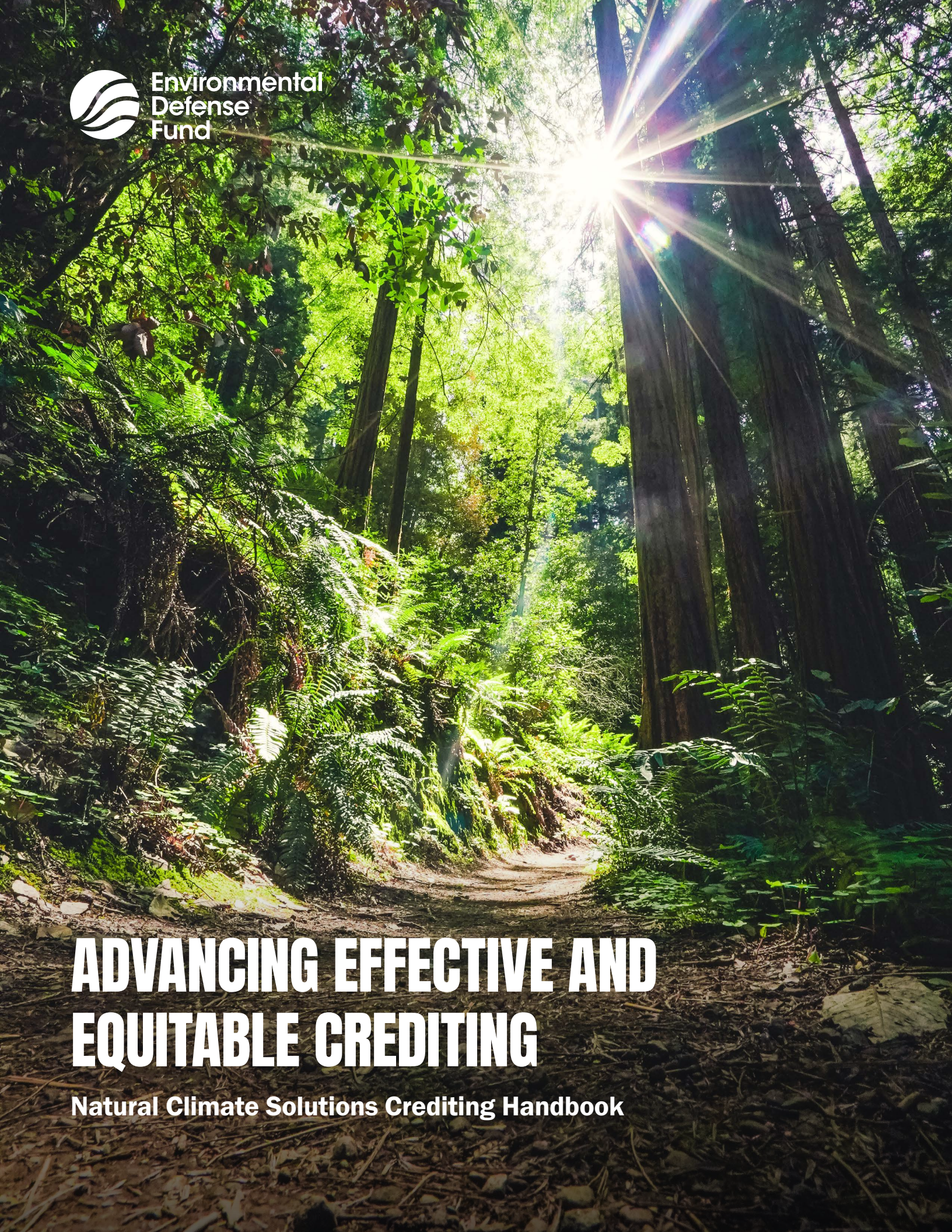

ADVANCING EFFECTIVE AND EQUITABLE CREDITING

Natural Climate Solutions Crediting Handbook

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

ACRONYMS

AF	Assessment Framework
AFOLU	Agriculture, Forestry, and Other Land Use
ART	Architecture for REDD+ Transactions
BCM	Bilateral Credit Mechanism
CA	Corresponding Adjustment
CAD Trust	Climate Action Data Trust
CCB	Climate, Community, and Biodiversity
CCP	Core Carbon Principles
CDM	Clean Development Mechanism
CITSS	Centralized Issuance Tracking and Settlement System
CME	Chicago Mercantile Exchange
CO2	Carbon Dioxide
CO2e	Carbon Dioxide Equivalent
COICA	Coordinator of the Indigenous Organizations of the Amazon Basin (Spanish: Coordinadora de las Organizaciones Indígenas de la Cuenca Amazónica)
COP	Conference of the Parties
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CPI	Climate Policy Initiative
DEBS	Direct Environmental Benefits in the State
EDF	Environmental Defense Fund
EEUs	Eligible Emissions Units
ERR	Emission Reduction or Removal
ETS	Emissions Trading System
EU ETS	European Union Emissions Trading System
FCPF	Forest Carbon Partnership Facility
FONAFIFO	National Forestry Financing Fund (Spanish: Fondo Nacional de Financiamiento Forestal)
FPIC	Free, Prior and Informed Consent
GCF	Green Climate Fund
GCF Task Force	Governors' Climate and Forests Task Force
GHG	Greenhouse Gas
GT	Gigaton
GTCO2[e]	Gigatons of Carbon Dioxide [Equivalent]
HFLD	High Forest Low Deforestation
ICAO	International Civil Aviation Organization
ICE	Intercontinental Exchange
ICROA	International Carbon Reduction and Offset Alliance
ICVCM	Integrity Council for the Voluntary Carbon Market
INPE	National Institute for Space Research
IP	Indigenous Peoples
IP and LC	Indigenous Peoples and Local Communities
IPCC	Intergovernmental Panel on Climate Change
ISO	International Standards Organization
ITMO	Internationally Transferred Mitigation Outcome
JNR	Jurisdictional and Nested REDD+
J-REDD+	Jurisdictional REDD+
MRV	Monitoring, reporting and verification
MT	Megaton
MTCO2[e]	Megatons Carbon Dioxide [Equivalent]
NCS	Natural Climate Solutions
NDC	Nationally Determined Contribution
N-GEO	Nature-based Global Emissions Offset
NOx	Nitrogen Oxides
ODA	Overseas Development Assistance
OECD	Organisation for Economic Co-operation and Development
OTC	Over the Counter
PAF	Pilot Auction Facility
PES	Payment for Ecosystem Services

PM	Particulate Matter
REDD+	Reducing Emissions from Deforestation and Forest Degradation, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries
RS	Remote Sensing
SBT	Science-Based Target
SBTi	Science Based Targets initiative
SIDS	Small Island Developing States
SISA	Incentive System for Environmental Services (Portuguese: Sistema de Incentivos a Serviços Ambientais)
TFCI	Tropical Forest Credit Integrity
TREES	The REDD+ Environmental Excellence Standard
UN	United Nations
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
VCMI	Voluntary Carbon Markets Integrity Initiative
VCS	Verified Carbon Standard
WWF	World Wide Funds for Nature (global), or World Wildlife Fund (United States & Canada)

PREFACE: GOALS & GRATITUDE

This Handbook attempts to provide an impartial and accessible introduction to the essential elements of the broad, fast-moving and sometimes controversial topic of crediting Natural Climate Solutions (NCS). Substantial efforts have been made to reflect the wide range of perspectives that exist across this complex suite of topics, and to take into account relevant developments up to the beginning of the external review window in July 2023. This edition may therefore necessarily omit commentary on developments or initiatives announced after that time.

Furthermore, given that this Handbook covers a rapidly evolving topical landscape of immense complexity, this first edition will inevitably contain mistakes and omissions, as well as interpretations that unintentionally reflect subjective perspectives of the authors. We welcome feedback from readers on any areas where the Handbook could be enhanced in potential future editions, and especially any factual errors that can be corrected.

This work has been prepared by the lead authors with input, advice and support from the acknowledged contributors, thought partners and reviewers. It has also benefitted from the expertise and attention of many others who have shaped its ideas and prepared it for final publication. We are deeply grateful for the time, support and expertise of all of these critical contributors. Please consider any errors to belong to the authors.

We are excited to provide what we believe to be the first attempt at a resource of this breadth on this topic. We hope others will find it to be a valuable reference and orientation to the space.

EXECUTIVE SUMMARY

The NCS Crediting Handbook will guide readers through key decisions and complex issues involved in creating effective crediting systems for natural climate solutions (NCS). NCS crediting is one of the most controversial issues in climate policy. Some see it as an indispensable tool, if the world is to have any chance of meeting the temperature targets of the Paris Agreement. These advocates argue that NCS crediting can help achieve the Paris Agreement goal in a way that supports sustainable development for economically disadvantaged people and regions, while also providing and protecting much-needed ecosystem services that are themselves vital for climate resilience. Others, however, see NCS crediting as an opportunity for greenwashing, diverting resources from climate action in the energy and industry sectors, and sometimes undermining the rights of Indigenous Peoples and local communities or contributing to ecologically damaging monocultures. We aim to unpack these arguments and debates, and to provide the reader with an impartial guide to many key arguments around this complex topic.

NCS refer to the protection, restoration and improved management of natural ecosystems and managed landscapes as pathways to address climate change. The greatest policy focus to date has been on NCS in tropical forests, although there are also many opportunities to use NCS in temperate and boreal forests, agricultural lands, peatlands and marine ecosystems. NCS activities support climate change mitigation in one of two ways. First, they can lead to a reduction (or avoidance) of greenhouse gas (GHG) emissions into the climate system, relative to what would otherwise have been emitted. These emissions-reducing pathways includes, for example, avoiding anticipated deforestation. Second, they can remove (or capture) previously emitted carbon from the climate system, coupled with long-term storage through natural means. Removal pathways include activities like planting new forests or restoring wetlands. Overall, researchers estimate that NCS can provide about one-third of the mitigation needed in the period before 2030 to remain on or below a 2-degree pathway (World Economic Forum, 2021).

NCS crediting is a policy option to drive financial support for NCS activities. Crediting involves recognizing NCS activities that result in a difference in GHG emissions or carbon sequestration from a baseline, quantifying that difference, and creating an equivalent number of credits that have monetary value. These credits have value because their owners can claim the reductions or removals they represent for regulatory compliance or to meet, or go beyond, voluntary targets.

We explore key issues and debates surrounding NCS crediting through four key lenses:

The supply of NCS credits: which considers issues that arise for people (for example, farmers, Indigenous peoples, project developers and government agencies) making decisions about whether – and how – to undertake activities that could lead to the generation of NCS credits. It also includes the decisions of those who regulate the supply of credits. In other words, this part of the Handbook assumes that there will be a buyer for each credit supplied and considers the questions that arise in generating high-integrity credits to meet that presumed demand.

The demand for NCS credits: which explores issues that may be considered by those who wish to purchase and use an NCS credit (and the emission reduction or removal that the credit represents), and/or by those who might regulate such purchases. In this part of the Handbook, we assume a credit has been generated and focus on the issues that those who might buy that credit might face.

The market for NCS credits: which looks at how buyers and sellers come together to transact credits, and the various ways in which these interactions can be organized. We pay special attention to the issues that arise when NCS credits are traded across international borders.

Financing for NCS activities: which recognizes that the opportunities associated with NCS crediting can be realized only if those with the potential to generate credits can access finance to cover the costs they incur before receiving revenues from credit sales (as well as any other financial benefits from the NCS activities). This financing can come from a variety of sources, including credit buyers. We explore these dynamics and discuss a range of options available to overcome related challenges.

Throughout, our intention is not to tell the reader the 'correct' answer to the wide range of questions that NCS crediting raises. Rather, we hope to lay out the key debates, explore why different people believe and

defend the stances that they do, and unpack what assumptions may underlie some of these arguments. Our ultimate goal is for readers – (potential) buyers, sellers, regulators, policymakers and investors – to be empowered by the Handbook to better navigate the NCS crediting landscape. We hope this text will help these groups better understand where there is already broad consensus on key issues of importance and where real debates remain, so that they can make more informed decisions.

The supply of NCS credits

Ultimately, NCS credits are generated by the actions of the people who work with, care for and manage landscapes and ecosystems. NCS crediting will only be successful if the prospect of income from the sale of NCS credits makes it more feasible and attractive for these people on the ground to engage in the sustainable, climate-smart activities that underpin crediting. To work at all, NCS crediting must work for them.

A key distinction between different NCS crediting activities is the physical scale at which efforts to define, measure and verify NCS credits take place: project-based or jurisdiction-based crediting. In a project-based approach, activities that reduce or remove GHGs from an agreed baseline are evaluated in a defined, relatively small geographic area, with a 'project proponent' responsible for carrying out the NCS activities. This project proponent may either be one or more people with secure land title in the location where the NCS activities will take place, or, alternatively, it may be a person or group who are assured that they have the rights to any credits generated by their NCS activities. In contrast, under a jurisdictional model, a subnational or national government entity (including Indigenous governments) is provided with incentives to take responsibility for ensuring that increasing implementation of NCS activities is carried out within the geographic region in which it has authority. This jurisdiction then typically holds the right to sell the credits generated by these activities.

Many advocate for jurisdictional crediting. Advocates for jurisdictional crediting point to benefits offered by an approach implemented under the unique authority of governments to make and enforce laws. These benefits relate strongly to the increased scale of NCS activity made possible by this approach, and the increased confidence it can provide that credits generated will be of high integrity (defined below). To date, however, there remain relatively few examples of jurisdictional crediting, and jurisdiction-scale implementation may be especially complex or challenging in some locations. Critics point to the difficulty of negotiating and generating credits with governments that might sometimes have little control over the activities that are expected to generate credits.

Regardless of the scale at which they are generated, high-integrity credits should meet six criteria:

- **Real** — Credits issued and sold represent unique units of actual emissions reductions or removals (ERRs), without double counting, and with measures in place to mitigate the risk of leakage.
- **Quantifiable** — Credited activities can be accurately linked to measurable ERRs, based on robust methodologies and monitoring approaches.
- **Additional** — Activities and/or GHG emission reductions or removals that exceed those otherwise required by law, regulation or legally binding mandate, and that result in more reductions or removals than would occur under a conservative business-as-usual scenario.
- **Verifiable** — Crediting activities, outcomes, rules and processes are transparent, and where appropriate are validated and verified by an independent third party, in order to ensure compliance with other high integrity criteria.
- **Permanent** — Mechanisms are in place to ensure that the carbon associated with credited ERRs is not released into the atmosphere over the agreed-upon timeframe of the credit.
- **Equitable** — The crediting program incorporates effective and ethical environmental and social safeguards, including meaningful partnership and engagement with IP and LC stakeholders and fair benefit-sharing mechanisms.

Crediting standards are a critical tool for ensuring the generation of high-integrity credits. Standards lay out the technical parameters for how NCS activities are translated into a defined number of credits, as well as other related requirements to which credit generators must adhere. The standard used by a supplier can affect both the quality of the credits generated, and the real and perceived value of these credits to potential buyers. Standard-setting bodies may provide methodologies for both project-based and jurisdictional crediting. Examples of crediting standards include those developed by the American Carbon Registry, Climate Action Reserve and Gold Standard, as well as those used in compliance markets (see below), such as those provided by the California Air Resources Board or the New Zealand Emission Trading System. However, credit suppliers will often need to complement the requirements of credit standards with other actions in order to deliver truly high-integrity credits.

TABLE ES1

Tool and mechanisms for promoting high-integrity credits

Integrity element	Tools and mechanisms for promoting high integrity	Key discussion points/ongoing debates
Real	• Safeguards against double-counting including credit registries, third party validation and verification, and growing efforts at sharing and harmonizing information • Safeguards against leakage to reduce underlying demand/need for emitting activity	• Jurisdictional programs likely to have a structural advantage over project-based crediting in preventing leakage, but there can still be concerns about addressing leakage that occurs across jurisdictional boundaries
Quantifiable	• Use of calculation methods and buffer pools that account for ecosystem carbon dynamics (in different ecosystems) • Effective monitoring, reporting and verification (MRV) protocols	• Jurisdictional crediting may better account for uncertainties in quantification by allowing averaging over larger spatial scales • May be a need to recognize that some regions should not be relied upon to continue storing carbon at their current rates • Potential for growing use of remote sensing technologies, at least in some NCS pathways • Jurisdictional crediting may offer economies of scale in MRV
Additional	• Appropriately conservative baseline setting • Design of methodologies to avoid adverse selection	• Baseline setting remains inherently challenging, leading to risk of both errors of inclusion or exclusion • Jurisdictional crediting may allow for more accurate baseline setting (although the impact of any errors may be more substantial) • Ongoing debates over whether and how to conceive of additionality for NCS activities in High-Forest Low Deforestation (HFLD) contexts
Verifiable	• Effective and consistent measurement methods/tools/frequency • Transparent reporting of all stages of process with third party verification/validation	• 3rd party verification seen as crucial by most
Permanent	• Buffer pools • Replacement requirements • Safeguards and local consultation to ensure buy-in, lowering risk of future reversal	• Different drivers of reversal at project versus jurisdiction may demand different approaches
Equitable	• Free prior informed consent practices • Social and environmental impact monitoring • Benefit sharing arrangements • Support for adaptation and resilience	• Best practices may not be fully specified in crediting standards, • IP and LC groups are not homogenous and should not be treated as such, even under uniform standards. • Consultation processes are lengthy but are necessary for high-quality credits. • Identifying which IP and LC groups will be impacted by a program/project can be difficult

Table ES1 on previous page summarizes how standards, complemented by other actions of credit suppliers and intermediaries, can help to promote high-integrity credits. It also identifies some of the key discussion points and outstanding areas where there is ongoing debate about how credit integrity can best be ensured.

The attractiveness of jurisdictional NCS crediting approaches, coupled with the prevalence of existing project-based NCS credits in many places, is driving growing interest in the concept of 'nesting'. This refers to the integration and alignment of crediting at both scales within one jurisdiction, while continuing to ensure that all credits meet the integrity criteria outline above. For those jurisdictions considering nesting, a number of different models have been proposed; different approaches are also reflected in crediting standards and associated methodologies. In all cases, however, effective nesting will require the development of clear legal and institutional frameworks, as well as standardization of GHG accounting approaches, to align efforts at the two scales.

Demand for credits

There are four main types of NCS credit 'end-users' – i.e., those who retire NCS credits and claim the emission reductions or removals they represent:

- **Voluntary market participants** who use NCS credits either as part of their strategy to meet GHG emission targets within their value chain, or to achieve 'beyond value chain impact' where they support emission reductions and removals that go beyond the targets they have established within their own value chains;
- **Compliance market participants** who are subject to emissions constraints imposed by national or sub-national jurisdictions, and who use credits instead of either reducing their emissions or purchasing allowances or paying a carbon tax;
- Those companies operating under **international sectoral commitments** to reduce their emissions below a target, which currently refers to airlines operating under the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) scheme; and
- **Governments/sovereign countries,** who may purchase NCS credits as a strategy to meet their nationally determined contribution or provide effective climate finance.

In addition, others may purchase credits in the hope of profiting from the difference between the price at which they purchase the credits and the price at which they sell them.

In the recent past, the majority of end-user demand for NCS credits has come from the voluntary market, although growth in this market has slowed since 2021. This slowdown reflects both market guidance suggesting that credits should only be used in targeted circumstances, and fears of reputational risk from purchasing low-quality credits. Demand from the other three sources has significant growth potential as the global climate response intensifies.

Buyers – and, where appropriate, their regulators – need to weigh a number of factors when deciding how much emphasis to place on NCS (and other) credit purchases in their emission reduction strategies. On the one hand, the option to purchase NCS credits expands the range of mitigation options that can be considered. This makes ambitious climate action easier and less costly, which may encourage buyers to set more ambitious targets in the first place. Buyers may also value the robust quantification of emissions impact that purchasing credits provides; they may also value the benefits that NCS credit purchases can provide to marginalized communities, regions or countries. On the other hand, some stakeholders express concern that purchasing NCS credits may result in buyers putting less effort into reducing their own GHG emissions than is globally equitable and efficient. A diminished focus on buyers' own emission reductions would also mean that important co-benefits of their potential emission reductions – such as improved air quality for a local community within the buyer's supply chain – would be lost. Some have also expressed concern that purchasing credits risks undermining other forms of national or international cooperation.

