JCC), made up of officials from the Forestry Commission and the Cocoa Board, with the role of engaging private sector actors and defining their roles for successful implementation.
- They were aligned with international agreements, such as the Bali Action Plan and COP16 decision to ensure full and effective participation of relevant stakeholders.
- Consulted community representatives from various regions to discuss both carbon and non-carbon benefits, such as sustainable agriculture, ecotourism, biodiversity conservation, and alternative livelihoods.
- Private sector actors such as cocoa companies focused on promoting climate-smart interventions across forest-cocoa landscapes.[36]

Impacts

- **Mitigation results:** 4.35 million ERs verified and issued from the first and second reporting periods, resulting in a total payment of $21.76 million to Ghana,
- **Community development:** funding was approved and disbursed for 300 community projects from the first round of ER payments,
- **Enhanced governance:** all six HIAs have established inclusive community governance structures representing their communities and farmers' groups,
- **Distribution of farmer inputs:** a renewed focus on ensuring equitable, high-quality agricultural inputs for farmers in subsequent distribution rounds,[37]
- **Satisfactory safeguard performance:** social and environmental safeguard systems in place, with active REDD+ safeguards sub-working group, strengthened protection of LCs' rights, customs, and traditions as a key outcome and promoting high-integrity of forest credits,[38]
- **Non-carbon benefits:** farmers adopting climate-smart cocoa agriculture practices, improving the yield of cocoa production.

[35] Government of Ghana (2020) Final Benefit Sharing Plan Ghana Cocoa Forest REDD+ Programme (2020)

[36] Forest REDD+ Programme (2017) Emission Reductions Programme Document of Ghana Cocoa

[37] Satisfaction surveys conducted with around 1600 beneficiary farmers revealed some dissatisfaction with the agricultural inputs received as benefits, prompting a renewed focus by the National REDD+ Secretariat on improving the quality of these benefits in time for the second round of distribution.

[38] World Bank (2024) Ghana Emissions Reductions Program: Implementation Status & Results Report.

Strengths and weaknesses

CRITERIA	RATIONALE
Environmental and social integrity	When compared to project-based crediting approaches, jurisdictional approaches offer a number of integrity benefits: • They are considered better able to avoid risks of leakage and inflated baselines by accounting for all changes in net carbon stock within a jurisdiction. • Given their scope, they can also better avoid or reduce adverse impacts on local populations, including infringing on the rights of IPs and LCs. • Nonetheless, risks relating to additionality and non-permanence remain largely the same as within project-based crediting.
Scalability	• One of the primary benefits of jurisdictional approaches is their potential for achieving larger-scale ERs and, more broadly, generating higher-level policy changes that may lead to more systemic change (e.g., across the agriculture and forestry sector).
Uncertainties and complexity	In general, jurisdictional approaches are more complex to develop and manage than project-based approaches, due to the following: • The number of stakeholders involved and the larger geographic area across which data gathering and MRV must be carried out. • They require longer-term planning and coordination by all stakeholders; robust and sustained political will, leadership and engagement by national or subnational governments; and the full and effective participation of local actors (including IPs, LCs, women, and underserved communities) in formal administrative and legal processes. • They rely on good governance at the subnational level and, as a result, can be vulnerable to delays or failures when governance issues arise. • For jurisdictional REDD+ reversal risks need to be managed, e.g., through buffer mechanisms.

Further resources

- Boyd, W. et al. (2018). Jurisdictional Approaches to REDD+ and Low Emissions Development: Progress and Prospects. Working Paper. Washington, DC: World Resources Institute.
- McCall-Landry, D. and McLaughlin, D. (2024). Navigating Jurisdictional REDD+: A Pricing Guide for Tropical Forest Nations. Environmental Defense Fund.
- CDP (2022). Landscape and Jurisdictional Approaches: Opportunities to finance a nature-positive net-zero transition.
- World Bank (2020). Analytical report on Urban Crediting Methodology. Ministry of Environment of the Hashemite Kingdom of Jordan and Partnership for Market Readiness (PMR). World Bank, Washington, DC.
- BioCarbonFund Initiative for Sustainable Forest Landscapes (2021). How BioCarbon Fund ISFL Programs Generate Emission Reductions Credits.
- World Bank (2024). Accelerating Natural Climate Solutions for Forested Landscapes: Key Lessons from FCPF and ISFL Evaluations. World Bank, Washington, DC.
- Dyck, M., Streck, C. and Trouwloon, D. (2023). The Voluntary Carbon Market Explained. Chapter 15: How does REDD+ nesting work? Climate Focus.