Balancing these considerations typically results in restrictions on the use of NCS and other credits. For example, in compliance markets, regulators often set limits on the extent to which NCS credits can be used compared to reducing emissions directly; these limits sometimes distinguish between NCS credits sourced domestically (which may ensure co-benefits occur within the geographic territory of the compliance market itself) and those credits sourced from overseas. In the voluntary market, it is generally accepted best practice to use NCS (and other) credits only for those emissions that cannot be technically and economically reduced by other methods, or in cases where voluntary buyers want to use credits to further exceed the targets they have set for themselves.

End-users also need to consider what types of NCS credits to purchase. This will depend on factors such as cost, co-benefits, the presence of benefit-sharing mechanisms, execution risk and strategic alignment. In

addition, however, buyers (and, in compliance markets, their regulators) will need to consider three issues that have attracted broader policy interest. These are:

- **The weight to give to project-based versus jurisdictional credits.** Given the attractiveness of jurisdictional crediting to many stakeholders, buyers may wish to increase the proportion of credits from such programs (or from nested projects within programs). They may also wish to make forward purchases of such credits or finance to these programs, which can strengthen these efforts by clearly signalling future demand. Such signals may also encourage project developers to support jurisdictional crediting and nesting arrangements.
- **The balance between reduction and removals credits.** Stakeholders have different perspectives on how quickly buyers should shift from the current market focus on reduction credits to removal credits. These perspectives reflect different assumptions about the importance of credit purchases – compared to other approaches – in providing the financial incentives needed to protect tropical forests and other existing ecosystems.
- **Within the class of reduction credits, the priority to give to high forest, low deforestation (HFLD) credits.** Those who advocate for the purchase of HFLD credits note that the revenues associated with credit purchases will help sustain ongoing efforts to combat deforestation threats; they are also likely to benefit Indigenous peoples and local communities, avoid the risk of perverse incentives to increase deforestation and help provide ecosystem benefits. Others argue that HFLD credits should not be purchased because of the perceived difficulty of demonstrating their additionality. Yet another perspective argues that buyers should purchase these credits, but not claim legally that they represent additional emission reductions. In balancing these perspectives, a key consideration for buyers is whether there are effective alternative approaches available for supporting forest protection in HFLD countries and how this is likely to change over time.

Given the diversity of credits available, end buyers often face challenges in distinguishing high-integrity NCS credits. In response, a number of coalitions and initiatives have emerged, particularly focused on the voluntary market. The most notable of these is the Integrity Council for the Voluntary Carbon Market (ICVCM), which has published both Core Carbon Principles (CCP) and an Assessment Framework to help apply these Principles. A number of civil society and private sector tools and products are also emerging to help to address this challenge. However, in some cases, the methodologies and processes used to assess credit quality lack transparency.

Within the voluntary market, there is a growing interest in what end-users should communicate to investors, clients and others about their use of NCS (and other) credits. In particular, there is interest in using corporate sustainability disclosures to increase transparency about the claims that NCS credit buyers are making, and the types of credits being used to meet those claims. This area has been supported by the Voluntary Carbon Market Integrity Initiative (VCMI), which has developed a Claims Code of Practice that identifies different types of claims that purchasers might make and the information about (NCS) credits that should be disclosed.

Markets for NCS credits

Buyers and sellers, assisted by traders and brokers, can come together to transact credits either through over-the-counter (OTC) transactions or on a market exchange. The former offers buyers and sellers the flexibility to tailor the transaction to meet their respective needs. The latter offers the prospect of scale, liquidity and greater market transparency. The majority of NCS credits are currently traded in OTC transactions, although exchanges are becoming increasingly popular.

NCS credits can be traded domestically, or across international borders. In some cases, buyers and sellers (and their regulators) may prefer to maintain a domestic market for NCS credits. There may be more trust between buyers and sellers if they are located in the same jurisdiction; limiting buyers to purchasing NCS credits from within a domestic market may ensure that the territory of the jurisdiction also receives any ecological or social co-benefits from the NCS activities that underpin the credits. However, allowing NCS credits to be traded across international borders can have a number of important benefits. For sellers, many of whom will be based in tropical countries, an expanded pool of potential buyers makes it more likely that they can find partners and structure contractual and commercial relationships that meet their needs and preferences. For buyers, meanwhile, the wider range of suppliers available in a global market can help ensure that they are able to purchase credits based on activities that reflect their preferences. Expanding the geographic scope of NCS credit markets to cover credit generation in tropical countries and others can also increase the feasibility of achieving global temperature targets in part by reducing the cost to the global community of supporting climate action. This in turn opens the door for the global community to "reinvest" these cost

savings, increasing the overall ambition of their climate actions. Some economic modeling illustrates how reinvesting cost savings from NCS credits could dramatically increase the global volume of mitigation at no extra cost; although real-world challenges of implementation will limit the magnitude of these gains in practice, such studies help to illustrate the potential value of allowing this type of international NCS crediting use.

The institutional/organizational options available to sellers and buyers considering cross-border transactions vary, depending on the level of government involvement in the transaction. Significant government involvement in the supply side of transactions is, by definition, required to realize the benefits of jurisdictional crediting. Supplier-side government involvement in sales of project-scale crediting or other types of ERR transactions may also help to ensure that credits are sold in a manner that protects the integrity of the supplying country's NDC and also offers opportunities to invest the gains from trade towards other broader development goals. For some, however, a perceived trade-off of these benefits is the risk that strong government involvement could erode competition between suppliers, making credits from the country less attractive to buyers. On the buyer side, strong government involvement (most obviously in the form of direct purchase by governments) provides close control over how NCS credits are deployed in the national climate change strategy. It also provides the ability to align credit purchase decisions with broader foreign policy objectives. However, strong government involvement on the side of buyers may reduce the extent to which buyers compete to explore new ways to source credits and reduce emissions, while credit purchase decisions may also be distorted by non-climate policy objectives. These different supply and demand options interact to create a range of potential institutional options for international transactions, including Climate Action Teams and ETS linking.

When NCS and other credits are traded across international borders, a critical question is whether the host government – the government in the country where the NCS activity takes place – should make a corresponding adjustment (CA). In cases where the NCS credit is used to meet NDC obligations in the buyer's country or to help airlines meet their CORSIA targets, a corresponding adjustment is required. This helps to avoid double counting of emission reduction efforts – when the same emission reduction is counted towards the targets of two (or more) parties. However, if the purchased credits are used to meet only a voluntary commitment rather than to meet NDC (or equivalent) requirements, the Paris Agreement rules do not require a corresponding adjustment. This leaves the decision on whether to make a CA to the host government, as well as to the buyers, who can decide whether to purchase credits with such an adjustment. Proponents of using credits with CAs in this context argue that this makes it more likely that voluntary purchases will lead to an increase in additional global emission reduction efforts. They also argue that it reduces the risk that companies purchasing credits will make misleading claims. Those who oppose the use of CAs in this context point out that the credits purchased are not used to meet another country's NDC, thus obviating the need for an adjustment. Furthermore, they argue that the use of a CA in this context could reduce the size of the voluntary market and the benefits it brings to drive NCS and other creditable mitigation activity. The loss of this potential stream of 'stacked' financial support for credits may make it more challenging for the host country to meet its current NDC, and/or set a more ambitious NDC in the future.

Financing NCS crediting activities

The creation of thriving NCS credit markets requires both that NCS credits be appropriately valued and that actors are willing to provide the capital needed to invest in credit generating activities. The capital needed for NCS activities can come from a variety of sources. Sometimes it may come from the internal resources of the credit providers. In other cases, credit providers will seek external financing from public or private banks or equity investors. In other cases, potential credit buyers will provide capital in exchange for preferential access to the credits that the NCS activities will generate. While there is a close link between the value at which NCS credits sell and the ability to raise capital for NCS credit generation activities – for example, it will be easier to access external capital to invest in NCS activities if the price of credits is high – the two concepts are separate. Both require policy attention if NCS credit markets are to scale.

There is currently a significant shortfall in investment for NCS activities in general, including those that are expected to generate credits. One estimate suggests that the total investment required for NCS activities – both those that generate NCS credits and those that do not – over the period to 2050 could be as high as $11 trillion, if the world is to meet a 1.5 degree temperature target while halting biodiversity loss and achieving land-degradation neutrality. The same report also estimates that current annual investment flows for the same activities are about $154 billion, about 32% of the 2030 investment needs and 23% of the 2050 needs (United Nations Environment Programme, 2022). Key

potential investors in NCS crediting activities – such as institutional investors and large agribusinesses – have so far contributed relatively little in the way of actual investment.

A number of barriers can make it difficult to invest in credit-generating NCS activities. Some of these relate to issues associated with realizing revenues from the successful delivery and sale of high integrity credits. These include:

- **Generation risk** — the risk that the activities will generate fewer credits than expected;
- **Price risk** — the risk that supply and demand dynamics may reduce the price at which credits can be sold;
- **Policy risk** — the particular impact that policy changes can have on changing supply and demand dynamics and hence prices, for example by changing the rules on credit eligibility; and
- **Reversal risk** — the risk that the emission reductions or removals that lead to the generation of NCS credits will be reversed. This either reduces the demand for NCS credits in the first place, or the additional requirements may be placed on credit providers to address this risk can make NCS activities a less attractive investment proposition.

Other challenges relate to the characteristics of NCS activities themselves, and the geographic, political, and economic environments in which many crediting activities are located.

Some of the risks associated with the crediting process can be addressed by using different types of contracts to structure the sale of credits. For example, forward/future contracts – whereby buyers and sellers agree the price at which credits will be sold in the future - can help reduce the price risk that credit suppliers and their investors face. Similarly, donors or philanthropists can offer 'put options' that give NCS credit suppliers with the right, but not the obligation, to sell NCS credits at a certain fixed price. Contracting structures can also be used to help reduce reversal and delivery risk.

However, other barriers to investment in NCS activities suggest the need for increased support for jurisdictional crediting, and/or greater use of carefully designed blended finance solutions.

- The greater scale of **jurisdictional solutions** reduces the significance of transaction costs when designing financing arrangements and might provide an easier to way to attract large pools of institutional investor capital into NCS crediting solutions than is possible with project-based crediting. But the greater scale of jurisdictional crediting may also increase risks, as larger quantities of capital will need to be invested before credits have been generated. To address this conundrum, public finance providers (such as development finance institutions) can play an important role working alongside jurisdictional authorities. These bodies can provide support or upfront financing to enhance the readiness for jurisdictional crediting, making it more likely that jurisdictions can exceed their targets. Carefully designed nesting solutions can have the same effect. Another option to ease financial flows into jurisdictional solutions is incorporating NCS readiness activities within broader rural/agricultural or other sustainability reform programs, which will help to diversify the cashflows of the needed activities.
- **Blended finance** – which involves the use of concessional capital from public or philanthropic sources, to reduce risks to private actors investing to support sustainable development – can also have a role in either project- or jurisdictional-scale crediting. Some blended finance structures that offer potential for support of NCS activities include investment funds with different capital stacks, as well as the provision of concessional partial guarantees to provide comfort to those taking on the financial risk of lending to NCS crediting activities. Blended finance activities have attracted criticism, however, and need to be carefully designed to increase their likelihood of success. Effective finance solutions may ultimately be as diverse as the jurisdictions from which credits are sourced.

INTRODUCTION

KEY TAKEAWAYS

This section introduces some of the key themes and concepts explored throughout the rest of the NCS Handbook.

1. Scaling up Natural Climate Solutions (NCS) – the protection, restoration, and improved management of managed landscapes and natural ecosystems – is critical in the near term for meeting global emissions targets.

2. Crediting mechanisms involve recognizing actions that result in a difference in greenhouse gas (GHG) emissions or carbon sequestration from a baseline, quantifying this difference, and creating an equivalent number of credits. These credits have value because the owners of the credits can use them to claim the reductions or removals that the credits represent. NCS crediting refers to credits created and sold by undertaking NCS activities.

3. NCS crediting can have a number of benefits. For buyers, the ability to purchase NCS credits can reduce the cost of meeting ambitious emission reduction targets, making it more likely that they will set such targets in the first place. There is also growing interest in corporates, as one particular type of buyer, using NCS credit purchases to support mitigation action 'beyond their value chain' (i.e. in excess of their voluntary targets). For sellers, NCS credits constitute an opportunity to achieve environmental goals, such as halting tropical deforestation – a priority for many countries with such forests - for both climate (including adaptation) and non-climate reasons. The prospect of revenues from credit sales, and the financial and technical support that this can precipitate, may be a more successful way to encourage involvement in NCS activities than other approaches, such as command and control regulation. NCS crediting may generate large additional revenue flows for under-resourced communities, IPs, regions and countries.

4. However, NCS crediting can be controversial, and some stakeholders view it with scepticism. For example, some have argued that if stakeholders have the opportunity to purchase NCS credits, they may place less emphasis on reducing emissions under their direct control. In addition, some stakeholders have raised concerns about whether credits represent genuine emission reductions or removals, or that the emission reductions or removals are otherwise of low quality. A particular concern is that, historically, local communities have too often been excluded from the decision-making processes that lead to credit generation.

5. A wide range of initiatives have, and are, in place to seek to address these sorts of concerns. Although welcome, these initiatives can make the NCS crediting landscape appear complicated and confusing.

1.1 What are Natural Climate Solutions?

The need to reduce greenhouse gas (GHG) emissions to net zero becomes more apparent every day. Climate change is already affecting an estimated 85% of the world's population (Callaghan et al., 2021), and is radically disrupting global health, development, and welfare (IPCC, 2022). Through the Paris Agreement and other political commitments, policymakers around the world have affirmed the importance of reducing the impacts and risks caused by climate change. This includes, in particular, to 'holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels'. IPCC analysis shows that limiting global warming to 1.5°C will likely require global net zero CO2 emissions between 2045 and 2060, while a 2°C temperature goal will require the same target to be achieved between 2060 and 2080 (IPCC, 2018).

To achieve these goals, the global community has an opportunity to harness the way that managed landscapes and natural ecosystems influence climate systems – that is, to use Natural Climate Solutions. NCS are actions (sometimes referred to as pathways) that increase carbon storage and/or avoid new greenhouse gas emissions from the world's forests, agricultural and grass lands, and marine ecosystems (Griscom et al., 2017). For the purposes of this

Handbook, we consider NCS actions as being those that focus on maintaining and/or restoring ecosystems to more closely resemble natural conditions.[1] As Table 1.1 illustrates, these pathways include actions that protect, restore, or improve the management of a diverse range of landscapes and natural systems.

TABLE 1.1

Examples of NCS in different ecosystems Source: Griscom et al. (2017)

	FOREST ECOSYSTEMS		Agricultural Lands and Other Non-Forest Terrestrial Ecosystems	MARINE ECOSYSTEMS	
	Tropical forests	Forests beyond the tropics		Terrestrial blue carbon	Coastal blue carbon
Protect	Avoided/reduced land-use conversion or degradation (emissions reduction)	Avoided land-use conversion	Avoided conversion of grasslands and shrublands, or other ecosystems, to croplands	Avoided conversion and degradation of wetlands and peatlands	Avoided degradation of mangroves, salt marshes, and seagrasses
Restore	Reforestation or aggradation of cleared or degraded tropical forest ecosystems	Reforestation or aggradation of cleared or degraded temperate or boreal forest ecosystems	Restoration of native prairie or savannah ecosystems	Peatland restoration	Replanting/ restoration of mangroves; restoration of degraded tidal marsh vegetation and associated hydrologic regimes
Improve	Sustainable agro-forestry and integrated forest and livestock management (incorporation of trees into mixed crop and livestock systems)	Improved natural forest management (maintaining healthy conditions within natural forests); Improved plantation management (such as extending harvest rotations, treating areas affected by insects and diseases); Wildfire management (including thinning and prescribed understory burns to prevent catastrophic fires)	Improved agricultural soil carbon management, such as introducing cover crops, no – or reduced – tillage agriculture, improved crop rotation practices, biochar use, and many others; Improved fire management of grasslands and other fire-prone terrestrial landscapes		Improved management of individual nearshore component ecosystems (mangroves, tidal marshes, seagrasses, and natural seaweed beds) and integrated seascapes (across multiple components)

1 This implies the exclusion of the creation of new ecosystems, such as growing macroalgae in oceans, or processes that do not move systems closer to the original function.

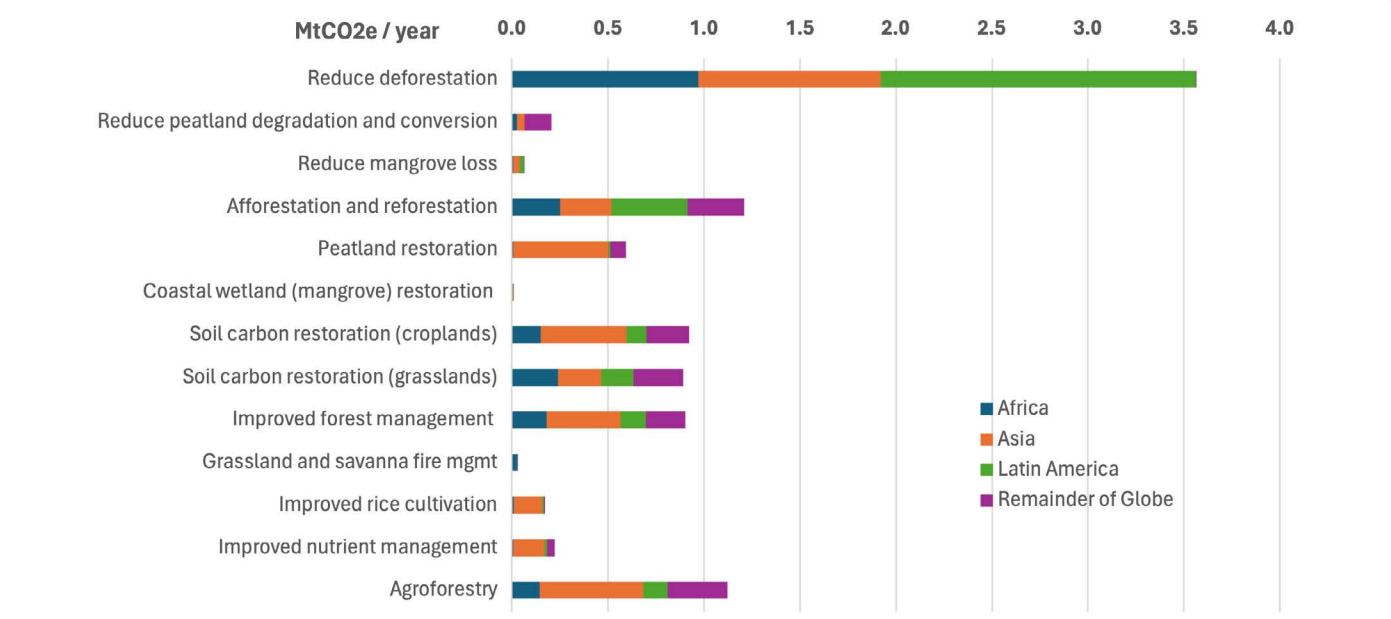


FIGURE 1.1

Distribution of cost-effective NCS abatement potential across pathways and geographies.
Figure based on country-level datasets published by Roe et al. (2021).

NCS, especially those related to forests, are an integral part of any plausible global below 2°C pathway. The IPCC, reviewing a range of studies, suggests a central figure for the economically feasible mitigation opportunity provided by NCS of around 10.7 GTCO2e per year (and a range of 5.3-18.6GTCO2e/year).[2] This compares to expected global GHG emissions in 2023 of around 58GT CO2e (World Data Lab, n.d.). This high potential is also reflected in the results of studies suggesting that NCS can provide about one third of the mitigation needed in the period before 2030 to remain on a below 2°C pathway (World Economic Forum, 2021). Figure 1.1 shows the results of one recent study exploring the breakdown of cost-effective NCS abatement potential across different pathways and geographies[3]. It shows that NCS opportunities are heavily concentrated in forest ecosystems, although there are also significant NCS opportunities in relation to peatland protection and restoration (within wetlands).

Many NCS opportunities are available at relatively low cost. Of the economically feasible potential NCS potential of 10.7GTCO2, research suggests that about 30% could be available at less than $10/tCOe (Griscom et al., 2017). This makes NCS opportunities significantly less costly than many other mitigation options such as carbon capture technologies which can cost over $200 per ton CO2 (Keith et al., 2018). However, in some cases the transaction costs and implementation of NCS activities may be underestimated, particularly when it comes to reducing emissions from deforestation (Luttrell et al., 2018).