2.4 Policy crediting

Introduction

Policy crediting can help developing countries achieve broader policy objectives, such as meeting their NDCs and sectoral priorities. This approach responds to the need for scaled-up and transformative mitigation actions that go beyond investment projects or programs.

Unlike traditional projects, it focuses on driving large-scale change by financing ERs generated through the implementation and enforcement of policy instruments and regulations. This broader scope makes policy crediting an effective instrument for governments aiming to implement impactful policies that deliver significant ERs across or within a sector, supporting their climate targets and decarbonization strategies. Table 5 presents key examples.

Payments for carbon credits from policy crediting can come from RBCF and potentially carbon markets with a first transaction already undertaken under compliance carbon market modalities. Proceeds can be used for paying for policy implementation costs (e.g., cost of equipment testing under efficiency standards), compensation payments to households and enterprises potentially negatively impacted (carbon pricing, subsidy reform), incentive payments (e.g., under feed-in tariffs), and/or for fiscal revenue generation.

Table 5. Examples of policies suitable for policy crediting.

POLICY INSTRUMENT	SECTORS COVERED	OBJECTIVES
Carbon pricing instrument (e.g., carbon tax)	• Energy, transportation, industry, and other sectors	• Price GHG emissions. • Incentivize the use of low-carbon technologies.
Fossil fuel subsidy reforms	• Energy sector and low-carbon technologies	• Gradually reduce or phase out subsidies for fossil fuels. • Promote clean energy alternatives while addressing social and economic impacts.
Mandatory energy efficiency	• Industry and industrial products	• Establish minimum efficiency standards for appliances and equipment. • Phase out energy-inefficient products, reducing household energy consumption.
Feebates for low-carbon vehicles	• Transport and vehicles	• Impose fees on high-emission vehicles and provide rebates for electric vehicles. • Encourage both consumers and manufacturers to adopt cleaner technologies.

Background

Policy crediting is a relatively new approach designed to support the implementation of high-mitigation-potential policies that governments often find difficult to implement effectively. These challenges vary by policy but commonly include insufficient public financial or human resources, limited technical expertise, and weak enforcement mechanisms. Additionally, governments frequently encounter lobbying from industrial groups or resistance from consumers and households, particularly with price-based policies like the removal of fossil fuel subsidies. Policy crediting helps address these barriers by identifying what is needed to implement the policy and how financing can provide solutions, such as strengthening technical and administrative capacities or compensating potentially negatively affected households or businesses.

How it works

Policy-based carbon crediting requires innovative MRV frameworks that can accurately capture the ERs achieved through policy actions rather than just project-level activities. The calculation of the baseline and ER outcomes depends on the policy type, based on two main methods:

- **Economic modelling.** Economic modelling is suitable to quantify the mitigation impact of price-based policies such as implementing a carbon tax or removing of fossil fuel subsidies. Unlike emissions inventories, which measure actual emissions after implementation, modelling provides a controlled way to attribute changes solely to the policy.[39]
- **Monitoring market penetration rates.** A key tool for assessing ERs, particularly for regulatory policies such as energy efficiency standards. It involves systematically tracking the adoption of low-carbon technologies to assess the impact of a policy or regulation.

Box 6 presents a case study of a carbon crediting program generating ERs from a policy intervention.

BOX 6 THE TRANSFORMATIVE CARBON ASSET FACILITY (TCAF) AND THE INNOVATIVE CARBON RESOURCE APPLICATION FOR ENERGY TRANSITION PROJECT (iCRAFT) IN UZBEKISTAN.

Brief overview

The iCRAFT program implemented between TCAF and the Government of Uzbekistan is the world's first policy crediting program and the first international carbon market initiative in Uzbekistan and Central Asia under Article 6 of the Paris Agreement.

TCAF was the first facility to promote and implement policy-based carbon crediting. TCAF, a trust fund of the World Bank, supports developing countries' efforts to implement transformative policies and economy/sector-wide programs beyond project-by-project mitigation activities. Examples include implementing carbon pricing policies, transport, climate-smart agriculture, urban programs, and greening the financial sector. The Facility emphasizes supporting policy reforms and institutional capacity building to create a long-term impact and lay the groundwork for sustained decarbonization.

TCAF offers a hybrid funding structure through i) RBCF disbursed as RBPs to support the implementation of NDCs under Article 9 of the Paris Agreement, with the verified ERs remaining in the country and ii) carbon markets-based finance, under Article 6 of the Paris Agreement, which requires ERs to be transferred as Internationally Transferred Mitigation Outcomes (ITMOs).[40]

The Innovative Carbon Resource Application for Energy Transition Project for Uzbekistan (iCRAFT)[41]

iCRAFT aims to create incentives for energy subsidy reforms that will result in lower energy consumption and GHG emissions, seeking a dual benefit: implementing subsidy reforms while protecting vulnerable households and reinvesting revenues into energy efficiency, energy reforms, and renewable energy initiatives.

Uzbekistan's economy has traditionally relied heavily on its substantial natural gas reserves, which account for 83% of primary energy consumption and 80% of the electricity mix. This reliance, coupled with below-cost tariffs and significant energy subsidies (6.6% of GDP in 2020), has made Uzbekistan's energy sector one of the most energy-intensive globally, leading to inefficiency and waste. Despite this, the country faces gas production peaking in 2024–2025 and widespread shortages in heating and electricity services due to underinvestment.

[39] TCAF (2021) Supporting transformative mitigation action in developing countries through results-based payments for verified emission reductions.

[40] For more information, see The Transformative Carbon Asset Facility website.

[41] TCAF (2022) Program overview: Uzbekistan iCRAFT.

Key information on the impact in ERs of the program:

- **Annual ERs: 3.6 $MtCO_2e$ (**achieved in the first monitoring period – year 2022)
- **Potential ERs over the program lifetime:** 10 $MtCO_2e$ per year
- **Payment period:** 2021-2027
- **Volume of ERs paid for:** 1.3 $MtCO_2e$ under RBCF, 0.8 $MtCO_2e$ under Article 6.2 of the Paris Agreement
- **Price of ERs:** USD 15/tCO_2e under RBCF, USD 30/tCO_2e under Article 6.2 of the Paris Agreement
- **Size of grant:** USD 46 million, including USD 43.3 million for carbon credits under RBCF and Article 6.2 of the Paris Agreement

Approach

As part of the iCRAFT program, TCAF will provide technical assistance to the government of Uzbekistan to identify the country's needs regarding policy, technical, and regulatory aspects required for carbon crediting transactions under Article 6 of the Paris Agreement. This support will also provide a roadmap to define a clear Article 6 strategy and understand the infrastructure needs, such as registry requirements, to meet the transparency and integrity requirements of Article 6 for tracking and transacting ITMOs.

The program will help generate carbon credits that the government can sell in international carbon markets. Until 2028, iCRAFT will disburse RBPs to reward the phase-out of energy subsidies to reduce GHG emissions. A part of those being transferred as ITMOs to TCAF and another part staying in Uzbekistan for domestic NDC compliance following the hybrid structure of TCAF transactions as explained above.

Impacts (2022 data from baseline)[42]

The TCAF program is distinguished by its focus on achieving transformational impacts, which are evident across various categories and economic sectors:

- **Policy:** 179.97 MW installed capacity of renewable energy, improved social security to more than three million households, and reduced fossil fuel subsidies by USD 21,038 million,
- **Technology:** increased the import of 277,257 energy-efficient appliances,
- **Financing:** reduced spending on fossil fuel subsidies in the USD billions p.a.,
- **People:** 2.7 million new green jobs, social acceptance of tariffs reforms (electricity 16.3% and natural gas 9.7%)
- **Environmental:** improved air quality by reducing annually 1,720 kt of SO_2, 2,688 kt of NOx, and 1,288 kt of NMVOC,
- **Sustainable Development Goals (SDGs):** contribution to climate action (SDGs 3, 12 and 13), energy security (SDGs 13 and 11) and sustainable development (SDGs 1, 8 and 9).