NCS activities also offer substantial opportunities to protect and improve the health and well-being of ecosystems and people. Thoughtfully implemented NCS can deliver a range of additional environmental, social, and economic co-benefits (Brand, 2021). Many NCS pathways protect and enhance essential 'ecosystem services' that support biodiversity (Nabuurs et al., 2022) and also provide social benefits such as improved food and water security (Cohen-Shacham et al., 2016), improvements in human health, and systemic resilience (Romanello et al., 2021). The Dasgupta review emphasized the importance of preserving nature and biodiversity for economies, livelihoods and wellbeing (Dasgupta, 2021) . In addition, ethically designed NCS activities have the potential to bring additional benefits to communities with deep ties to the land and natural systems, so long as these groups are meaningfully empowered to participate in the selection, design, development, and implementation of NCS solutions. Figure 1.2 illustrates some of the ecosystem and economic benefits of NCS activities.

2 From Table 7.3 of (Nabuurs et al., 2022). We use the estimates of the sum of Forests and Other Ecosystems and Agriculture-Carbon Sequestration, using sectoral estimates, and focusing on potential that has a cost of less than $100/tCO2e.
3 Defined as an estimated cost of less than $100/tCO2e

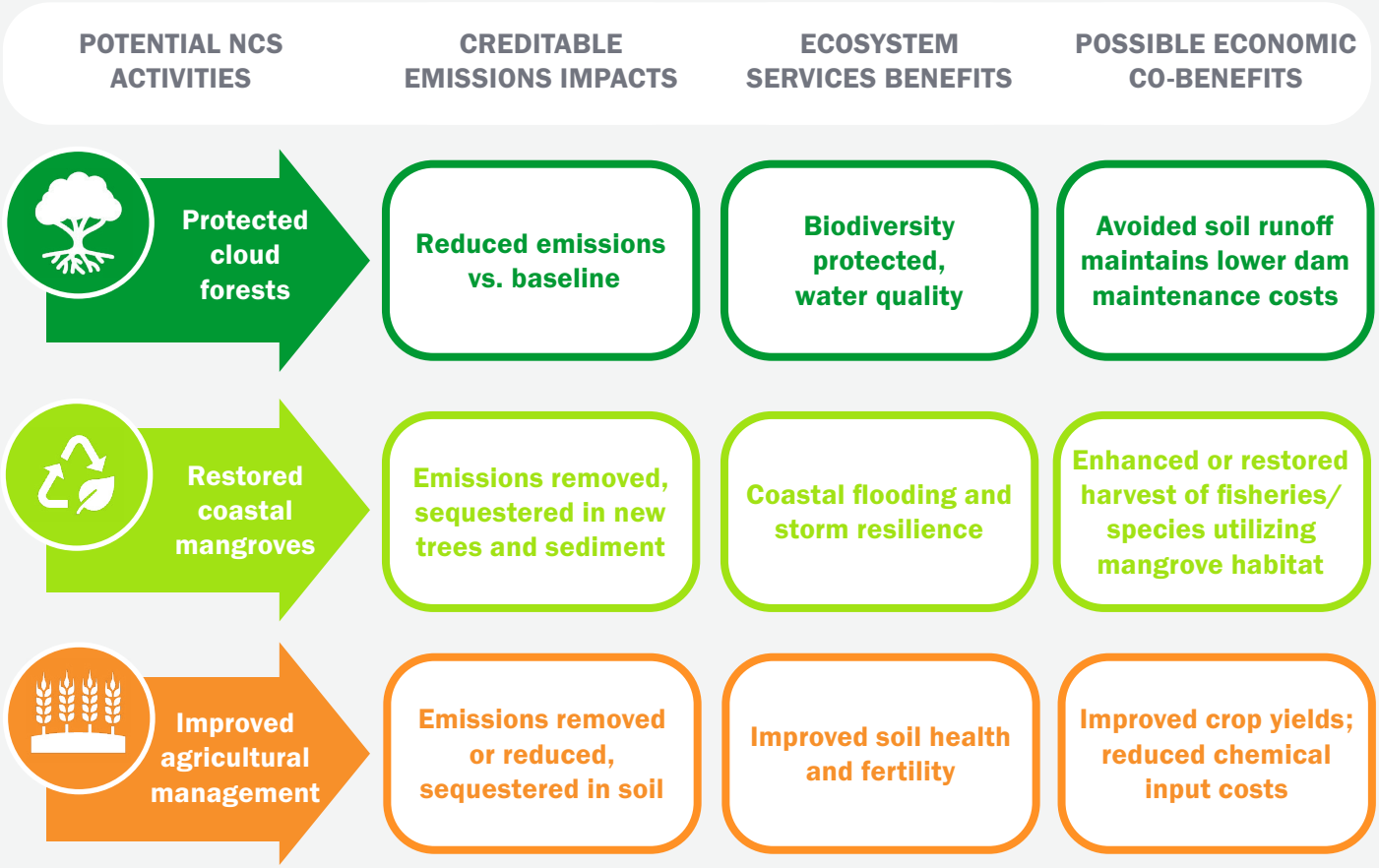


FIGURE 1.2

Examples of emissions and other benefits of various NCS activities

BOX 1.1

TIPPING POINT: UNDERSTANDING THE AMAZON FOREST DIEBACK

A changing climate may be pushing the southeastern Amazon Basin into a potentially irreversible feedback loop – a stark example of a looming climate tipping point.

Global climate change is causing hotter and drier conditions in the Amazon, weakening the geophysical suitability of the area to sustain a rainforest. In addition, as areas of the rainforest are cut, burned, and cleared, there is growing evidence that the hydrological cycle throughout the Amazon is being affected, at both local and regional scales. For example, local forest loss reduces transpiration which in turn reduces cloud formation. Some studies suggest that as forest loss approaches 25%, changes in precipitation patterns may trigger forest dieback. This dieback could lead to large amounts of emissions through the loss of carbon stocks in trees and soils, further exacerbating warming.

This tipping point threshold may be dangerously close, as about 20% of the Brazilian Amazon forest has already been lost. With continued deforestation and the resulting reduction in rainfall, parts of the Amazon are expected to be permanently converted to grassland within 10-15 years. This would represent a permanent loss of carbon storage capacity. Passing the tipping point in this system would have cascading effects on the entire South American continent and, indeed, on the global climate system, potentially putting a 2-degree warming target out of reach.

Sources: Amigo, 2020; Boulton et al., 2022; Lovejoy and Nobre, 2019, 2018; Xu et al., 2022

There is an urgent need to scale up the use of NCS as part of a global strategy to reduce emissions, especially before climate and land-use changes lead to local or global tipping points being passed. The Earth's ecosystems store an enormous amount of carbon and organic matter and rates of loss are expected to be very high in the next decade if no action is taken. These rates of loss would both exacerbate global climate change and worsen local/regional environmental stresses. In combination, these changes could lead to both irreversible ecosystem loss, and yet further increases in emissions. For example, Box 1.1. describes how the combination of the local and regional impacts of deforestation on the hydrological cycle, alongside the effects of global climate change, could threaten the viability of large parts of the Amazon rainforest (Lawrence et al., 2022). The latest IPCC report (IPCC, 2022) emphasizes that some rainforest ecosystems are already reaching the limits of their ability to adapt to climate change, underscoring the need to intensify near-term efforts to protect and regenerate these critical biological systems.

1.2 What is NCS crediting?

There are a number of different ways in which NCS activities can be supported. Countries can introduce land-use regulations that require land to be managed in a certain way, or they might introduce policies that seek to facilitate or incentivize a particular type of land use or practices on that land. NCS crediting is only one of a number of options within the policy toolkit that can encourage NCS activities.

The starting point for NCS crediting is the recognition that carbon emissions in the atmosphere impact the global climate system in roughly the same way, no matter where they occur. A ton of CO2 avoided by stopping deforestation in Indonesia has broadly the same benefit in terms of reducing climate change impacts, as reducing a ton of CO2 that would otherwise have been emitted from a smokestack in Germany.[4] This 'fungibility' of emission change opens the possibility that an actor (such as a company or government) in one location can reduce climate change, and its impacts, by providing funding to mitigation, such as NCS activities, that take place elsewhere.[5]

Under a crediting mechanism, this funding is provided through creating a market that allows for the purchase of emission credits. An emissions credit represents a specific amount of emissions (i.e., one credit = 1 metric ton of CO2 equivalent or CO2e) relative to a baseline. Credits can be generated by activities that result in either of the following:

- **Emissions reductions:** reduction or avoidance of new GHG releases into the climate system, relative to what would otherwise have been emitted i.e. relative to a baseline[6]. Examples of this activity would be avoiding expected deforestation or substituting wood for concrete in building materials;
- **Emissions removals:** capture of previously emitted carbon from the climate system, coupled with long-term storage through natural or technological means (sequestration) above what would otherwise be expected to be captured and stored[7]. An example of this activity would be the planting of new forests or restoring wetlands.

An NCS credit represents an emission reduction or removal specifically associated with NCS activities. Credits based on emissions reductions and removals (ERRs) can potentially come from any sector that can avoid emitting GHGs, or remove emitted GHGs from the atmosphere. However, the focus of this Handbook is on credits from NCS activities, in other words, from the types of activities discussed in Table 1.1. This Handbook addresses issues that are both unique to NCS credits, as well as some issues that, in principle, may apply to any credit type, but which are particularly sensitive or acute in the context of NCS credits.

A market for NCS credits requires a number of actors. As Figure 1.3 shows, the key players in the NCS credit market are suppliers, buyers, and various intermediaries and institutions that enable the creation, verification, trade, and accounting of credits. In NCS markets, there is likely to be a particularly important role for institutions that ensure the full and effective participation of Indigenous Peoples and local communities (IP and LCs) who may have rights associated with many NCS activities.

Credit suppliers are individuals, firms, sub-national and national jurisdictions or other entities who take action

4 It should be noted, that while equivalent from a GHG perspective, an avoided ton of CO2 in Indonesia from deforestation would likely have greater cooling effects than an avoided ton in Germany due to the non-GHG biophysical cooling effects of tropical forests have on the climate (Lawrence et al., 2022; Lawrence and Vandecar, 2015).

5 The fungibility between two activities that reduce atmospheric emissions in different locations using different strategies relies on them having the same long-term impact on reducing global temperature increases. Section 2 discusses the implications that this has for NCS crediting in more detail.

6 This is sometimes referred to as a 'counterfactual'. It is important to note that the concept of a baseline or counterfactual as 'what would otherwise have happened' will not necessarily be the same as 'the state prior to the action commencing'.

7 Typically, but not always, it is reasonable to assume that the amount that would otherwise have been captured and stored would be zero.

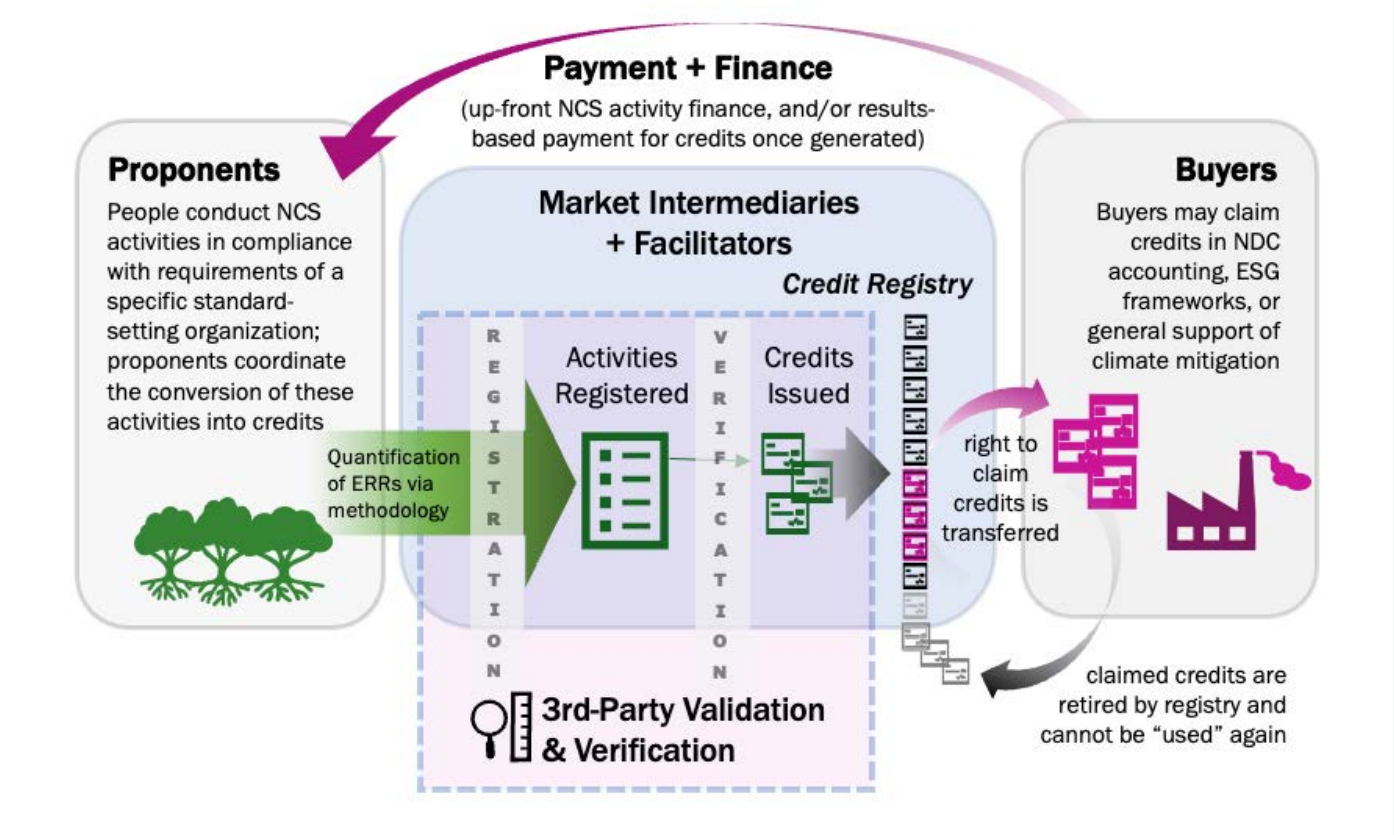


FIGURE 1.3

Illustration of relationship among NCS credit suppliers, buyers and other key stakeholders and institutions in a typical NCS credit market

that leads to quantifiable emission reductions or removals from natural ecosystems relative to an established conservative baseline. They receive payments and may also receive financing and technical support from credit buyers for undertaking these actions.

Credit buyers, in turn, may claim the reductions or removals that a purchased credit represents. Sometimes this claim is made as part of an exercise to reduce emissions towards a target, where the purchased credit is treated as equivalent to reducing the buyer's own emissions by one ton. In other words, it is used as an offset. In these cases, it can be helpful to distinguish between compliance and voluntary market participants. Compliance buyers are countries, companies or other actors that use NCS credits to meet regulatory obligations to reduce emissions, including Nationally Determined Contributions (NDCs) or other national climate targets. Sometimes these regulatory obligations will impose conditions on the use of NCS credits including, as discussed below, the standards to which NCS activities must conform. Credible voluntary market buyers are those who have chosen to reduce the GHG emissions for which they are responsible and purchase carbon credits (including NCS) to go beyond internal decarbonization efforts or address emissions that they are unable to abate in the near term. Both voluntary and compliance buyers might pool their climate funding resources to create a buyers' platform. A growing number of initiatives are taking this approach to credit purchase.[8]

Buyers also may purchase NCS credits for reasons other than offsetting their emissions. For example, in voluntary markets the concept of 'Beyond Value Chain Mitigation' has gained traction in recent years, whereby companies support climate action even if that action is

8 One such player is the LEAF Coalition. Other initiatives of this nature include the World Bank's carbon funds Forest Carbon Partnership Facility (FCPF), the BioCarbon Fund Initiative for Sustainable Forest Landscapes (ISFL), and the upcoming Scaling Climate Action by Lowering Emissions (SCALE) and new carbon instruments and private sector fund aggregation approaches being designed by the International Finance Corporation.

not counted towards reducing their measured emissions footprint. They may do so, for example, to make claims against their contributions to global climate targets or to help address emissions not included in their value chain (Science Based Targets, 2021). Purchasing NCS credits can be a key component of a Beyond Value Chain Mitigation strategy. A similar motivation may drive the purchase of NCS credits by other actors, including philanthropists, governments, or multilateral agencies.

Market intermediaries help bring credit buyers and suppliers together. Intermediaries may either directly broker relationships between buyers and sellers or they may enter into a financial arrangement with credit suppliers that gives them ownership of any credits generated by the NCS activities, which they can then resell to credit buyers. Intermediaries may also directly finance the NCS activities that will lead to the generation of NCS credits or help to facilitate financing from third party financiers. Other market intermediaries include credit exchanges and auction platforms. Exchange platforms simplify and speed up the trade of credits by creating standardized products while auction platforms provide a specific opportunity for the transaction of newly generated credits in a way that facilitates price discovery and transparency.

Credit suppliers and/or market intermediaries may choose to align their NCS activities with a crediting **standard.** Standards aim to ensure that credits are of 'high quality': they reflect an additional reduction or removal of emissions relative to a conservative baseline and the process for generating that additional reduction or removal meets various other requirements. For example, regarding the appropriate consultation processes that preceded the activity that led to the generation of NCS credits. Crediting standards can apply to suppliers and market intermediaries, and to purchasers.

Standards have been published by third-party organizations with an interest in credit integrity or market facilitation (for example, the Verified Carbon Standard published by Verra or the standard published by the American Carbon Registry (ACR) Standard). Standards may also be published by jurisdictions (e.g. national and subnational governments) that allow NCS credits to be used to meet regulatory obligations to reduce emissions (for example, standards published by regional carbon markets in China, the United States, and Europe). Standards can vary widely in key elements as they prioritize different goals or take different approaches to crediting.[9]

In other cases, credits may not be aligned to a formal crediting standard. One example where this may be the case is when NCS credits are exchanged between two countries under Article 6 of the Paris Agreement, with the credits being used by the purchasing country to help meet its NDC or national goals as permitted under the Paris Agreement Rulebook. While Article 6 contains general requirements for environmental integrity of such trades, and avoidance of double counting, host countries (or host and buyer partners together) can create their own approaches and seek external validation for them, but without reference to a specific standard.

Standards include specific **methodologies or protocols** to measure emissions reductions or removals and certify their quality attributes. These specify how to determine the emissions impact of a particular activity as well as the additionality of the impact. For example, the number of credits generated by primary forest conservation is determined by a different methodology than that used to quantify the credits generated by agroforestry or wetland restoration activities. The different methodologies reflect the fact that actions in different ecosystems reduce or sequester carbon through different processes and at different rates. In cases where NCS credits are traded without reference to a pre-existing standard, the arrangements that buyers and sellers reach will also need to specify how the quantity of credits within the transaction has been determined, with best practice requiring that this be subject to some form of external certified validation or verification.

To participate in some credit markets, an NCS activity under consideration for engagement in a carbon market needs to be listed (also known as 'registered') in the associated carbon credit program, which is done by providing specified information about the activity and applicant such as location and how it satisfies any eligibility criteria. This formalizes a relationship between the credit-generating activities and that specific program (either voluntary or compliance based), with the program specifying the particular methodologies and other applicable rules that all registered credits must follow. For example, the California Compliance Offset Program sets the rules for the use of NCS credits (as well as credits from other mitigation activities) for compliance purposes within its

9 In July 2023, the Integrity Council for the Voluntary Carbon Market (IC-VCM) released a set of Core Carbon Principles and an Assessment Framework in a step towards developing a universal set of key principles for standards that are commonly used in transactions with voluntary buyers.

emissions trading system (ETS) (California Air Resources Board, 2023a). Listing with a credit program typically means that the activity and the emissions reductions it generates must be verified by an independent validation and verification body. These validation and verification activities confirm the (continued) application of a proper methodology for estimating GHG emissions reductions/removals and compliance with other rules.

In cases where buyer and seller have aligned the transaction to a particular standard, the credits corresponding to the verified emissions reductions or removals are issued by the standard-setting organization – the entity that develops methodologies and protocols under which credits are verified – and documented within a credit registry. New credits can be generated over the life of the registered activity's lifespan as additional emission benefits are verified. Once a buyer reports a credit as used (or 'surrendered') it is retired within the registry and cannot be used again. Furthermore, in cases where credits are transacted between Parties to the Paris Agreement (i.e. countries), potentially without reference to pre-existing standards, then the Paris Agreement rulebook specifies how 'corresponding adjustments' should be made to each country's national inventory of emissions with the aim of avoiding the double-counting of emission reductions or removals (See Section 4.5).[10]

1.3 What is the value of NCS crediting?

NCS crediting can play a critical role over the next decade in helping companies and countries translate their climate goals into action. As noted above, many NCS activities may reduce or remove emissions at a lower cost than other options. By enabling actors to support low-cost but high-quality mitigation activity, NCS crediting can make it more likely that actors will be willing to commit to, and then implement, more ambitious climate action over time.

Strengthening markets and global demand for high-quality NCS-based carbon credits can also motivate beneficial and sustainable land-management practices in contexts where other (regulatory) approaches may be less effective or less equitable. For example, legal requirements to implement conservation and other NCS activities may be unenforceable and might place an unfair burden on small landholders; by contrast, these actors may be drawn to the same land use changes through economic incentives (Jones et al., 2017). Similarly, credit-based economic incentives for NCS activities might facilitate the participation of politically powerful entities who might otherwise be inclined to resist mandated NCS activities (Milmanda and Belen, 2019). In addition, credit-based incentives may also be effective in countries with limited fiscal space where it is difficult to offer powerful tax incentives or other subsidies for NCS activities.

The scale and direction of financial flows associated with NCS crediting can contribute to broader development goals. Many of the opportunities to implement NCS activities arise in the global South. This means that the sale of NCS credits can provide new sources of revenue to historically marginalized communities, economically disadvantaged regions, and developing countries generally. If transaction costs and certification complexities are not prohibitive, these revenues could be greater than the costs of implementing NCS activities, meaning that the surplus can be used for a variety of purposes – including improved health or education provision, or further ecosystem protection and restoration. The resulting benefits are in addition to any benefits directly associated with implementing the NCS activities - for example, the employment associated with restoring degraded landscapes.[11] The potential scale of demand for NCS credits means that net revenue flows from credit sales could rival or exceed other funding streams that seek to achieve similar outcomes, such as Overseas Development Assistance (ODA).[12] In addition, successfully navigating the development of governance infrastructure to participate and manage high-integrity crediting systems can empower local communities and governments.

1.4 What are some of the key challenges with NCS crediting?

Negative experiences with some NCS credits have cast doubt on the use of NCS credits as a GHG mitigation tool. This doubt stems in part from a lack of clarity and consensus on how to create, identify, measure and enforce use of **high-integrity NCS credits.** In this Handbook, we define 'high-integrity credits' as those whose creation and use sustains a limit on or reduces

10 There is ongoing discussion about which credit transactions require corresponding adjustments within national inventories. This is discussed in Section 4 of the Handbook.

11 Work by the International Labour Organization (ILO) and World Wide Fund for Nature (WWF) find that NCS activities tend to support between 0.0002 and 3 full-time equivalent jobs per hectare (Lieuw-Kie-Song and Perez-Cicera, 2020). On the other hand, undertaking NCS activities may need to some jobs to be foregone, for example the jobs that would have been associated with agricultural expansion. Evidence on the net employment impacts of NCS activities remains scarce.

12 On occasion, governments will provide ODA through the purchase of NCS credits.

climate change over time and in a way that supports sustainable development. This is expressed in terms of representing at least one metric ton of real, permanent, additional, quantifiable, and verifiable reductions in otherwise unclaimed GHG reductions or removals – with appropriate safeguards to ensure environmental and social equity.

There are legitimate concerns that some NCS credits created and used to date, and some likely to be used in the future, have not been, or will not be, high-integrity credits. The following issues are prominent among those that have been raised by stakeholders skeptical of, or opposed to, the large-scale use of NCS credits:

- **The environmental integrity of NCS credits – that is, whether they actually reflect the tons of GHG emissions they claim to reduce or store – has been questioned by some, although these concerns have been disputed by others.** For example, a 2020 study on crediting schemes in the Brazilian Amazon found that many projects overstated their reduced emissions values. This was the result of a number of project- and locale-specific issues as well as the infrequency of updates to the baselines (West et al., 2020). However, Verra, the issuer of the credits, published a technical review and response to these claims, stating that the analyses "contained serious methodological deficiencies" and providing additional information on factors included in the critical analyses (Verra, 2023). Similarly, the integrity of forest management credits claimed in the California carbon market has been challenged on the basis of inappropriately generous baselines, specifically whether the baselines accurately captured carbon density or carbon accumulation rates (Badgley et al., 2022; Coffield et al., 2022; Randazzo et al., 2023).[13] The California Air Resources Board has released statements in response to criticisms like these, detailing how their program sets baselines and takes into account risks (California Air Resources Board, 2021). For some NCS activities, including those related to soil carbon, the challenge is more fundamental; in these cases there may be underlying difficulties in understanding and/or measuring changes in emissions at reasonable cost.
- A related concern is that **emission reductions or removals may be reversed** especially given the growing risks of forest fires, insect and pathogen outbreaks, drought stress, and illegal logging in some regions. As noted above, climate change itself likely increases some of these risks. However, many of these reversal risks can be managed for. Problems arise if the risks are not anticipated and built into credit specifications and transactions (e.g., specifying some NCS credits as contingent and establishing buyer or seller responsibility to address reversals through credit reserves).
- **There is a concern that NCS crediting, by placing an explicit monetary value only on GHG mitigation benefits, may over-emphasize the carbon sequestration 'service' that ecosystems provide, and undervalue their other environmental or social values.** In the context of forestry, for example, there is a concern that NCS crediting may incentivize forest monocultures of rapidly growing species providing relatively high carbon sequestration rates, while failing to prevent deforestation of native forests with high biodiversity. A similar concern can arise if NCS activities and management approaches conflict with the traditional ways in which Indigenous communities use and relate to the land.
- **Leaving local communities (including Indigenous communities) out of NCS decision making and implementation, in favor of other interests, can undermine trust in NCS crediting among key stakeholders.** This is not an inherent problem with crediting, but it becomes a problem when it leads to negative impacts on their communities and livelihoods.

These challenges are often exacerbated by a lack of transparency which can undermine confidence in the global NCS market. The wide range of different approaches and the need to navigate among different standards or credits whose levels of quality may be difficult to discern – mean that both buyers and sellers may experience confusion when looking to produce and transact. Lack of standardization can also make it easier for non-credible actors to trade in low-quality credits, reducing overall trust in NCS credits globally.

Further concerns regarding NCS crediting arise on the demand side of the market. For example, even if NCS credits are of high integrity, there are concerns that their use could induce credit buyers to defer implementing their own necessary emissions reductions (Greenpeace International, 2021; Pearse and Böhm, 2014). This would also mean that some local co-benefits from making these emission reductions, such as improved air quality, would also be lost.

Various efforts are seeking to address these concerns. These initiatives are particularly pronounced in the voluntary market which, by definition, has historically been subject to less regulatory scrutiny. Relevant initiatives include the Integrity Council for the Voluntary

13 A further benefit of NCS crediting is that it helps to identify and improve these methodological weaknesses.

Carbon Market (ICVCM), Voluntary Carbon Market Initiative (VCMI) and Science Based Targets Initiative (SBTI). Each is discussed in later sections. While these efforts are seeking to establish guidance on the use of credits and standards of quality, the number of initiatives working in this space has itself been a source of confusion, with both suppliers and buyers unsure where to look for reliable guidance.

A further challenge in the market is that the scientific and technical understanding of NCS and NCS crediting continues to evolve. This allows stakeholders to strive for higher integrity but may also lead to confusion. What was considered to be best practice in the past, may not be considered to be best practice today. Remote sensing capabilities, for example, have vastly improved, increasing the ability to accurately identify changes at smaller and smaller scales.

This Handbook will explore these NCS challenges in more detail and present guardrails and methodologies, based on inclusive processes and current science, that can help address them. Where promising solutions have been proposed, it will discuss how these might be implemented to help address the issues highlighted above. It will also note where legitimate concerns may persist in the near-term, as NCS crediting stakeholders continue to seek creative solutions and new approaches.

1.5 How does the material in this Handbook apply to non-market NCS?

Some of the challenges associated with NCS crediting pathways may also apply to other mechanisms used to achieve similar objectives but which do not involve the sale of credits. For example, national or international policymakers may design results-based incentives, in which financial transfers are triggered only when a certain level of GHG mitigation (or capacity to mitigate future GHGs) is achieved, with timing and size of payments varying in relation to the achievements. While such arrangements do not involve the trading of fungible carbon credits, participants may face similar technical and ethical questions as arise in NCS crediting. An example is Costa Rica's Payment for Ecosystem Services (PES) scheme in which the national government pays landowners to protect forest in exchange for the benefits they provide ("FONAFIFO | Sitio Web," n.d.). Multilateral programs may also support NCS activities using both results-based approaches. For example, the Green Climate Fund (GCF) provides results-based finance and other financial instruments to help developing countries achieve and exceed their NDCs in a transition towards low-emissions and climate-resilient pathways, including measures to reduce investment risks to mobilize large-scale mitigation finance aligned with sustainable development. The Amazon Fund is another example of a multilateral program providing results-based support to support reduced deforestation.

While this Handbook focuses on NCS crediting, it highlights important links between NCS crediting and other policies that aim to support NCS activity. As mentioned above, other NCS policies may face many of the same challenges encountered by high-integrity NCS credit systems. These other policies may help prepare market participants for the opportunities and risks associated with NCS crediting.

1.6 Handbook structure

The remainder of this Handbook explores the topics introduced in this section, and related issues, in more detail. Throughout, the focus is on providing foundational knowledge and clear, practical guidance on how to make decisions that will maximize the potential and reduce the challenges associated with NCS crediting in different contexts. Where helpful, each section directs the reader to in-depth further reading on specific topics.

While the Handbook discusses NCS pathways across diverse ecosystems, most of the examples in the text focus on crediting in relation to reducing tropical deforestation. This is the most studied and well-established NCS crediting activity and therefore provides the richest base of examples for many of the key issues that arise. It also represents the NCS activity with the greatest opportunity for impact in the next decade. Tropical forests are estimated to contain over 100 gigatons of carbon stocks that once lost cannot be recovered, but this vital ecosystem faces high rates of deforestation with roughly eleven million hectares of tree cover lost per year, producing 6.3 gigatons of CO_2 annually (Goldstein et al., 2020; World Resources Institute, 2022).

The Handbook's use of these examples intends to illustrate general arguments and concepts that can be applied, with appropriate nuance, to NCS crediting across all biological pathways as methodologies and markets develop. The Handbook therefore lays a foundation for the potential expansion of crediting programs to include other biological pathways of forests (temperate, and boreal); agricultural and grass lands (cropland, grasslands, shrublands and agroforestry); and marine ecosystems (peatlands, seagrass, salt marsh, mangroves, and coastal and open ocean carbon sinks), to the extent that the science will support adequate monitoring of these systems and that crediting is an appropriate policy instrument.

We organize the Handbook into 4 further general sections:

- Section 2 looks at the decisions that arise on the **supply side of the market,** exploring the key issues that potential sellers of NCS credits, and those who regulate or influence their actions, need to consider and engage with when considering NCS crediting. In doing so, this sheds further light on some of the most common concerns about NCS crediting, and how these can be addressed.
- Section 3 turns attention to the **demand side of the market,** discussing the different types of buyers of NCS credits, the incentives they may have to buy credits, and some of the key factors and policy issues that arise when buyers consider purchasing and using credits. This discussion helps to illustrate the potential benefits from NCS crediting, as well as how some of the risks or drawbacks can be managed through actions by credit buyers.
- Section 4 on **markets** brings together the demand and supply side perspectives. It looks at the different ways in which NCS credits can be transacted – over the counter (OTC) and in exchanges – and the advantages and disadvantages of each. It examines the opportunities, design issues and challenges that arise when the country where the credit is generated is different from the country where the buyer's purchase is recognized.
- Finally, Section 5 looks at the **financing needs for the activities that underpin NCS credit generation,** and the different models for linking buyers, sellers, and finance providers, including the role of governments and international partners.

In the near future, this version of the Handbook will be complemented with a series of annexes that provide overviews of the state of science and markets related to NCS crediting in five ecosystem settings:

- tropical forests
- forests beyond the tropics, including temperate and boreal forests
- agricultural and other non-forest terrestrial ecosystems
- terrestrial blue carbon (freshwater wetlands and peatlands)
- coastal blue carbon (Mangroves, seagrasses, coral reefs and salt marshes).

This additional material will aim to highlight the unique needs and realities of each of these diverse settings, and to provide a high-level window into how general crediting concepts might be adapted to meet the emerging needs of specific NCS pathways.

2. SUPPLY SIDE OF THE MARKET

SUPPLY SIDE ISSUES FOR NCS CREDITING: KEY TAKEAWAYS

This section explores key elements of the process of generating and issuing high-integrity NCS credits.

1. NCS credit generation depends on actions by the people who manage, care for and cultivate the land. NCS crediting can make it easier for those who ultimately manage the land to engage in climate-smart activities.
2. A key distinction among different NCS crediting activities is the physical scale at which efforts to define, measure and verify NCS credits take place: project-based or jurisdiction-based crediting. Activities at different scales can also complement one another.
3. High-integrity credits are based on emissions reductions or removals that are real, quantifiable, additional, verifiable, permanent, and that incorporate effective and ethical environmental and social safeguards. Suppliers can use various tools to ensure implementation of these key principles.
4. Environmental and social impacts are closely linked, especially for those groups whose lives and cultures are deeply intertwined with the landscapes where NCS activities may take place. This makes the incorporation of effective and ethical safeguards critical. However, the implementation of such safeguards has historically fallen short and credit suppliers must work actively to reverse this trend.

In this section we look at the key issues that arise for people (for example, farmers, indigenous peoples, project developers and jurisdictional authorities) making decisions about whether and how to undertake activities that could lead to the generation of NCS credits, including the key decisions of those who regulate this behavior. In the absence of regulatory constraints on land use activities, people responsible for managing land are not obliged to undertake NCS activities; they will do so if the benefits to them appear to outweigh the costs. For those who do decide to undertake NCS activities partly motivated by the potential for rewards through credits, the extent to which these actors find success in generating credits will depend on questions such as how activities are carried out and how these actions are monitored and/or regulated. This section considers trade-offs in the different ways in which people can organize themselves to undertake NCS activities and generate credits, and how different approaches to organization, and the associated use of different tools, can succeed or fail to create credits of high integrity. The section is organized as follows:

Section 2.1 discusses **key actors who might be involved in a decision to generate NCS credits** – such as indigenous and other peoples engaged in land use such as farming; project developers; and jurisdictional authorities. It presents three stylized models of how these different groups might organize themselves to undertake NCS activities that lead to credits, and the factors that will make it more or less likely that they will decide to undertake these activities. In this discussion, we introduce a distinction between two crediting scales: **project-based crediting** and **jurisdictional crediting.**

Section 2.2 explores **what defines high-integrity credits** – that is, what features and requirements suppliers must fulfill in order for NCS crediting to credibly deliver on its potential for global climate impact. It is not enough for farmers or others with responsibility for land management to simply decide to engage in NCS activities and generate credits; the long-term credibility of the market requires that the credits they generate have certain features or qualities. Indeed, the failure of some existing NCS credits to meet these features underlies much of the controversy surrounding NCS crediting. In this subsection, we explore **what these features are** and how they shape the actions of those involved in credit supply.

Section 2.3 discusses the **range of mechanisms** developed by market actors and other stakeholders to help develop and promote the necessary features of high-integrity credits; it includes discussion on **how these mechanisms vary at different scales** of crediting.

Section 2.4 builds on the discussion from 2.3 and outlines potential pathways to facilitate effective linkages between crediting and project-based and jurisdictional scales. This includes opportunities for integrating new and existing project-based crediting into more jurisdictional approaches to crediting – often referred to as nesting.

Throughout this discussion, our focus is centered on different approaches to managing the supply of credits. In this section, we do not cover questions about who and how others might buy these credits, and how large the demand for credits might be. In other words, we 'assume a buyer' who values high-quality, real reductions and focus on the issues that need to be addressed in supplying that buyer with credits. Key demand side issues are in turn discussed in section 3.

2.1 Who are the main suppliers of NCS credits?

Ultimately, NCS credit generation stems from the actions of the people who manage, care for and cultivate land and ecosystems. These actions include many approaches to activities or policy reforms that can reduce greenhouse gas (GHG) emissions or sequester carbon — such as defending forested land against illegal incursions, planting trees, shifting cropping practices, restoring wetlands, facilitating traditional Indigenous and community ecosystem stewardship practices, and many others. In most cases, these activities will require some investment of resources from land managers (such as indigenous communities or smallholder farmers and forest managers): for example, these managers may have to incur financial costs, spend additional time and effort, or use ecosystems in unfamiliar ways relative to prevailing practices and norms.

In many cases, the actors performing NCS activities have to give up doing something that is economically attractive to them. This is the opportunity cost of the NCS activity. While some foregone land uses may not be the most profitable or societally valuable in the long term (or may even be illegal), they may be activities that are financially attractive in the nearer term. For example, harvesting timber or clearing land for agriculture can be profitable upfront, even if it may not represent a sustainable use of the land (or even the most profitable long-term decision). While there are likely inherent medium or long-term benefits to acting in ways that supports an ecosystem's health and carbon stocks (especially if most other land managers are doing the same), the short-term incentives – which may range from meeting immediate local subsistence needs to meeting international demand for commodities — or profiting from land grabbing and other criminal activities — may win out economically.

NCS crediting provides financial returns that make it more feasible and appealing for those who work and manage land and ecosystems to engage in sustainable, climate-smart activities. The prospect of revenue from the sale of credits helps to change the range of economic decisions available to farmers, Indigenous peoples, or others who manage landscapes or aquatic ecosystems. Further, the receipt of the revenues[14] can provide resources needed to invest in additional facilities or institutions – such as tree nurseries, agricultural training facilities, or other complementary infrastructure – that make it easier to undertake further NCS activities. These facilities and institutions can, in turn, enable a wider and more durable transformation of the local or regional economy that appropriately values a shift toward beneficial and sustainable land use. In this way, crediting can serve as an incentive-based complement to emerging command-and-control efforts by government and regulatory bodies.

NCS activities – and the roles of those involved in supplying and managing credits – can be organized in very different ways. While implementation of NCS activities is ultimately carried out by those who work on or manage the land or ecosystems where credit generation occurs, different frameworks may govern aspects such as the responsibility for ensuring that these activities take place, the quantification of the credit value of these activities and the right to sell any credits that they generate.

The scale at which credits are generated creates key distinctions among NCS approaches. The two primary approaches in use today are crediting at a project-based scale, and crediting at a jurisdictional scale:

In a **project-based approach**, activities that reduce or remove GHGs relative to an agreed baseline are evaluated in a defined, relatively small geographic area. A project owner/developer (of which there are different forms, as discussed below) is responsible for coordinating and incentivizing NCS activities (such as tree planting, forest conservation or seagrass restoration) among individual or groups of land stewards within a discrete area. Credits are generated through quantification protocols that assess how these NCS activities have impacted GHGs and translate this impact into a specific number of credits.

14 Or the expectation of these revenues if there is an opportunity to borrow against these future expected revenues.

In a **jurisdictional approach** to NCS crediting, a subnational or national government entity (potentially including Indigenous governments) is provided with resources and incentives to increase the implementation of NCS activities throughout the geographic region for which it has some authority. For example, a government may introduce policies and/or programs that result in farmers and indigenous communities changing their tree-harvesting practices, or conserving forested land throughout a subnational region or across an entire country. A government may promote these changes through positive incentives (such as rewarding activities with payments, or with other special rights or benefits) or through command-and-control actions that create negative incentives (such as issuing fines, or other punishments for noncompliance with laws). Critically, under jurisdictional systems the changes in emissions and the associated level of credits generated are calculated using a framework that considers trends in emissions across the whole jurisdiction, rather than only considering the specific areas in which NCS activities have taken places. The jurisdiction subsequently acquires (and/or coordinates the distribution of) the rights to the credits generated under this framework[15], and may administer any revenues or other benefits negotiated among key stakeholders carrying out the NCS activities or otherwise impacted by the program.