[42] TCAF (202) Program overview: Uzbekistan iCRAFT.

Strengths and Weaknesses

CRITERIA	RATIONALE
Environmental and social integrity	• Policy crediting can achieve deep and transformative decarbonization. • Additionality demonstration and baseline setting are the main methodological challenges for policy crediting. • Depending on the policy type, policy crediting can play a major role in supporting the social integrity of policies, e.g., for subsidy reform policies.
Scalability	• Policy crediting responds to the need for scaled-up and transformative mitigation actions that go beyond projects and programs. • One of the primary benefits of policy-based approaches is their potential for achieving larger-scale ERs and, more broadly, generating higher-level policy changes that may lead to low-carbon transformation in several sectors of the economy. • Encourages governments and large organizations to adopt comprehensive climate policies, leading to more sustainable, long-term ERs.
Uncertainties and complexity	• The challenges of policy crediting include technical complexities in baseline setting, attribution, and monitoring. Addressing these requires robust methodologies, institutional capacity, and strong stakeholder coordination to ensure policy crediting delivers credible, scalable, and equitable outcomes. • Accurately measuring and verifying the impact of broad policies can be more complex and uncertain than project-based approaches. • The effectiveness of policy-based crediting is highly dependent on the stability and enforcement of the underlying policies, which could be subject to political changes.

Further resources

- World Bank (2023). Results-Based Climate Finance to Support Mitigation Policies in Developing Countries.
- TCAF (2021). Supporting transformative mitigation action in developing countries through results-based payments for verified emission reductions.

2.5 Sectoral crediting

Introduction

Sectoral crediting generates carbon credits based on sectoral targets that need to be overachieved to generate ERs. The scope of this approach is defined by specific economic sectors or subsectors, such as the agricultural sector or rice production subsector.[43]

For instance, in the energy sector, establishing sectoral targets for the share of renewable energy in the grid mix can define a sectoral crediting program (Table 6).

Payments for credits from sectoral crediting programs can come in the first phase mainly from RBCF and then potentially from (compliance) carbon markets. Proceeds can be used to pay for related policy implementation costs (see policy crediting) and/or to provide reward and incentive payments to key stakeholders in the respective sector (see jurisdictional crediting).

Table 6. Examples suitable for sectoral crediting.

SECTOR DEFINITION	OBJECTIVES
Transport	• Gradually reduce circulating vehicles with high GHG emissions per kilometer driven. • Encourage low-carbon transport service supply and demand.
Energy	• Promote renewable electricity generation and phase out fossil fuels. • Promote clean energy alternatives.
Agriculture, rice subsector	• Reduce methane emissions from improved water management practices in rice cultivation. • Foster low-carbon rice production.

Background

The European Commission originally proposed sectoral crediting as a reform of the CDM for advanced developing countries and highly competitive economic sectors. Sector-wide mechanisms were meant to overcome the limitations of project or programmatic carbon crediting.[44] However, this approach has not yet been tested.

The EU proposed using EU Emissions Trading System (EU ETS) benchmarks as a reference for setting the baseline in sectoral crediting approaches. These benchmarks reflect the performance of the most efficient installations within specific sectors covered by the EU ETS, providing a standard for setting the baseline and estimating ERs in other jurisdictions without an ETS in place. By aligning the approach to set baselines of sectoral approaches with these benchmarks, the EU sought to ensure that ERs generated in other jurisdictions would represent genuine and significant improvements over existing practices, avoiding the risk of over-crediting and promoting alignment with robust climate policies.[45]

How does sectoral crediting work?

In sectoral crediting, ERs are quantified against a sector-wide baseline that can be defined based on gross emissions, emissions intensity, or technologies.[46] The unique feature of sectoral crediting is setting a fixed baseline ex-ante for the entire sector, which is compared with measured sectoral emissions ex-post (i.e., as opposed to using modelling tools to estimate the baseline in policy crediting).

[43] Environmental Defense Fund. (2011). Sectoral crediting: Getting governance right (Transparency International Briefing).

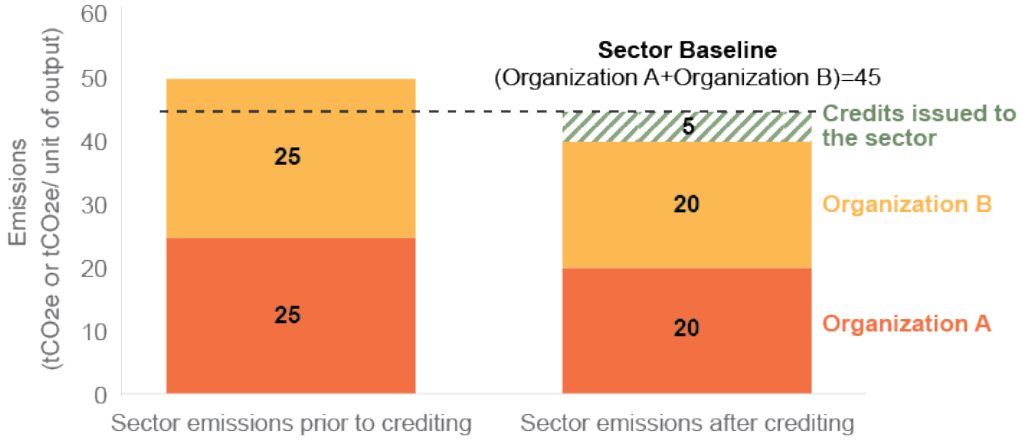
[44] European Commission. (2009, January 29). Questions and answers on emissions trading and national allocation plans (MEMO/09/34).

[45] European Commission. (2009, January 28) Towards a comprehensive climate agreement in Copenhagen.

[46] Baron, R., B. Buchner and J. Ellis (2009), Sectoral Approaches and the Carbon Market, OECD/IEA Climate Change Expert Group Papers, No. 2009/03, OECD Publishing, Paris.

Figure 8 presents an example of how sectoral crediting works. Prior to the crediting approach in place, the total emissions of a certain sector sum 50 tCO_2e (per unit of output). The government sets an ex-ante baseline of 45 tCO_2e as a reference level, designs policies to drive ERs, and develops an MRV system to follow up during implementation. After implementation, the two organizations of this sector, A and B, reduced their emissions, emitting 40 tCO_2e, which created a 5 tCO_2e reduction below the sectoral baseline. This reduction can be credited and generate financial revenue that the government, e.g., distributes proportionally to each organization's ERs.

Figure 8. Sectoral crediting operation.



Source: Baron, R., Buchner, B., & Ellis, J. (2009). Sectoral Approaches and the Carbon Market.

Box 7 presents an example.

BOX 7 HYPOTHETICAL CASE: LIGHT-DUTY VEHICLES EMISSION STANDARD

A government implements a measure to reduce transport emissions by establishing new standards for light-duty vehicles' gCO_2e/km emissions that are aligned with the EU's regulations. The transport sector is the country's main consumer of fossil fuels, consequently becoming the highest GHG emitter sector. Within the sector most emissions are caused by on-road vehicles. In its NDC the country unconditionally committed to reduce transport emissions by 10% and the proposed intervention would go beyond this ambition, proving its additionality.

Prior to implementing the regulation, the country sets a conservative baseline that captures the expected sector emissions under the NDC target. During implementation, the progressive introduction of light-duty vehicles that comply with the regulation lowers the sectoral emissions relative to the baseline, overachieving the NDC target and qualifying for carbon crediting. The country sets up the MRV framework to oversee the intervention impact, and independent bodies oversee the MRV framework to ensure transparency and accuracy.

The country monetizes the achieved ERs as carbon credits in accessing carbon market or RBCF funding. The carbon revenues are used to sustain transport sector decarbonization through various measures.

This intervention contributes to a cleaner transport sector and reduces reliance on fossil fuels. Additionally, its design facilitates ERs and strengthens the country's transport sector. In the long term, the transport sectoral intervention positions the country as a regional leader in sustainable transition. The successful implementation of sectoral crediting mechanisms paves the way for broader carbon pricing schemes, enhancing climate action at both national and international levels.