Growing evidence suggests that the integrity and durability of NCS crediting depends on increasing the spatial scale of NCS activities, and on their implementation through systemic and economy-wide changes. As both of these factors are key elements of successful jurisdiction-scale NCS approaches (Schwartzman et al., 2021), there is increasing support from civil society for a transition toward jurisdictional approaches when and where possible (Coordinator of the Indigenous Organizations of the Amazon Basin (COICA) et al., 2023), although few examples of successful implementation have yet emerged. As discussed further in this section, the large volume of emissions reductions that can be achieved though successful government action can, in theory, address many of the real and perceived challenges of ensuring high integrity in credits from smaller project-based efforts. Moreover, such large-scale jurisdictional NCS activities are implemented under the unique authority that governments have to make and enforce law – including to shift long-term economic incentives, regulate the allocation of resource concessions, recognize Indigenous rights and local land tenure, and implement other broad policy initiatives at a large territorial scale (Seymour, 2020). These system-level changes, implemented successfully, are potentially more durable than the types of small-scale incentives that drive project-level NCS activity (for example, as illustrated by McCallister et al., 2022). Some national programs to reduce deforestation have already delivered impactful results; an analysis of Guyana's national REDD+[16] program, for example, found that the jurisdictional program reduced tree cover loss by 35% from 2010-2015 (Roopsind et al., 2019), and other promising jurisdictional programs are rapidly evolving at the time of writing. But in some jurisdictions, serious questions remain about practical implementation of jurisdiction-scale NCS efforts.

The technical and practical frameworks needed to implement the two distinct approaches to scale are quite different, as discussed throughout the remainder of this section. Box 2.1 provides illustrative examples related to both project-and jurisdiction-based crediting.

All stakeholders involved in crediting efforts need to understand how carbon rights – the legal ability to make (or own) claims relating to GHG emissions reduced or sequestered within an area – are established. Such rights could take the form of either direct ownership rights for carbon credits generated through NCS activities, or to legal rights to make claims on the broader suite of benefits potentially accrued as part of such credit-generating activities. While the manner of allocation of these carbon rights varies from country to country, several common frameworks for distributing carbon rights under project-based crediting are described simply below:

- *Carbon rights correspond to land tenure rights.* For example, if a farmer owns land on which new trees are planted as part of an NCS activity, then the farmer owns the rights to any NCS credits associated with this tree planting.
- *Carbon rights belong to whoever conducts the activity that results in the additional GHG reduction.* For example, in the tree-planting scenario described above: if a local community grows trees from saplings, plants them and manages them on land that is also used by the same farmer to grow crops, it is the community, rather than the farmer, who receives the

15 Under a jurisdictional approach, carbon rights may belong solely to the jurisdiction. However, "nested" approaches may result in more complicated rights arrangements, as discussed below, and in Section 2.4.

16 "REDD" stands for Reducing Emissions from Deforestation and forest Degradation; the "+" signifies the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.

carbon rights for the NCS activity. (Note that such a community might have a claim to actual carbon credits, or instead have legal rights to share in benefits received by the carbon's other "owners".

- *Carbon rights belong to the jurisdiction in which emissions reductions occur.* For example, national laws (or other provisions) may determine that the jurisdiction has the right to distribute and/or sell carbon credits, regardless of who carries out the NCS activities. The jurisdiction may work to negotiate a benefit-sharing arrangement with landowners and implementing communities.

The considerations of scale and carbon rights thus results in three main models of credit generation (as illustrated in Figure 2.1 below):

- Project-scale credit generation where carbon rights are recognized as belonging to landowners (Section 2.1.1);
- Project-scale credit generation where carbon rights are recognized as belonging to those who undertake the NCS activity (planting trees, protecting the forest, managing wetlands) (Section 2.1.2);
- Jurisdictional scale credit generation where carbon rights are recognized as belonging to the jurisdiction (or where arrangements are made to cede carbon rights to the jurisdiction); this occurs typically with the anticipation that the jurisdiction will share some of the value from selling any associated credits with residents, communities or businesses within the jurisdiction (Section 2.1.3 and 2.1.4).

Each of these models is a broad generalization – but together they provide a useful framework for understanding the diversity of potential crediting approaches. For each model, we discuss below what might lead stakeholders to participate in NCS crediting under this framework, and what concerns or barriers might make them reluctant to do so. We note that this discussion is somewhat simplistic, as in practice more nuanced, layered, or intermediate arrangements exist; new arrangements will also continue to emerge as the NCS crediting landscape matures and evolves. But these simple models provide an initial introductory framework for considering the potential for different incentives and concerns among actors working to develop the supply of NCS credits, and the benefits of pursuing one approach over another.

BOX 2.1

PROJECT AND JURISDICTIONAL SCALE CREDITING IN PRACTICE

Climate Impact Partners, a private-sector project developer, has helped to develop more than 30 NCS projects. In one project in East Africa, it has organized small groups to plant trees on smallholder farmers' land. The trees are expected to reduce soil erosion, improve soil quality and produce fruits and nuts for additional income. The farmers plant the trees and then use tree monitoring technology to assess the health of the trees. Climate Impact Partners, as the project developer, has coordinated this activity, facilitated the training of the farmers and is responsible for the credit generation process.

While there are fewer examples of fully implemented jurisdiction-based crediting programs receiving credits, some insights are available from programs such as the Zambezia Integrated Landscapes Management Program (ZILMP) in Mozambique. In 2021, Mozambique became the first country to receive payments from the Forest Carbon Partnership Facility (FCPF), a fund set up by the World Bank, for activities that reduce emissions from deforestation and forest degradation. The Zambezia Province faces deforestation mainly due to agricultural expansion driven by a rapidly growing population. Through the program, which covers nine of Mozambique's sixteen provinces, the jurisdiction has implemented interventions to limit deforestation, such as adoption of sustainable agriculture practices, and land restoration. The FCPF program continues to develop and integrate lessons learned from initiatives like the ZILMP.

Sources: (Climate Impact Partners, 2023; World Bank, 2021a, 2023a)

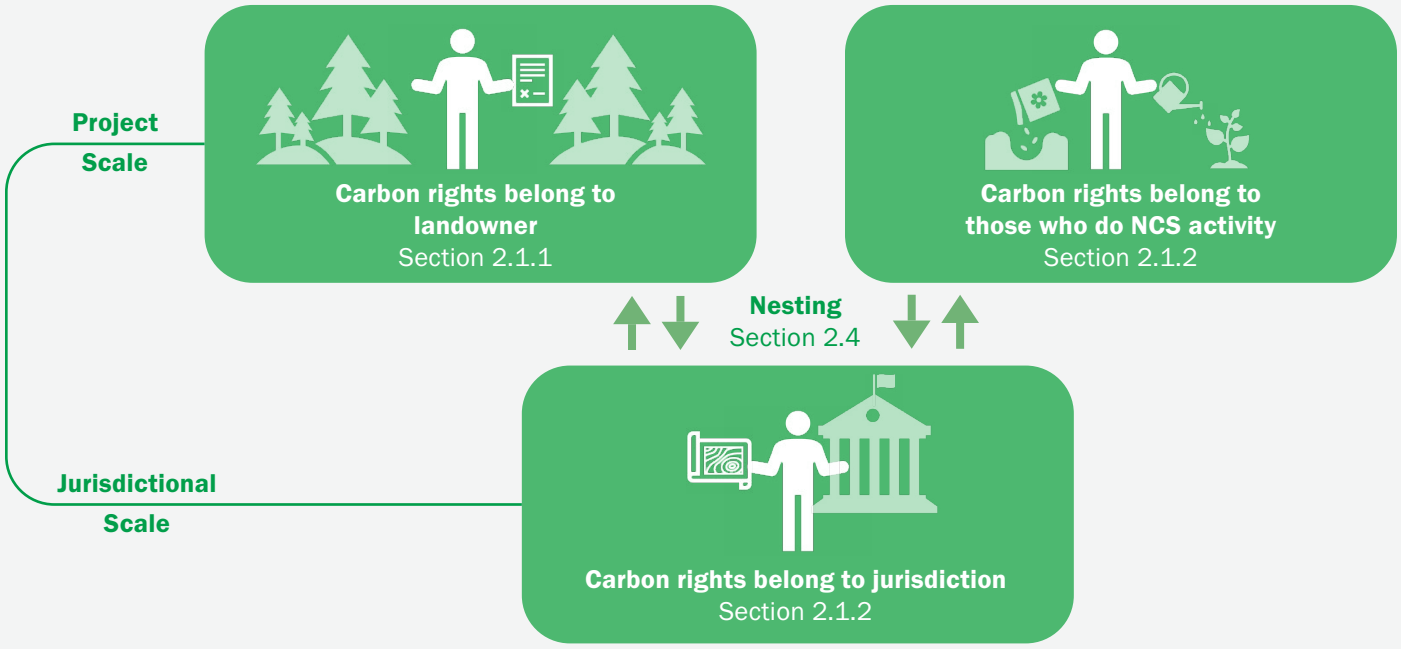


FIGURE 2.1

Three models of carbon credit generation

2.1.1 Project-scale crediting with carbon rights belonging to landowners

In this model, landowners with formally recognized land tenure rights can engage in credit-generating activities on their land[17]. These actors may be, for example, project developers who acquire rights to own or use an area of land, with the explicit intention of undertaking NCS activities such as improved forest management. As another example, they might be existing farmers with secure land tenure who may either choose to undertake the NCS activity to generate credits directly (such as planting cover crops themselves), or to enter into a commercial relationship with a project developer to undertake the NCS activity (for example, with a commercial contract determining the arrangements for benefitting from the credits generated.)

Because NCS crediting is intended to catalyze NCS activity that would not have happened without the additional incentive from credit returns, the primary incentive for these NCS activities will typically be direct financial returns from participating in a crediting program. Landowners will participate only if the expected revenues generated from the sale of credits, in addition to any financial or other benefits associated with the NCS activity (for example, from improved climate resilience), exceed the costs of the activity (whether direct financial costs, or costs in time, perceived risk or foregone economic opportunities.) Sometimes this financial assessment may be explicit; for example, a project developer may decide whether to acquire land for the purposes of developing NCS activities and sell the credits simply by comparing potential returns from this course of action with other investment opportunities. In other cases, this type of financial motivation may also be supplemented by a broader desire to contribute to climate change mitigation, or to realize some of the other local environmental, cultural, or socio-economic benefits that NCS activities can bring.

In turn, landowners may have concerns about the uncertainty of financial benefits from participating in crediting. They may worry that the revenues from credit generation, as well as the other purported benefits of NCS activities, will not be as high in practice as expected when they decided to pursue them. For example, a tree farmer may place a conservation easement on land that was previously harvested for timber; if future prices for NCS credits do not meet the landowner's expectations at the time of the investment, the

17 While this subsection focuses on a paradigm of individual or corporate landowners with rights to own and use land, there are examples of legally recognized community-based land rights to which the discussion in this subsection can also apply. For example, Nepal decentralized forest management to "community forest user groups" several decades ago. These user groups have a formal government-approved charter defining acceptable forest uses and rights of access for community members, plus restrictions on types and intensities of forest uses. These groups could be candidates for participation in REDD+ initiatives (Colfer Pierce J et al., 2012).

landowner could experience large financial losses compared to continuing her or his historic harvest practices. This concern will be particularly acute if the financial viability of the NCS project is critically dependent on a certain level of revenues from the sale of carbon credit credits — for example, if the activity requires the landowner to make costly upfront investments in equipment or training, possibly requiring external upfront finance — and if the commitment to the activity is not reversible for either contractual or physical reasons. The example of the decline in Clean Development Mechanism (CDM) credit prices after 2012 provides an important historical illustration of how upfront financial expectations may not be met[18]. In general, the greater the uncertainty about future NCS credit prices, the less willing landowners may be to make NCS investments.

A related concern is the possibility that the climate benefits associated with the supplier's NCS activities and investments could be subsequently reversed. (For example, an unexpected wildfire might lead to a reduction in the number of credits that can be sold by a particular farmer.) As discussed in subsequent sections, one of the most common responses to this risk is to require suppliers to generate a reserve of extra credits to preemptively mitigate the emissions accounting impact of a potential reversal. However, the requirements of mechanisms meant to mitigate this type of concern (as discussed further in Section 2.3.6) may discourage some landowners from attempting to generate credits or to continue after such a reversal.

Landowners may also harbor concerns that committing to changes in their land use practices may result in a loss of long-term control over how they manage their land. Undertaking NCS activities likely means changes in long-established land management practices. As an example, a farmer in a tropical region may shift their cultivation practices from slash-and-burn rotations to a new method of no-burn sustainable agroforestry. Landowners may feel that adopting an untried production mode is risky. Some landowners also may understandably have a strong cultural or social attachment to their tried-and-true historic management practices, even if there is a high probability that the new NCS activity (such as the agroforestry system, in this example) could be more financially attractive in the long term. Training for communities and rural families in skills such as negotiation, and a broader availability of standardized text designed to protect the interests of sellers for key aspects of credit contracts, could help them advocate for more equitable agreements when it comes to their future rights to use, and benefit from, their land.

2.1.2 Project-scale crediting with carbon rights belonging to those who undertake the NCS activity

A second project-based model involves individuals or communities undertaking NCS activities and securing the rights to the carbon credits from projects, even if they do not have individual or collective legal land tenure. In many parts of the world where NCS opportunities are prevalent, legal title to land is not fully defined or secured. In many places, Indigenous or other traditional cultural groups are the custodians of an area of land by custom, but there may be no formal legal mechanisms to recognize that customary tenure; such groups may even be legally excluded from areas of their customary tenure for historical reasons. Historically, lack of clarity over land tenure or land use rights has been seen as a barrier to credit generation (Jindal et al., 2008)[19]. However, there are a growing number of examples of Indigenous groups, or other communities or individuals without secure tenure, being empowered to establish carbon rights on the basis of the services or actions they undertake to reduce or prevent emissions. Guatemala's national climate law, for example, states that stakeholders that invest in and carry out carbon market projects have the right to the ERRs generated by those activities. Guatemalan law also provides rights for individuals to have rights of access and management of NCS activities on property owned by another person, if there is a contract between the owners and those carrying out the NCS activities (Kuper, 2014; Streck, 2020a). As another example, the Brazilian state of Acre's Incentive System for Environmental Services (SISA, for the Portuguese acronym) represents what is often described as the first jurisdictional REDD+ program (Duchelle et al., 2014). Under this framework, benefits were allocated to indigenous and other stakeholders on the basis of contributions to emissions-reducing activities (Schwartzman, 2021).

In addition to many of the same incentives and concerns discussed in 2.1.1, untenured community groups seeking credits for carrying out NCS activities may have

18 In this case, a key source of demand for these credits, the European Union Emissions Trading System (EU ETS), changed its rules to only allow credits generated in Least Developed Countries (LDCs) to be eligible for use. Alongside other factors, this led to a fall in credit prices from around €10 per CER to around €0.5 per CER (Kainou, 2022). Most of the credits generated as part of the CDM were not credits NCS activities.

19 An alternative risk is that despite the strong role that indigenous groups play as custodians of the land, project developers or others act as if they have unambiguous land tenure rights, and hence carbon credit rights.

additional incentives to engage in NCS crediting as a pathway to bolster their land rights. Communities may be motivated by the potential to use these revenues to support community development activities, and to develop or maintain a sustainable Indigenous economy that protects cultural heritage. Box 2.2 below describes one example of how revenue from the sale of carbon credits on land owned by Indigenous People has empowered them to buy back formal rights to additional ancestral territory, reclaim important cultural sites and reinstate traditional land management practices. The act of participating in NCS crediting and determining how the revenues are used can also empower local stakeholders — providing an opportunity to build internal and external institutional relationships that can help them advocate for the group's broader legal rights and needs.

BOX 2.2

YUROK USES FUNDS FROM CARBON CREDIT SALES TO PURCHASE ANCESTRAL TERRITORY

The Yurok Tribe in California manages three forest carbon projects on forested land the tribe purchased from a timber company. They sell compliance-grade carbon credits under California's cap-and-trade program. As part of the Yurok's efforts to secure sustainable tribal economic ventures and advance nation-building, carbon credit revenues have been invested, along with complementary revenue sources, in: forestry practices, the reacquisition of ancestral lands, the procurement of the largest known private Yurok basket collection, economic development ventures, finance direct services, technology development and investment in Yurok Natural Resources Management and Finance portfolio. This is in addition to diversifying their investment portfolio into a wide range of other revenue generating opportunities. This incentive is complemented by a number of co-benefits – for example, forest protection allows Tribal Nations to continue to promote Indigenous-based sustainable management, supporting regenerative economies with these forests for provisioning of services, and to maintain the cultural and ceremonial lifeways connections between the Yurok and their Ancestral lands and resources.

Sources: ("Climate Action Reserve," 2023; Kormann, 2018; United Nations Development Programme (UNDP), 2021); personal communications with Yurok tribal representatives by the authors, 2023)

Another potential concern (for all communities engaging in NCS crediting, with and without secure land tenure) is that NCS crediting may conflict with existing social norms and traditional ways of relating to and managing the land. In a forest context, for example, communities may be concerned that the focus on carbon sequestration in NCS crediting comes at the expense of multiple other uses and values that forests provide to a local community.[20] This concern is often referred to as carbon commodification. Changes in land use norms and restrictions may not only damage social cohesion, but also undermine traditional land management and social practices that support forest conservation.

2.1.3 Jurisdictional-scale actors

Jurisdictions may pursue NCS crediting as a joint opportunity to receive finance to reduce GHG emissions, secure the direct benefits of NCS activities at the landscape scale and receive funds that can also be reinvested to meet other economic or social needs. Given the growing evidence and recognition of the importance of scale for high-quality NCS crediting (Schwartzman et al., 2021), and emerging mechanisms to finance and support such efforts, various stakeholders are looking towards jurisdictional scale crediting as a promising path forward for NCS crediting.[21] Many NCS activities also have the potential to deliver a wide range of socio-economic benefits including expanded employment (for example, through landscape restoration tasks), biodiversity protection, preserving cultural heritage and enhanced climate resilience and adaptation.

National and subnational governments typically initiate and coordinate a jurisdictional crediting effort. Governments can use their administrative infrastructure and legal powers to construct and enforce policy tools, supporting or requiring that citizens and stakeholders in their jurisdictions undertake the NCS activities

20 For example, academic analysis has documented how a REDD+ scheme in Zanzibar may have prevented local communities from engaging in traditional social practices such as making charcoal before weddings or religious holidays (Benjaminsen and Kaarhus, 2018).
21 E.g., see recommendations of Coordinator of the Indigenous Organizations of the Amazon Basin (COICA) et al., 2023.

needed to secure benefits. These actions may include, for example, implementing and enforcing regulations to require the conservation of special ecosystems, or creating new economic incentives that make land restoration activities more attractive.

In addition to some of the same concerns project-scale credit providers may have, jurisdictions undertaking NCS crediting must manage the political and fiscal complexities of implementing and financing credit generation at a much larger scale. At a jurisdictional level, the potential number of credits that may be generated implies that credit revenues may be very large. But this larger scale also means that concerns about whether there will be long-term, stable demand for these credits, at a sufficiently high price to ensure a return on the jurisdiction's investment, may have concomitantly higher stakes than for projects of relatively smaller financial value. And while some promising mechanisms are under development to support upfront financing for jurisdictional-scale implementation (and avoid the risk of very low prices), politicians may be reluctant to commit public funds (which may in turn require increased borrowing) if they perceive that successful credit generation will generate only modest revenues compared to their initial outlay. [22]

Policymakers may also face significant political risks in implementing the rules, policies and transactions underpinning effective jurisdiction-wide NCS action and crediting. Jurisdictional actors such as a forest management ministry may have to compete with other priorities for spending and administration within the broader government; the uncertainty associated with future carbon credit prices may also expose the agencies negotiating credit prices to further political (or even legal) risk. And some aspects of policy implementation may also be unpopular with certain constituencies. For example, it may be difficult to set and enforce rules designed to prevent landowners from converting forest lands to agriculture – both depending on the state of monitoring and law enforcement and on the political power of major agricultural constituencies (e.g., Milmanda & Belen, 2019).

Jurisdictional crediting approaches are relatively new, and the space is rapidly evolving. A growing number of actors have developed jurisdictional scale standards and methodologies (e.g., the World Bank's Forest Carbon Partnership Facility (FCPF), Verra and ART); efforts to provide finance and technical support to help jurisdictions navigate the requirements of these approaches are also under active development. As jurisdictional carbon crediting approaches are only beginning to come online, there are limited examples to date of jurisdictions successfully navigating these new program frameworks. However, this lack of examples is best understood as an indicator of the newness of these ambitious endeavors, and not as an indicator of their inherent potential for future success and viability.

2.1.4 Summary of supply-side actors

NCS crediting aims to enable and incentivize those responsible for stewarding or managing landscapes to protect, restore, or otherwise enhance forests and other ecosystems. Under project-based crediting, carbon rights may be owned either by those who own the land or those who carry out the NCS activities. In either case, the people making the decisions regarding NCS crediting have close relationships with these people managing the land. Under jurisdictional crediting, the jurisdictional entity benefits from the carbon rights, determines how those benefits are distributed within the jurisdiction, and can shape the rules and incentives for those who make land management decisions. Structurally, jurisdictional agents making decisions regarding NCS crediting may be more removed from the individuals managing the land, although social safeguard requirements (as discussed in Section 2.3) can provide an opportunity for meaningful engagement and collaborative decision making among these stakeholder groups.

National and international regulators of emission crediting standards and NCS credit transaction venues, as well as those with an interest in the governance or oversight of NCS crediting, should look for opportunities to make NCS crediting attractive and accessible to the people and organizations involved in these different models. While financial and other returns provide incentives to supply credits, other incentives and transaction costs borne by these actors must also be considered. Finding ways to give people confidence that engaging in NCS activities and receiving revenues from NCS crediting is the right decision for them is important for unlocking the volume of NCS activities needed to fulfill the global potential of this approach. Some landowners or community groups may make NCS-related financial decisions based on expected returns from competing investment opportunities, meaning that those building NCS crediting frameworks

22 Innovative approaches for addressing the challenge of financing up-front costs associated with large-scale programs are developing at the time of writing and may evolve rapidly over 2023 and 2024, including the potential for significant developments during the period between the editing and final publication of this text. For example, efforts are underway to develop sustainable up-front financing pathways for jurisdictions seeking to engage with the LEAF coalition.

must take these competing opportunities into account to design sufficient incentives. And in other cases, where NCS crediting has no attractive competing investment opportunities for land stewards, crediting proponents still need to ensure that revenues and benefits, which may include broader outcomes such as developing and maintaining a sustainable indigenous economy and protecting cultural heritage, are greater than the true costs of implementing NCS activities.

Supply-side actors each have unique priorities that will align differently with the requirements put in place by carbon market programs or evolving carbon market standards. Concerns may include conflicts between balancing traditional cultural practices and land management with meeting the requirements of crediting standards. Table 2.1 summarizes these drivers and concerns across the different models discussed here for organizing supply.

TABLE 2.1

Summary of key potential motivations and reservations of credit suppliers

Credit supplier	Potential motivations	Potential hurdles
Proponents* of project-based NCS activities with secure land title	• Expected profits from credit sale. • Cultural and socio-economic benefits from NCS activities.	• Concern that revenues from credit sales and other purported financial benefits from NCS activities may not meet investment (and external finance) needs. • Concerns regarding restrictions of rights to pursue other land-use opportunities.
Proponents* of project-based NCS activities without secure land title	• Ability to use revenues from credit sales to support community development activities, develop/ maintain a sustainable indigenous economy and protect cultural heritage. • Cultural and socio-economic benefits from NCS activities.	• Risks of 'carbon commodification' or over-prioritization of the carbon benefit of ecosystems, overlooking provisioning or cultural benefits, as well as the risk of undermining social norms. • Concerns that revenues will be insufficient to sustain the intended activities. • Concerns regarding restrictions on future options for use of land.
Jurisdictional actors (national or sub-national government entity with administrative authority)	• Opportunity to secure investment in NCS activities that make it easier to achieve current and future NDCs (if no 'corresponding adjustments' are made). • Prospect of funds that can support other development goals. • Cultural and socio-economic benefits from NCS activities.	• Concerns that revenues will not justify upfront investments needed (financial and political) to generate credits. • Technical capacity to comply with evolving credit standards • Potential political and financial risks and challenges of needed upfront investment

*As discussed in Sections 2.1.1 and 2.1.2, project proponents with land tenure are frequently, though not exclusively, individuals and are discussed here as if they are individuals; similarly, projects without land tenure are often, but not exclusively, communities or Indigenous tribes, and are discussed here as such. The discussion in these sections and in this summary table is inherently simplified, but we hope still provides a useful framework for those new to the topic.

2.2 What does a high-quality supply of NCS credits look like, and why is it important?

Regardless of who supplies credits, achieving the potential GHG mitigation benefits of NCS crediting requires that the credits be of high integrity. Currently, diverse systems and rules exist for generating credits for sale within compliance or voluntary markets; these rules (including codified crediting standards, discussed further in Section 2.3) largely determine the extent to which any particular credit can be relied upon to correspond to its expected emissions reduction or removal impact, as well as the degree to which each credit was generated in line with other types of environmental and social impacts or safeguard efforts. As global efforts evolve to ensure that carbon markets meaningfully bolster the world's climate mitigation response, requirements for adherence to high-integrity principles are likely to continue to increase, as much across NCS crediting as across any other mitigation crediting efforts. Potential suppliers should therefore understand the characteristics of high-integrity credits and the types of mechanisms and activities necessary to achieve these qualities. Building on the work of many other initiatives, for the purposes of this Handbook, we define high-integrity credits as those that meet the following six criteria[23] , with nuance where appropriate:

Real: Credits issued and sold represent unique units of actual emissions reductions or removals (ERRs), with no double counting and with measures in place to mitigate the risk of leakage.

Quantifiable: Credited activities can be accurately linked to measurable ERRs, based on robust methodologies and monitoring approaches.

Additional: Credited activities and/or greenhouse gas emission reductions or removals exceed those otherwise required by law, regulation or legally binding mandate, such that more reductions or removals occur as a result of crediting thanwould be the case in a conservative business-as-usual scenario.[24]

Verifiable: Crediting activities, outcomes, rules and processes are transparent and, where appropriate, are validated and verified by an independent third party, in order to ensure compliance with other high-integrity criteria.

Permanent: Mechanisms are in place to ensure that carbon associated with credited ERRs is not released into the atmosphere over the agreed-upon timeframe of the credit.

Equitable: The crediting program incorporates effective and ethical environmental and social safeguards, including meaningful partnership and engagement with IP and LC stakeholders and fair benefit sharing mechanisms.

Ensuring that credits are of high integrity can help reduce some of the financial and reputational risk that credit suppliers may otherwise face. Ensuring that credits are of high quality may increase the prices and the revenues received by generators and investors. For example, one study found that in the voluntary market, credits from both forestry and non-forestry projects perceived to be high-quality, because they were certified by particular standards (see Section 2.3.1 below), have historically traded at a premium of 30-65% higher than those that have not received such certification (Conte and Kotchen, 2012).

Various groups and initiatives have worked to define carbon credit integrity, some with a specific focus on NCS. Many of these initiatives build on and complement each other to address a range of issues that are relevant in both the compliance and voluntary markets. This guidance covers which elements of integrity are important as well as recommendations on mechanisms to achieve particular aspects of credit integrity. Examples of this guidance include the work of the Integrity Council for the Voluntary Carbon Market (The Integrity Council for the Voluntary Carbon Market, 2023) (see also Section 3.4) and the Tropical Forest Integrity Guide, produced by a group of 8 NGOs and IP organizations (Coordinator of Indigenous Organizations of the Amazon Basin et al., 2023). A compilation of such resources is included among the curated references listed at the end of Section 2.

The tools used to achieve these high-integrity criteria can also support the overall success of NCS activities in the longer term. For example, processes to ensure meaningful partnership and engagement with IPs and LCs can help to reduce the risks of carbon commodification, help align with their priorities, and improve environmental and social outcomes for these communities. Failure to do so can have the opposite

23 The NCS Handbook reflects elements of quality identified across a variety of sources. Other commonly referenced categorizations of these criteria have been developed, such as those used by the Carbon Offset Guide (Broekhoff et al., 2019). Although there may be subtle differences, these classifications have a high degree of overlap.

24 In this section, we focus on additionality within the geographic context in which the NCS activities and associated emission reductions or removals take place. The issue of whether the use of the credits generated lead to additional emission reductions or removals at a global level depends on how the use of credits interacts with the activities of the buyer. This is covered elsewhere in the Handbook, especially Section 4.5.

effect (McGregor et al., 2014; Wallbott and Florian-Rivero, 2018). A transparent and fair process for ensuring full and effective consultation – such as efforts to obtain free, prior and informed stakeholder consent and participation, and similarly transparent negotiation of benefit sharing – can also help to secure the stakeholder commitments needed to manage ecosystems in a way that ensures crediting goals are honored throughout any agreed timeframes. (Safeguards are further discussed in Section 2.3.7.)

2.3 What tools can drive supply-side credit integrity?

2.3.1 Governing credit generation and integrity: standards and beyond

Crediting standards – and associated accounting, monitoring and governance frameworks – play a central role in ensuring the environmental and social integrity of credits. Standards lay out the technical parameters of how NCS activities are translated into a defined number of credits, and other related requirements with which credit generators must comply. The standard used by a seller can impact both the quality of generated credits, and the real and perceived value of these credits to potential buyers, whether in voluntary or compliance market settings (see Box 2.3).

Efforts by credit suppliers to deliver emissions reductions and removals for crediting need to be transparently validated, registered and monitored through processes established by a credit-issuing body. Auditing the design of NCS activities, along with ongoing monitoring, help to ensure that the activities (and their associated emission reductions or removals) are carried out in compliance with all of the rules of the underlying methodologies and standards. The use of **third parties** to perform these functions facilitates a degree of standardization across credit generators and allows for a degree of separation between those responsible for enforcing the protocols (e.g., the standards) and those seeking to generate credits.

However, some essential aspects of ensuring credit integrity may not be directly addressed in standards. For example, critical elements of equitable and effective stakeholder engagement may not be explicitly included in the rules required to generate carbon credits, or may be required only in non-specific terms. But if credit suppliers fail to meaningfully incorporate these elements in the credit generation process, they are more likely to experience failures or reversals – and may also harm communities that rely on the landscapes in which the credits are based. Meeting these important criteria may require thoughtful, intentional efforts on the part of credit generators and other supply-side actors, especially in the absence of binding rules or requirements that define success. In the absence of binding criteria, this Handbook highlights widely agreed upon elements of quality, and emphasizes the need for equitable and effective stakeholder engagement.

BOX 2.3

CARBON MARKET STANDARDS FOR NCS CREDITING

The major internationally recognized carbon crediting standards have methodologies for crediting different NCS at both the project and/or jurisdictional scales. The voluntary carbon market includes many organizations that manage standards and associated methodologies, protocols and registries. Some key examples include:

- American Carbon Registry
- Architecture for REDD+ Transactions (ART), which oversees The REDD+ Environmental Excellence Standard (TREES)
- Clean Development Mechanism
- Climate Action Reserve
- Forest Carbon Partnership Facility Carbon Fund
- Gold Standard
- Plan Vivo
- VERRA's Verified Carbon Standard and Jurisdictional & Nested REDD+ Framework

Examples of organizations and programs setting standards for compliance markets include:

- California Air Resources Board Cap-and-trade system
- New Zealand Emissions Trading System (ETS)
- Tokyo Cap-and-Trade Program
- International Civil Aviation Organization's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA).

Credit suppliers and purchasers should be aware that there are also some non-standard-based crediting efforts, seeking to promote carbon units that do not include the elements recognized as essential to high-integrity standards (such as independent third-party verification and validation). Many environmental organizations agree that these types of crediting systems should not be relied upon to supply high-quality credits, particularly if intended for meeting emission reduction targets (see Section 3.1). See the Tropical Forest Credit Integrity Guide (COICA, 2023) for more detail on this matter.

In the rest of Section 2.3, we discuss in more detail how standards, complemented by other mechanisms and actions of credit suppliers and intermediaries, can help to promote high-integrity credits. We organize the remaining sub-sections around each of the six features of high-integrity credits listed in Section 2.2. These criteria are closely related, and many of the mechanisms and practices described in each sub-section relate to other criteria as well. While not featured in a standalone section, it should be noted that these elements of integrity rely on a foundation of **ecological integrity** — that is, encouraging elements such as use of native species and ensuring no-harm principles for biodiversity. Table 2.2 maps out each integrity element, some of the key tools and mechanisms that can be used to deliver this element and the associated sub-section in which these are discussed in more detail.

TABLE 2.2

Elements defining high-integrity NCS credits with example mechanisms

Integrity element	Tools and mechanisms	Section
Real	• Safeguards against double-counting • Safeguards against leakage, including jurisdictional scale	Section 2.3.2
Quantifiable	• NCS pathway selection • Effective monitoring, reporting and verification (MRV) protocols	Section 2.3.3
Additional	• Appropriately conservative baseline setting • Addresses adverse selection	Section 2.3.4
Verifiable	• Effective and consistent measurement methods/tools/frequency • Transparent reporting of all stages of process	Section 2.3.5
Permanent	• Buffer pools • Replacement requirements • Safeguards and local consultation to ensure buy-in, lowering risk of future reversal	Section 2.3.6
Equitable	• Free prior informed consent practices, meaningful inclusion of IPs and LCs in planning and implementation • Social and environmental impact monitoring • Benefit sharing arrangements • Support for adaptation and resilience	Section 2.3.7

While standards attempt to achieve high credit quality, some people question whether the complexity of rules and burdensome administrative elements of credit generation may discourage credit suppliers from seeking to participate. Box 2.4 below describes some of these tradeoffs in more detail.

BOX 2.4

OPPORTUNITIES AND RISKS OF SIMPLIFYING CREDITING RULES AND PROCEDURES

Given the necessary timeframe for achieving tangible progress toward global climate mitigation, many stakeholders see a tension between credit quality requirements and the large volumes of credit generation urgently needed. This tension lies between the need for any individual credit to precisely represent a known emissions equivalency with reasonable certainty (so that credits in general warrant trust among buyers and global accounting frameworks), and the need to ensure that credit generation is still easy enough for significant numbers of credits to be generated (and thereby provide the large scale of climate mitigation needed to meet ambitious targets.) Effective markets must therefore maintain a high level of quality to function but must also do this without majorly disincentivizing sufficient levels of credit generation overall.

Simplifying crediting rules is one approach to addressing these tensions. Such simplification efforts potentially come with both benefits and risks; these risks vary depending on whether they arise from efforts to simplify the actual criteria by which high-quality credits are judged and defined, or efforts to instead streamline the administrative or transaction cost burdens on suppliers attempting to produce high-quality credits.

Depending on the specifics of changes made or proposed to standards and crediting processes, streamlining credit rules could make credits less costly and more feasible to produce at larger volumes. Such streamlining might also in practice ensure more equitable access to credit markets, by removing inequitable barriers to market participation. In turn, the combination of these first two factors could more quickly drive financing to places that most need it to conserve critical ecosystems.

Undue simplification of crediting standards, however, creates a risk of reducing the integrity of any particular credit generated and sold under that standard. The simplification of criteria by which integrity is judged could weaken checks and safeguards around underlying equity and benefit sharing concerns, and drive overestimates of the volume of ERRs represented by these credits in global accounting. This type of streamlining might therefore lead to less uniformity and credibility across crediting systems than is needed to support an effective market, confusing buyers and ultimately resulting in unfairly lower prices for some (or all) NCS credit types.

Optimizing crediting precision against sufficiency of crediting accuracy and incentives

There may exist a necessary balance point between these two opposing targets: the need for credits to represent an exact quantity of ERRs with high precision, and the value of allowing quantification of credits to be only *accurate enough on average* as needed to support mitigation efforts at large scale. This alternative perspective considers not only the implications of accidental over-crediting, but also the implications of under-crediting. For example, imagine two crediting standards:

- Standard A, which conservatively ensures every credit generated represents at least 1 ton of ERRs if not more, and systematically errs on the side of issuing too few credits as a result; and
- Standard B, only stringent enough to ensure that its credits represent around 1 ton of ERRs on average.

In this imaginary example, the use of less-precise Standard B could conceivably lead to better global outcomes than the more rigorous and precise Standard A, depending on other factors. For example, Standard B might be simple enough to engage with that it drives the generation and purchase of hundreds of millions of (reasonably accurate) credits annually; while Standard A systematically undercompensates generators for the effort needed to produce each ERR unit, possibly leading to low uptake of the standard. 90% of hundreds of millions is still hundreds of millions; 100% of zero is zero.

Most "conservative" crediting standards tend to lean toward underestimating the ERRs represented by a single credit, erring on the side of under-crediting. However, it is worth noting that there are also existing special crediting circumstances in which over-crediting is understood to potentially occur without creating negative environmental impacts. For example, when credits are issued by a jurisdiction that also has an enforced limit on effectively monitored net emissions, this enforced limit means that the government will already be required to make up the difference in ERRs for any aggregate over-crediting, meaning that

over-crediting should not ultimately result in unaccounted-for emissions within the scope of the jurisdiction. New Zealand's emissions trading system (ETS) is an example of this situation; under this framework, each forest-based credit is not necessarily additional, but the National Inventory determines the country's environmental integrity accounting success, not the ETS cap. This enables use of a much simpler approach to crediting (though over-crediting as a result may still have distributional implications.)

As discussed throughout Section 2.3 of this handbook, and as illustrated by the simplistic thought experiment above, achievable scale matters enormously to discussions of necessary levels of both accuracy and precision in setting high-integrity standards. Those advocating for significantly streamlining and simplifying crediting rules in pursuit of increasing volumes of credits generated globally would also do well to explore the potential of effectively-implemented jurisdictional crediting frameworks, whose strengths derive from their large-scale nature. Supporting the effective design and development of high-integrity jurisdiction-scale crediting efforts is another potentially pivotal path toward transforming the availability of high-quality NCS credits globally, while boosting credit integrity across NCS markets.

As noted above, jurisdictional and project-scale approaches necessarily require significantly different methodological and governance criteria. Jurisdictional systems may rely on fundamentally different technical approaches to translating NCS activities into saleable credits, as well as different processes for effectively monitoring progress and sharing potential benefits. The different approaches taken by standards to supporting each quality criteria in project versus jurisdictional crediting is identified in each subsection, as appropriate, with further insight provided in Table 2.4 at the end of Section 2.3.

2.3.2 Ensuring credits represent real, distinct emissions reductions and removals

In the context of this Handbook, a credit is "real" if there is a clear and credible correspondence between the number of credits issued and the volume of actual ERRs resulting from the credited activities. This includes consideration of the risks of double counting and of leakage.

Double counting

Double counting refers to the many ways in which the same unit of ERR can be included more than once in global mitigation accounting systems, resulting in an over-estimation of the ERRs achieved through crediting.[25] Some potential means of double counting include:

1. **Double issuance:** the generation of multiple credits based on the same unit of ERRs; for example, multiple programs issuing a credit for the same deforestation reduction activity, due to overlaps in registered project areas or multiple registration efforts.

2. **Double use:** the use of the same credit more than once within mitigation accounting; for example, two separate companies attempting to retire the same registered credit in a registry to meet an annual GHG mitigation target.

3. **Double claiming:** The potential for overlap of certain types of credited claims with other required emissions reduction accounting; for example, carbon credits for sale on the carbon market are claimed by a company required to meet a national compliance obligation, while at the same time, the same ERRs are counted within a different national GHG reduction framework where the ERR was generated.[26]

While avoiding double counting partly relies on behavior on the demand side of the market, the design and maintenance of a credit registry on the supply side of the market is central to avoiding double counting. Registries track the generation and retirement of credits. A program's registry compiles public information on the unique identity (e.g. serial number), ownership, location and retirement status of carbon credits. This information allows a credit to be uniquely identified; transparent public registries also help to facilitate due

25 In general, double use and double counting are ultimately the responsibility of demand-side actors. However, there are nonetheless actions that can be taken as credits are generated to reduce the risk of these arising.

26 There is a vigorous debate regarding the circumstances in which, when credits are traded internationally, some types of double claiming may take place (and when/whether this is problematic). For example, some pathways for allowing "stacking" of multiple payment streams to reward credit generators for the same emissions reduction unit. This practice could provide valuable additional financial incentives to drive larger volumes of ERR activities forward particularly while most payment streams offer low prices – so long as these units are not actually considered more than once in global mitigation accounting. The issue of double claiming is discussed further in Section 4.5 with the topic of corresponding adjustments.

diligence to ensure that credits are not being issued by another crediting organization for the same NCS activities.