Strengths and Weaknesses

CRITERIA	RATIONALE
Scalability	• Sectoral carbon crediting responds to the need for scaled-up and transformative mitigation actions that go beyond projects and programs. • Whole sector coverage, unlocking carbon revenues as a result. Sectoral approaches give host countries the flexibility to design and implement ambitious policies that exceed ER targets. • Paves the road for transitioning to an ETS. Sectoral crediting approaches require setting a conservative sector-wide baseline that can help to transition over time to an ETS.
Uncertainties and complexity	• High dependency on external factors, which ends up in a high risk of generating ERs and receiving related payments. • Incentives to individual sectoral entities (buyers of light-duty vehicles in the example) may be less direct and, therefore, weaker than those under project-based and programmatic crediting.
Environmental and social integrity	• Using emission intensity instead of gross ERs may compromise the environmental integrity of the credits generated, as the intensity can decrease while gross emissions increase with higher activity levels. • There is a risk of sectoral leakage as, typically, economic sectors show a high degree of interdependence.

Further reading

- Baron, R., Buchner, B., & Ellis, J. (2009). Sectoral Approaches and the Carbon Market, OECD/ IEA Climate Change Expert Group Papers, No. 2009/03, OECD Publishing, Paris.
- Environmental Defense Fund (2011). Sectoral crediting: Getting governance right (Transparency International Briefing).
- European Commission (2009, January 28). Towards a comprehensive climate agreement in Copehagen.
- European Commission (2009, January 26). Questions and answers on emissions trading and national allocation plans (MEMO/09/34).
- Sri Lanka (2019). Sri Lanka Climate Finance for Renewables Project. Carbon Partnership Fund (CPF).

2.6 Economy-wide crediting

Economy-wide crediting approaches extend the inventory-based approach of sectoral or jurisdictional crediting to a country's entire economy, establishing a single target line for ERs across all sectors. Countries earn carbon credits for ERs exceeding this target, often linked to their NDCs.

This approach resembles international emissions trading under the Kyoto Protocol, where countries traded Assigned Amount Units (AAUs). The main difference lies in using carbon credits instead of AAUs and the broader application to a single aggregated inventory rather than sector-specific baselines. The novelty of this approach lies in its potential for simplicity and inclusiveness, though it has yet to be implemented in real-world contexts, leaving its operational dynamics untested.

One significant advantage of economy-wide crediting is its applicability to smaller countries, such as small island developing states (SIDS), that might struggle to generate sufficient ERs within individual sectors to meet the thresholds for large-scale crediting programs. These nations can access international carbon markets by aggregating reductions across the economy. Despite its promise, the lack of practical examples underscores its conceptual nature, raising questions about its feasibility and potential challenges in implementation. This approach represents an innovative progression of inventory-based crediting with the scalability and adaptability to address diverse global mitigation needs.

To get started with economy-wide crediting, SIDS are likely to be the most relevant. These countries would benefit from an approach that allows them to cover the totality of their national emissions. Funding could come from RBCF sources and/or from selling carbon assets within cooperative approaches under Article 6.2 of the Paris Agreement.

Proceeds can be used to pay for related policy implementation costs (see policy crediting) and provide reward and incentive payments to key stakeholders in the respective sector (see jurisdictional crediting).

3. SUMMARIZING OVERVIEW OF THE CREDITING APPROACHES

This chapter provides a summarizing overview of stylized features of each crediting approach in suggesting for each approach the main areas of application, typical program entities implementing the respective crediting program, possible use of proceeds (carbon revenues) within or beyond the program, typical funding source, methodological approach and methodology availability, main risks to credit integrity, and overall advantages and disadvantages of the respective approach.

This overview certainly does not address each possible case but focuses on the most common features of each approach. Programmatic crediting, e.g., can, in principle, also be applied to large-scale projects, but so far, it has been mostly applied to small and micro-scale activities; policy crediting, e.g., is also complex on MRV, and integrity risks are not just limited to additionality and baseline setting, but the latter are the most crucial for policy crediting.

Stylized features of the crediting approaches

Table 7. Project-based crediting.

FEATURE	DEFINITION
Application	Individual projects with large mitigation impact (renewable energy, landfills, wastewater facilities, industrial plants, NbS, etc.)
Program entity	Private or public enterprise
Use of proceeds	Closing cost/viability gaps of low carbon technologies and/or rewarding for mitigation behaviors and outcomes
Funding source	Carbon markets
Methodologies	Technology-based, high availability
Integrity risks	Additionality, leakage, and social integrity
Advantages	Well-established and easiest applicable crediting approach
Disadvantages	Limited potential for scale

Table 8. Programmatic crediting.