Additional procedural requirements can further reduce the risk of double counting. High-integrity programs use third-party validation and verification to ensure that projects are not registered in another crediting framework. Standards should also have clear procedures for situations that require the transfer of credits between programs or standards– that is, a defined process to ensure that any existing credits are canceled before new credits representing the same ERRs are issued under the new framework. Some programs may also require project proponents to legally certify that they are not pursuing credits for the same ERRs under another program. In the event that project boundaries could overlap between programs facilitating crediting of different types of ERRs (e.g., between clean cookstove and REDD+ projects), there is a need for increased coordination to ensure crediting is reconciled and/or that project boundaries are appropriately defined.

The risk of double counting could be reduced through systems for sharing and harmonizing information across registries. Credits are issued by a number of institutions, each with potentially different processes and due diligence standards. Efforts to reduce system-wide risks of double counting rely on transparent and proactive cooperation among these potentially competing entities. In late 2022, the International Emissions Trading Association (IETA), World Bank, and the government of Singapore announced the creation of the Climate Action Data Trust (CAD Trust); this new initiative aims to serve as an open-source system for sharing information across multiple carbon credit platforms (Climate Action Data Trust, 2023). Another proposed solution to facilitate transparent coordination is a global registry, where all legally recognized carbon credits would have to be registered. Current efforts to promote metadata sharing could lay the foundation for future integration between these types of systems (Torras Vives, 2023).

Leakage at project and jurisdictional scales

Whether a credit is "real" should also include consideration of the risk that the emissions-generating activities that appear to be halted by NCS activities may, instead, move to another area outside of the geography of the crediting framework—and not actually cease. The term **leakage** refers to this movement of GHG emitting activities to areas outside the regions receiving credit for their reductions or reversals. For example, an NCS project that involves stopping planned deforestation on land in one location might be undermined if the land-user planning this deforestation simply clears a different plot of land instead. This can happen either through direct relocation of an activity by the primary actors involved, or indirectly through changes triggered by shifts in economic factors such as market prices. Under this framework, emissions are said to potentially "leak" from one area to another.

Leakage is particularly relevant for crediting of those NCS activities that have implications for land uses related to agricultural commodity production. Deforestation or other land-use conversion may be driven by regional or global demand for a good or product. For example, land-use change to allow agricultural expansion is the dominant driver of tropical forest loss in much of the world (Pendrill et al., 2022). In this context, one NCS activity aimed at credit generation might be the prevention of a planned area of forest clearing. But the reduction in expected crop production within the project or program area could lead to an increase in pressure to deforest land elsewhere. If there was an increase in deforestation elsewhere, the benefit of the ERRs from the original avoided deforestation within the crediting area would be undermined. Ultimately, leakage is incentivized if the fundamental needs – such as increased income, local or global food supply, or employment – that drove the emitting activity are not addressed in other ways.

Project-scale interventions can address some direct local causes of leakage. For example, project-scale interventions to stop deforestation might be complemented by activities aimed at providing an alternative source of income for local communities. For example, a community losing its potential income from unsustainable timber harvesting could be assisted to develop a new market for sustainable goods or handicrafts. The intention of these new activities is to facilitate local communities to transition to livelihoods that are less emissions intensive, reducing the likelihood that the community will simply relocate the emitting activities (in this example, the timber harvest) to a location outside the project boundary (VCS, 2018).

However, these localized project approaches may be ineffective in addressing leakage resulting from broader regional drivers, such as prices for agricultural inputs or outputs. For example, if forest land is being cleared for conversion to agriculture to meet growing demand for soy, the decision by some farmers to participate in NCS activities will reduce land available to soy production and reduce soy supply, and thereby increase the price of soy and other crops that compete for the same land. It may also increase the availability of agricultural laborers, while capital machinery for agricultural

production could become cheaper. There is therefore a risk that projects reducing clearing in one location could create a greater incentive to clear land for soy production elsewhere (because of the higher soy price) and that this new soy production may be less costly (as production inputs have become cheaper). If these effects are large, and other transaction costs are low, there may be little impact on the total area of land that is cleared for soy production in the region, despite the implementation of the original conservation projects.

Because of their large-scale approach, jurisdictional-scale NCS crediting programs have a structural advantage in avoiding some leakage. Jurisdictional systems target drivers of emissions at the policy and program level and thus can address more comprehensively the political and economic pressures that drive land-based emitting activities. The farmer who chooses to participate in NCS activities instead of clearing land for soy production is less likely to have her actions cancelled out by clearing elsewhere if the government chooses to implement policies that provide alternative employment activities, increase food production on existing agricultural land or that provide alternative uses for local capital. Additionally, because jurisdictional crediting accounts for ERRs at the scale of the entire territory, emissions-producing activities that move from one part of a jurisdiction to another are still accounted for under the carbon program. This avoids the potential for credits to be issued for ERR activities that are effectively "zeroed out" by new emissions elsewhere within the jurisdictional boundary.

Even with jurisdictional-based crediting, however, there is potential for leakage to occur across jurisdictional boundaries which can be difficult to measure and track (Streck, 2020b). While jurisdictional NCS efforts may be effective at reducing leakage through labor or local capital market channels, they may be less effective at addressing leakage through product prices, especially when prices are set in regional or global markets and scope for intensification of production within the jurisdiction is limited. The pressures for deforestation created by higher prices may be difficult to resist and are hard to account for accurately. They may also arise in locations that have historically not experienced significant deforestation. Some argue that this concern makes incentives to conserve standing forests, especially regions with historically low rates of deforestation, even more critical. Box 2.6 in Section 2.3.4 discusses high-forest, low-deforestation regions (Paltseva et al., 2023) while Section 3.3 considers this issue from the perspective of buyers.

2.3.3 Robust quantification of emissions reductions and removals

Suppliers can help secure high-integrity credits by using crediting methodologies that take conservative and scientifically sound approaches to quantifying ERRs. These methodologies require a solid foundation of scientific evidence, as well as feasible technological solutions, to link the NCS activities to a measurable quantity of reduced or removed GHGs. This section discusses quantification in terms of credible **NCS pathways,** and **effective measurement** of GHG impacts as NCS activities are carried out. (The discussion of comparing these quantified potential and actual impacts to baseline expectations of business-as-usual emissions is an essential component of assuring additionality of crediting. The topic of additionality is explored later in the text in Section 2.3.4.)

Selecting scientifically credible NCS pathways

At the most fundamental level, NCS mitigation depends on the complex chemistry of the natural environment's ability to sequester carbon. Functioning ecosystems consist of rich interactions between and among soil, air, water and life, including a diversity of plants, animals, fungi and microorganisms. Changes to an ecosystem – whether the result of an activity that causes emissions, or the result of an NCS activity that prevents or mitigates emissions – can alter the chemistry and physical properties of any or all of these elements. Suppliers and developers of NCS credits seek to predict the outcomes of these interactions to set emissions baselines, make management decisions, and inform financial decisions based on predicted revenue. Accuracy of these forecasts can affect efficiency of mitigation choices (and potentially equity, if vulnerable groups make undesirable decisions based off low-quality or incorrect information.)

It is not always easy to predict how an action will impact the release or uptake of GHGs within an ecosystem. Certain actions taken in an ecosystem might have a readily calculable effect on the amount of GHGs released by the system. For example, cutting down a large tree and burning it will release a predictable amount of CO2 and other by-products into the air: roughly the amount of CO2 stored in the amount of wood burned. But the effects on other parts of the same ecosystem can be more complex to understand, and even more complex to measure. For example, before they are harvested, trees can contribute to carbon storage in the soil in a variety of ways, including through interactions with soil fungi. In addition, specific local conditions, such as the acidity of the soil around

the tree, or the amount of rainfall over a season, could affect how quickly the buried root system of a felled tree decomposes – and releases more GHGs. Similarly, in forests managed for the production of wood products, the types of wood products and their fate should be considered when calculating the overall carbon balance of the forest system. For example, high-quality timber used for construction or furniture represents a stored carbon pool that can be expected to last decades or longer, whereas paper pulp used for tissue products can be expected to decompose and return its carbon to the atmosphere on a much shorter timescale.

The release or uptake of GHGs in an ecosystem may look different over different time scales and geographies – making these trends a challenge to measure and forecast. Net carbon uptake is influenced by a number of climatic and even short-term meteorological factors. For example, on the shortest timescales, cloud cover limits photosynthesis, temperature affects decomposition rates of soil organic matter, and (in arid ecosystems) rainfall can lead to bursts of both plant growth and organic decomposition. These factors can lead to significant differences in net carbon uptake from day to day. Annual variations in total carbon uptake are also significant yet are particularly difficult to predict. Many physical and ecological factors can affect plant growth rates, plant respiration and decomposition of organic matter in soils and leaf litter, all of which change seasonally. This complexity means that year-to-year variability in carbon storage and loss may be significant. In addition, there can be significant regional differences in carbon release or storage due to characteristics such as forest age or ground water availability. Local disturbances, such as pest outbreaks or fires due to natural disturbances or human intervention, can also contribute to these regional differences. Some of these events are small enough that carbon stocks may recover quickly, but others are intense enough that the carbon stocks of the affected area can take decades or centuries to recover, resulting in regional differences in long-term carbon balance.[27]

Longer-term trends in carbon uptake have tended to be more predictable than short term, but climate change and other environmental stressors are now making these predictions more difficult. Decadal trends in carbon accumulation among similar ecosystems (for example, of similar vegetation type and geography) are generally more predictable than shorter term and/or more geographically specific predictions. For example, increases in tree mass in a regenerating forest can generally be predicted on a decadal scale, using models that predict growth for a given forest type. However, climate change and other associated emerging trends — such as shifting ecosystem ranges and rapid accelerations of disturbances like fires and pests — are making assumptions based on historical trends less reliable in many regions. For example, recent research predicts a long-term decline in carbon storage in ecosystems, such as many forests of western North America, due to climate driven disturbances such as wildfire and stress-driven tree mortality (Anderegg et al., 2022).

These ecosystem carbon dynamics that vary with scale in terms of both time and size have at least four implications for carbon crediting.

- First, averages of carbon trends over multiple years will often provide a more stable and meaningful measure of creditable carbon than any individual annual measurements. Averaging can be a useful way of dealing with both natural changes in carbon and changes caused by management practices such as timber harvest cycles.
- Second, setting aside some expected ERRs (see discussion of buffer pools in Section 2.3.6) can help conservatively account for some disturbance-related carbon losses over different timescale and regions.
- Third, crediting carbon gains or losses over an entire jurisdiction, as opposed to a project-by-project approach to carbon crediting, can help to reduce uncertainty in ecosystem changes by averaging ecosystem carbon stocks over a larger spatial scale.
- Finally, projections of long-term changes in ecosystem carbon dynamics should be considered in planning for and accounting of credit generation. In areas that are expected to see an increased risk of disturbance (such as more frequent fires, due to projected climate change impacts), additional buffer credits may help avoid future accounting challenges. In the most extreme cases, such as regions where there is strong evidence of long-term declines in carbon stocks and a decreasing ability to recover from disturbances, it is possible that certain regions should not be relied upon to continue storing carbon at their current rates.

The scientific understanding of the GHG impacts of certain NCS activities is more firmly established than others. High-integrity NCS credits are based on NCS pathways for which the link between the credited

27 Boreal forests, which are home to carbon-rich peat soils, have historically experienced a healthy fire regime. However, as wildfires are growing in intensity, and catastrophic wildfires are becoming more common, the region's carbon-rich soils are losing their ability to store carbon. One study found that wildfire processes reduced carbon uptake in pristine peatlands by 35% (Wilkinson et al., 2023).

activity and an expected GHG impact is well-understood, at the spatial and temporal scales needed to facilitate meaningful crediting. As scientists continue to study the dynamics of key ecosystems such as wetlands and the oceans, a better understanding of their complexities may make it easier for some pathways that currently do not meet these criteria to be credited with high levels of confidence and integrity. This progress may also depend heavily on the development and cost of new technological means to study and quantify the impacts of these pathways – as discussed in the following subsection.

Availability and feasibility of technologies to quantify climate impacts

Credit suppliers must demonstrate that they are adequately monitoring NCS activities to support credible assessment and verification of NCS claims and their potential GHG impacts. Standards typically establish minimum data collection thresholds and requirements for monitoring NCS activities (see example approaches in Table 2.3); these data (whether direct measurements of carbon or other established proxies) are used in models to assess the validity of ERR claims on which credits are based. Monitoring for NCS crediting may be conducted either directly by the project owner or, for jurisdictional scale credits, by government agencies and local communities. Credit suppliers document monitoring data, usually in a standardized reporting format, and use it to model emissions outcomes, both of which are then verified by an independent third party approved by the applicable standard.

The monitoring techniques and technologies that suppliers can use to quantify and verify projected or claimed GHG impacts vary widely across ecosystems and NCS pathways. Because NCS pathways have diverse impacts on GHGs stored in soil, water and biomass, they require different monitoring approaches. There are two main approaches:

- **Direct monitoring** involves physical visits to NCS activity sites, to record direct measurements and changes in carbon stocks or other proxies. For forestry activities, monitoring to assess above ground carbon changes (e.g., carbon stored in trees) is done by collecting information on tree diameter, height, species and other metrics in sample plots following a process used in most national forest inventory protocols. Below-ground carbon (e.g., carbon stored in soil and organic ground matter) is calculated using equations that provide biomass estimates and is typically not directly measured or sampled which can have large errors of uncertainty (Oldfield et al., 2021).
- **Remote sensing (RS)** uses an array of approaches to gather information about an object (e.g., forest) without making physical contact with it, typically with advanced technological sensors mounted on airborne objects. RS is often able to efficiently collect data over large, inaccessible landscapes. Various sensors and methods currently used can draw on equipment and tools mounted on satellites, aircraft, and unmanned aerial vehicles. For example, NASA's LandSat program provides publicly available data on global land use changes dating back to the 1970s ("NASA," 2023). RS has been used for land cover analysis, land use change detection, carbon stock and carbon stock change detection, and monitoring logging, among other things.[28]

28 RS technology can include optical (which uses visible, near infrared and short-wave infrared sensors to collect data), radar (which uses radio signals to send and receive signals to and from an object) and LiDAR (which uses light rays or lasers to send and receive signals) (Centre for Remote Imaging, Sensing and Processing, CRISP, n.d.). Developments in these technologies are expanding the capabilities of RS and making data more accessible.

Table 2.3 illustrates some of the approaches available for monitoring emission changes within these two categories in different NCS Pathways, and some of the challenges that these can present.

TABLE 2.3

Examples of direct and remote monitoring techniques across select NCS pathways

Pathway	Approach	Example	Typical Challenges
Avoid tropical deforestation	Direct monitoring techniques	Site visits to confirm anti-deforestation measures such as security fencing are in place	Challenging physical conditions; identifying regional experts; security and safety issues; costly
	Remote sensing techniques	Satellite imagery used to observe changes in forest cover over time	Cloud cover in tropical regions can interfere with clear satellite imaging[29]
Temperate forest restoration and management	Direct monitoring techniques	Sample forest plots to estimate carbon stocks across time	Challenging physical conditions; costly
	Remote sensing techniques	Satellite imagery to see increase in forest cover and density over time	Low spatial and temporal resolution to accurately account for seasonality
Agricultural Soil Management	Direct monitoring techniques[30]	Field characterization or laboratory analysis of soil samples	Heterogeneity of soil chemistry across site of interest
	Remote sensing techniques	Spectral imaging to assess chemistry at regional or global scales	

To date, most credits have been generated using direct monitoring due to their higher perceived accuracy; however, this is changing as remote-sensing technologies evolve and provide less costly options.[31] The cost of direct measurements (and associated field visits) may be particularly pronounced in cases where the monitored area is large and/or when a higher frequency of measurement is required. Revenue from the sale of NCS credits sales would have to cover these and other costs for the life of the activity.[32] In contrast, remote sensing can potentially collect data over hundreds or thousands of kilometers in a short period of time, making it cheaper on a per-kilometer basis to monitor at larger scales and more frequently. Remote sensing data can also be made available for external verification and may be far easier to replicate than

29 Advances in remote sensing technology, especially with radar imagery, are reducing the severity of, or even eliminating, this challenge.

30 Research has shown that soil carbon is difficult to measure as soil carbon levels can vary significantly over small distances. Critics of soil carbon protocols note the inaccuracy of current soil carbon models. (Oldfield et al., 2021)

31 Some program standards are looking more into viable options for Digital Monitoring, Reporting and Verification (DMRV). For example, Verra, a carbon standard, and Pachama, a tech company that focuses on remote sensing and satellite imagery, launched a working group in Fall 2022 to explore this more. (Verra, 2022)

32 As noted above, accurate and precise MRV of soil carbon content is still not very cost effective.

field-based measurements, which may be heavily influenced by day-to-day conditions on-site. As explored in Box 2.5, a number of technological advances in remote sensing technologies are emerging that could help provide higher confidence measurements for lower costs per sample than has historically been possible. However, the high up-front costs of equipment for some remote sensing technologies can make these tools a challenge to develop or access. Alternatively, approaches that combine remote sensing and direct monitoring may offer significant potential for use in credit generation, as well as for the development of GHG inventories, other assessment of REDD+ activities and monitoring, reporting and verifying progress against NDCs.[33] Nonetheless, on account of their greater accuracy for small scales, at present, on-the-ground forest surveys (i.e. direct monitoring) are currently the standard for credits issued within most major standards.

BOX 2.5

SHIFTING PARADIGMS FOR REMOTE SENSING TECHNOLOGIES

The widespread adoption of satellite-based remote sensing (RS) techniques has transformed deforestation monitoring, and thereby conservation and other REDD+ activities. For example, the annual area of tropical forest loss in Brazil fell by 84% between 2004 and 2012. While many factors played a role in this, a key element was the development of Brazil's deforestation data network, built on remote sensing.

One area of promising technological development in the forest monitoring space is the development of low-cost, satellite-based active remote sensing options. Most satellite-based imaging is classified as **passive remote sensing** – that is, based on the reception of an existing signal from the environment (such as light or heat). Because these data rely on existing signals, environmental factors such as cloud cover can distort or even fully obscure the data. **Active remote sensing,** on the other hand, involves projecting a signal into the environment, which is then reflected back and measured. LiDAR imaging, for example, involves firing relatively high-energy lasers at the target, then collecting information about the object from the scattering of the reflected laser signal. Active remote sensing tools have typically been more expensive to operate than passive ones such as satellite imaging and require much more energy to operate. As a result, their use has been limited.

However, new advances in satellite-based active RS may open the door to another paradigm shift in forest change monitoring. For example, the Global Ecosystem Dynamics Investigation (GEDI) mission has been providing satellite-based LiDAR measurements of forest canopy and height since its launch in 2018. The advent of satellite-based active sensing could dramatically reduce the effective cost of monitoring for initiatives focusing on ecosystem-level changes at large scales. Such technologies could also lead to the development of more robust accounting systems; for example, widespread LiDAR data from a GEDI-like satellite could allow reference levels and changes in carbon stocks to be calculated as a function of above-ground biomass, rather than relying on average carbon density values and forest areas derived from passive satellite imaging. This could provide a clearer picture of the impacts of NCS activities at a level of detail previously unimaginable – facilitating, for example, easing the quantification and accounting of impacts of forest degradation, as well as improved management.

Jurisdictions can take advantage of economies of scale in quantifying emissions impacts that are less readily available at the project level. In some NCS pathways, smaller projects may face challenges related to the size of the area that needs to be monitored and the cost and availability of monitoring approaches—direct monitoring can be expensive relative to projected credit revenue and remote sensing in certain areas may be limited by data availability or quality at finer scales. However, because of their size, jurisdictions can overcome and even capitalize on these hurdles. When remote sensing is used to monitor emissions changes at this large scale, challenges that might affect small projects, such as pixel size affecting measurement accuracy (that is, how much land is represented in each pixel of a satellite image) or persistent cloud cover in certain areas, can be mitigated by looking at averages across entire jurisdictions. In addition, jurisdictions may have the capacity to develop, operate and maintain their own territory-wide ecosystem monitoring and

33 The Global Forest Observations Initiative (GFOI) provides guidance on how to best estimate emissions and removals for forests using a variety of tools to monitor progress, such as on-the-ground, remote sensing, or both (FAO, n.d.)

carbon accounting systems, such as Brazil's PRODES, allowing them to collect data tailored to their specific monitoring needs, an option that would be cost prohibitive at a small scale (National Institute for Space Research (INPE), n.d.).