FEATURE	DEFINITION
Application	Large number of standardized projects, most often small/micro scale (household devices, biodigesters, green buildings, etc.)
Program entity	Energy agencies, domestic development banks, technology providers
Use of proceeds	Funding of incentive payments, concessionality, price discounts
Funding source	Carbon markets, RBCF
Methodologies	Technology-based relying on sampling, high availability
Integrity risks	MRV of large number of dispersed mitigation activities, social integrity
Advantages	Well-established, facilitates low-income countries'/communities' access to carbon markets and RBCF
Disadvantages	Substantial capacity needs of program entity

Table 9. Jurisdictional crediting.

FEATURE	DEFINITION
Application	Geographically localized economic and/or conservation activities, in particular forestry and landscape management (prime example REDD+)
Program entity	Landscape governance/management entities (e.g., forestry departments, provincial governments, etc.)
Use of proceeds	Reward and incentive payments to broad range of critical stakeholders including farmers, LCs, IPs, authorities, etc.
Funding source	RBCF, carbon markets
Methodologies	Jurisdictional inventory-based
Integrity risks	Baselines and MRV both relying on substantial data availability and quality
Advantages	Large scale, avoidance of leakage risks, transparent and equitable distribution of benefits/ proceeds
Disadvantages	High complexity on governance and use of proceeds

Table 10. Policy crediting.

FEATURE	DEFINITION
Application	Sectoral or economy-wide policies including carbon pricing, subsidy reform, efficiency standards, feebates, feed-in tariff schemes, etc.
Program entity	Government
Use of proceeds	Paying for policy implementation costs (e.g., cost of equipment testing under efficiency standards), compensation payments to households and enterprises potentially negatively impacted (carbon pricing, subsidy reform), incentive payments (e.g., under feed-in tariffs), fiscal revenue generation
Funding source	RBCF and potentially compliance carbon markets
Methodologies	Modelling or market indicator based, very low availability
Integrity risks	Additionality and baseline setting
Advantages	Transformative impact and scale
Disadvantages	High technical complexity and substantial capacity needs

Table 11. Sectoral crediting.

FEATURE	DEFINITION
Application	Low-carbon transformation of high emitting economic sectors (power, waste, industry, transport etc.) through multiple policies and measures
Program entity	Government agencies (e.g. energy agencies)
Use of proceeds	Broad (see use of proceeds under both jurisdictional and policy crediting)
Funding source	RBCF and potentially compliance carbon markets
Methodologies	Sectoral inventory based, still to be developed, can build on similarities and experiences with jurisdictional crediting
Integrity risks	Sectoral leakage due to high interdependency of most economic sectors
Advantages	Transformative impact and scale
Disadvantages	Still untested in practice

Table 12. Economy-wide crediting.

FEATURE	DEFINITION
Application	Small economies including SIDS
Program entity	Government
Use of proceeds	Broad (see sectoral crediting)
Funding source	RBCF and potentially compliance carbon markets
Methodologies	National inventory-based, still to be developed, can build on similarities and experiences with international emissions trading
Integrity risks	Baselines face high level of uncertainty of future economic development
Advantages	Scale and simplicity
Disadvantages	Still untested in practice

Developing countries face immense financing challenges to implement their development and green growth strategies, including climate mitigation and adaptation. Carbon crediting can be an important and versatile financial instrument to support and further incentivize these goals.

This report has aimed to provide an overview of carbon crediting approaches, focusing on the needs of policymakers and program entities in developing countries implementing climate-related actions. It is also interested in better understanding the potential carbon crediting opportunities related to these actions.

The report can thus inform decision-making about which carbon crediting approaches may be most appropriate for which kinds of policies, projects, or other interventions. This overview resource can be complemented by other more technical resources on how to apply such approaches in different sectors and contexts. The additional resources cited in this report can help policymakers and entities continue on this journey. However, they are not intended to be comprehensive, and one should strive to consult the latest information in the dynamic and complex field of carbon crediting.