2.3.4 Ensuring additionality

A key focus of NCS crediting is to incentivize suppliers to take up activities and policy reforms that generate emissions reductions and removals beyond those that could have been expected otherwise. This 'additionality' of carbon credits – the idea that the credited ERR must exceed ERRs otherwise those otherwise required by law, regulation or legally binding mandate in a conservative business-as-usual scenario – is a central principle of credit quality. **Additionality is a tenet of quality at all scales, but additionality assessments must take different aspects into consideration with project-scale and jurisdictional-scale programs.**

- At a project scale, additionality centers on whether an NCS activity is additional to activities required by law, such that the prospect of revenues from credit sales switches an activity from being financially unattractive to financially attractive (e.g., the chance to sell credits shifts the 'activity' of conserving forest land from being seen as a lost revenue opportunity, compared to logging, to an activity that is financially beneficial). This second component requires an assessment of the costs and revenues, as well as other factors that may influence the viability of the project, to assess if the financial incentive provided by credit-revenues is significant enough to enable new, low-emissions activities that otherwise would not have occurred. In other words, the assessment of additionality focuses first on *whether* the NCS activity is additional; once (if) this is established, there is a logically separate step of *quantifying* the emission reductions or removal associated with the activity assessed to be additional.
- At the jurisdictional scale, assessment of the additionality of individual activities in isolation is not appropriate. A wide range of different activities will be required and these will be undertaken by a wide range of different actors. In many cases, the specific activities that will deliver the emission reductions or removals may not be specifically defined at the point at which an assessment of additionality is required. Moreover, the factors that will affect whether a jurisdiction can be encouraged to support jurisdictional-scale NCS crediting will encompass a wide range of factors, with the financial costs and benefits of these activities being only one consideration. Given these challenges, additionality at the jurisdictional scale is typically assessed directly in terms of the emission reductions or removals achieved compared to historic trends, and whether these are plausibly greater than would have been realized in the absence of the NCS crediting arrangements.

In both cases, estimating the volume of emissions a supplier's project or program area likely would have generated in the absence of creditable project-scale or jurisdictional NCS activities is central to determining how many credits to assign, if any. Under project-based crediting, this estimate of emissions without intervention helps determine the size of the financial incentive that NCS crediting provides, thus informing whether the proposed NCS activity is additional. Typically, a forecast of project or jurisdictional emissions or removals without the NCS activity are assessed as a **baseline** emissions trend, which is intended to represent the emissions scenario of the same geographic area in the absence of the credit revenue or program interventions. The implication is that the calculated ERRs in excess of this baseline are considered as **additional** to those that would have occurred in the absence of the incentive of the project or program. (This baseline scenario is sometimes referred to as a business-as-usual or reference scenario.) Figure 2.2 illustrates the concept of crediting in comparison to a baseline in a simplified way, for emissions reductions and removals.

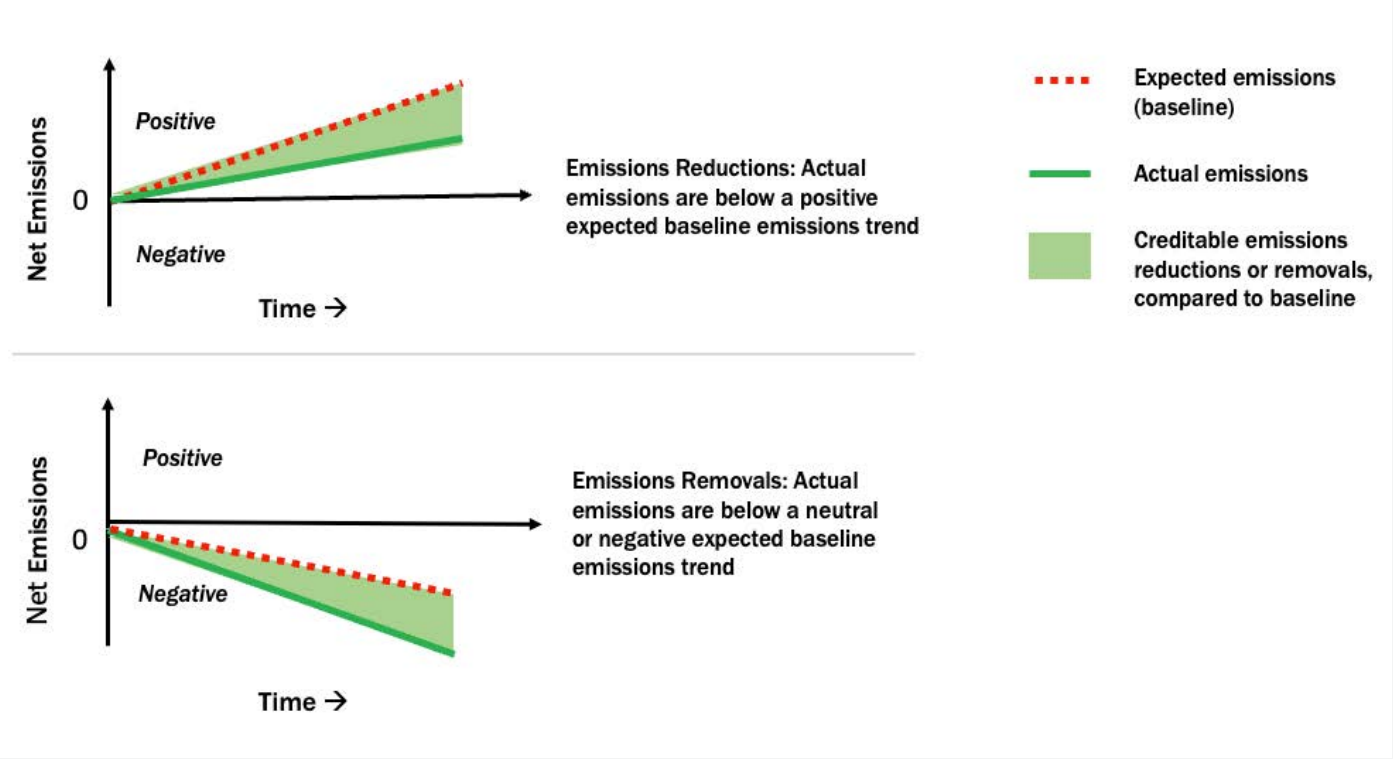


FIGURE 2.2

Simple conceptual illustration of additional credit generation (green shading and trend line) in comparison to a baseline (dotted red trend line), considering only the scope of the ecosystem(s) covered by the project or jurisdictional crediting effort. For emissions reductions (top panel), credits are generated when NCS activities cause the release of fewer emissions than would have been predicted based on a baseline trend. For emissions removals, NCS activities cause more GHGs to be sequestered and stored than would have been expected.

Establishing the appropriate baseline or reference level is key for suppliers to demonstrate additionality in any program. Suppliers establish baselines for project- and jurisdiction-scale programs in different ways.

- Project-scale baselines may be chosen based on the expected or measured emissions profile of a piece of land or ecosystem that faces similar conditions to the area where the NCS activity is taking place (Verra, 2022a). For example, if a company decides to purchase and plant trees on an abandoned piece of land that was deforested decades ago, the company can use estimates from nearby plots of land that are experiencing natural regrowth, in addition to historic land use and economic trends, to set a baseline scenario.
- Jurisdiction-scale baselines compare the emissions performance of the entire jurisdiction to its own recent historic performance. For example, if a country is developing a nation-wide strategy to reduce emissions from deforestation and forest degradation through a set of new policy initiatives, it can compare actual emissions to recent emissions before the policies were introduced. An example of jurisdictional baseline setting and concomitant credit generation is illustrated in Figure 2.3 below.

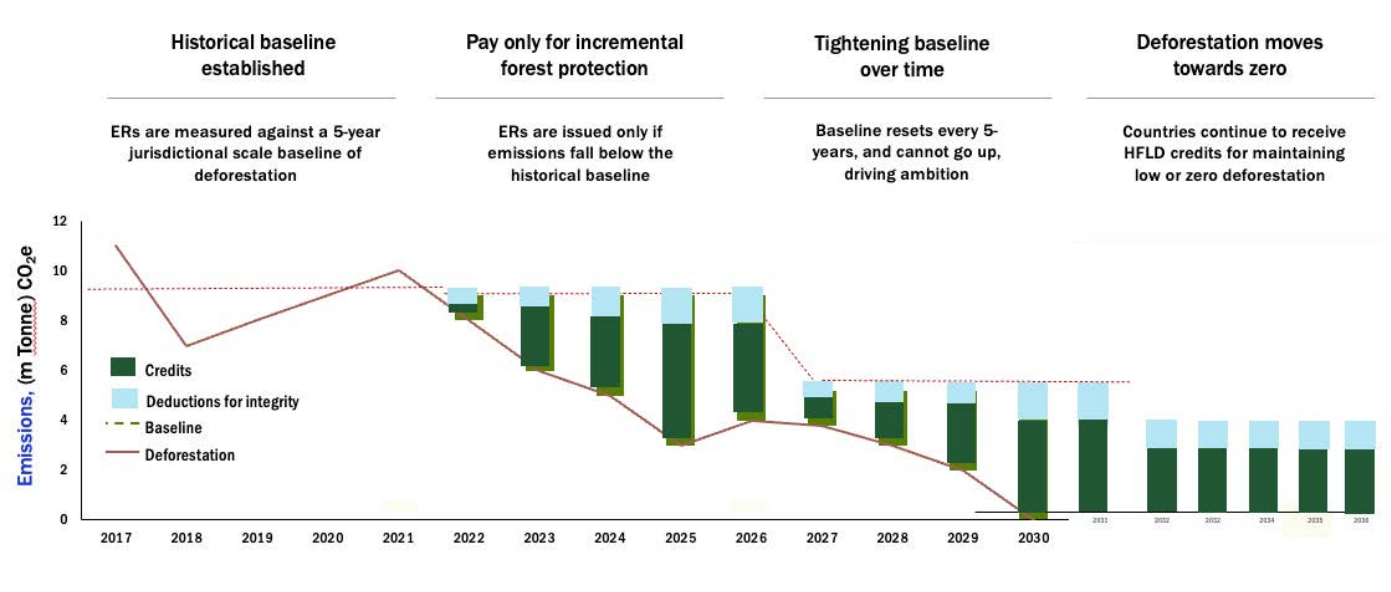


FIGURE 2.3

Simplified graph of how ART TREES sets and tightens program baselines to promote integrity. Programs receive credits for a given year (green) when they lower their emissions from deforestation (brown line) below their crediting window baseline (red dashed line), which is reassessed every 5 years to ratchet downwards and reflect jurisdiction-wide progress. In this example, the NCS activity is reducing emissions from deforestation.

- Project-scale baselines may also be set taking account of the jurisdictional scale baselines, as is required by Verra's consolidated REDD+ methodology.[34] This approach is becoming more common as both project- and jurisdictional-scale approaches are developed within the same jurisdiction. In this situation, suppliers of both project- and jurisdictional-scale credits must consider the existence of the other in their crediting activities. This topic is known as nesting and is discussed in Section 2.4.

The difficulty suppliers face in setting a baseline arises from the same challenge that plagues all attempts to forecast future events — it is impossible to know with absolute certainty how much of an activity would have happened without the credited intervention. Credit suppliers must make assumptions, predictions and judgements, and people may have different amounts of information that might be in their interest to share or not (Kerr et al., 2004; Mason and Plantinga, 2013). A few specific examples help to illustrate the challenges that suppliers can encounter:

- For credits issued under the umbrella of "improved forest management," baselines are often set using a "common practice" statistic that reflects the average carbon density of comparable privately owned forests. However, the calculation of this average in some protocols has been criticized for including too ecologically broad a range of forests and therefore allowing landowners to compare their forests to forests that are less carbon dense simply because of ecological, climatological and geographical factors (Badgley et al., 2022; Randazzo et al., 2023). In response to criticisms like this, the California Air Resources Board has released statements, detailing how their program sets baselines and takes into account risks (California Air Resources Board, 2021).
- Another criticism has focused on how baselines often do not accurately reflect increasing trends in carbon storage that predate enrollment in the carbon crediting program (Coffield et al., 2022)
- For jurisdictional scale interventions, using performance-based additionality can present unique challenges, especially where past deforestation trends cannot always predict future patterns of deforestation, such as is the case in some Indigenous territories (See Box 2.6 on High Forest, Low Deforestation (HFLD) forests).

34 As of July 2023, Verra's Consolidated REDD+ Methodology was still under development.

As is the case with inaccurate accounting for other types of crediting uncertainties,[35] inaccuracies in baseline setting can lead to errors in either of two directions (Kerr and van Benthem, 2010; van Benthem and Kerr, 2013). The first type of error is the **error of inclusion** which results in standards over-crediting or issuing credits to suppliers for emissions reductions that would have occurred in a conservative business as usual scenario. This results in buyers purchasing credits that overstate the actual GHG emissions reduction or removal they represent. The potential for the use of overly broad forest categorizations when calculating emission changes from forest management projects would be an example of an error of inclusion; owners of forests that benefit from a higher carbon density than other forests within a broad forest categorization are disproportionately likely to apply to the program because they can receive payment for what may be non-additional carbon stocks. The second error is the **error of exclusion.** This occurs where suppliers would not be credited for genuinely additional ERRs because of an excessively conservative assigned reference level and hence choose not to participate. Uncertainty and hence imprecision in reference levels, combined with suppliers having private knowledge about how their true reference level compares to the assigned reference level, and voluntary participation in the program, leads to both errors of inclusion and exclusion.

While under-crediting reduces the financial incentives to credit suppliers (and therefore reduces potential NCS activity), over-crediting has the effect of making it appear that climate change goals are being met when in fact they are not. This latter concern has frequently been raised in criticism of NCS crediting, sometimes with good reason. Conservative crediting standards therefore typically choose to err on the side of under-crediting or excluding large percentages of potentially creditable emissions reductions from being sold, through accounting measures like buffer pools (see Section 2.3.6 below) or deductions for potential leakage, additionality problems, and other uncertainty. These tools aim to increase the integrity of any claimed (and financially compensated) mitigation. But when methodologies to calculate the size of such deductions from the volume of emissions able to be sold are overly stringent, they also reduce the scope of potential incentives and benefits obtained from crediting NCS activities.

Jurisdictional crediting frameworks may lead to more accurate baseline assessments – and thus more confidence in the additionality of generated credits. Jurisdictional crediting inevitably involves larger volumes of baseline emissions than individual project scale activities. But because all areas of a jurisdiction are aggregated within the accounting framework, errors of over- or under-crediting that (on a percentage basis) could be proportionally more significant for any individual projects implemented across a region may largely cancel out at the whole-jurisdiction scale (Busch et al., 2012; van Benthem and Kerr, 2013). For example, jurisdictional accounting does not allow for small-scale actors in the jurisdiction to opt in to crediting programs (and their associated accounting frameworks) only if their potentially available crediting volumes happen to be especially favorable, based on (potentially problematic) baseline assignments. The inclusion of the whole jurisdiction's territory reduces the potential for such **adverse selection** (or 'cherry picking') of particular types of project sites – for example, types of sites whose locations or unique geography might allow developers to exploit quirks or technicalities in the details of a crediting framework to (erroneously) maximize their credit generation. Jurisdictional baselines help to ensure that no actor has better information about the true baseline than the regulator (and therefore, no potential power to use this better information to exploit the rules). This reduced potential for adverse project selection minimizes both the issuance of non-additional credits, and inappropriate under-crediting.

Jurisdictional baselines will still have some degree of inaccuracy, rooted in uncertainties and errors in carbon stock and emissions measurement at scale. But with appropriate mechanisms to minimize the impact of these errors, jurisdictional frameworks should still lead to less over- and under-crediting on a per-ton-of-carbon basis, if the jurisdiction is successful in implementing NCS activities and driving change at scale. Higher prices and good technical support for suppliers should therefore increase the integrity and scale of global NCS credit supply. As an added precaution, however, some jurisdiction-scale crediting standards choose to err on the side of under-crediting to conservatively account for uncertainties in setting baselines, and address additionality through performance-based approaches.

35 See discussion of potential implications of over- and under-crediting, due to errors inherent to inadequately or unnecessarily stringent crediting standards, in Box 2.4.

There is a particular challenge in setting baselines and determining additionality in High-Forest Low Deforestation (HFLD) contexts. This is explored in Box 2.6 below.[36]

BOX 2.6

SETTING BASELINE IN HFLD CONTEXTS

There are challenges in setting baselines and determining additionality in High Forest, Low Deforestation (HFLD) regions. These are the regions where forest cover is high and deforestation rates are low at a particular point in time. One common definition applied at the country level defines HFLD countries as those with at least 50% forest cover and deforestation rates below the global average. In these contexts, the key challenge centers on the fact that setting a crediting baseline using historic trends – the most common approach to setting baselines – would provide very little opportunity to generate credits as it would be difficult to reduce the deforestation rate further.

Advocates for HFLD crediting argue that, in a baseline scenario, the future is unlikely to resemble the past and that the future risk of accelerated deforestation means that NCS crediting provides a necessary financial incentive for heavily forested lands. They point to the fact that HFLD regions are facing increasing pressures to deforest (for timber, mining, agriculture, or other extractive uses) and present a great opportunity for supporting large-scale forest conservation that can benefit many stakeholders. Furthermore, these pressures may be intensified by the growth of forest protection efforts in other parts of the world causing actors in these supply chains to look for opportunities in new locations. In many cases, it is the active management by IPs and LCs that helps to withstand these pressures and preserve these areas of intact ecosystems. HFLD crediting advocates also point to the risk of creating perverse incentives for jurisdictions to increase their deforestation rates in the short term, simply to create a more favorable baseline for future crediting.

In response to these arguments, standard-setting bodies have developed new methodologies. These set the baseline crediting level according to both the historic emissions from forest loss, and the risk that some of the large existing forest carbon stock may be lost. For example, the two existing jurisdictional-scale HFLD modules – offered under ART's TREES and FCPF-CF – limit crediting to 0.05 percent and 0.1 percent of forest carbon stocks, respectively. Currently, there is no project-based HFLD crediting within the major standards due to environmental integrity risks.

Some stakeholders continue to express concern about credits developed under these methodologies. While these methodologies represent current best practice, there are, nonetheless, concerns since the risk of future forest loss cannot be known. This has led them to call for buyers to distinguish between their use of HFLD credits from other forestry credits and to adjust the claims that they make when using HLFD credits (see section 3 on Demand below).

There may be potential to extend the concept of HFLD to other NCS pathways. While specific HFLD crediting methodologies will continue to evolve, the concept of HFLD crediting can be applied more broadly to other NCS types where a historical average baseline across a large geographic scale likely underestimates the future magnitude of threat to that region.

Sources: (Fonseca et al., 2007; Cattaneo, 2009; ART TREES, 2021; Streck et al., 2022; Paltseva et al., 2023)

2.3.5 Ensuring crediting is verifiable

High-integrity crediting systems incorporate processes that are transparently documented and effectively checked. This extends from the rules for eligibility to participate in the crediting program, to the calculations and accounting frameworks that quantify EERs, to the registry systems that store credit records. Importantly, this transparency and accountability also relates to the processes of validating and verifying credited activities. These two concepts are closely related:

36 This box looks at the issue of HFLD crediting from the supply side perspective. The issues surrounding how buyers might treat HFLD credits, and the claims they make in relation to any credits they purchase are discussed in Section 3.3 below.

- **Validation** is the process of evaluating the design of a project or program's plan to sequester CO2 and avoid GHG emissions.
- **Verification** is the process of checking the accuracy of GHG data and evaluating calculations of the actual amount of GHG emissions that have been avoided or sequestered due to the NCS activity.

High quality standards require suppliers to appropriately monitor NCS activities, thoroughly report NCS activities and ERR quantification, and to have this information audited, verified and validated by an independent, accredited third party. Auditing of project or program design, and monitoring of mitigation activities, can help ensure that mitigation activities and claimed ERRs meet high quality standards. A credit supplier's contracting of an independently certified **third party**[37] facilitates standardized practices and allows for a degree of separation between those seeking to generate credits and the standard setting body [as discussed in Section 2.1]. External verification is a key element in building confidence in the quality of information supporting carbon credit claims.

Jurisdictions may be able to take advantage of economies of scale in providing support for validation and verification (often bundled with the approach taken for monitoring and reporting). In particular, it may be relatively straightforward for jurisdictions to deploy large-scale monitoring techniques for forests, such as remote sensing, and then use dedicated staff for internal reporting prior to verification by external organizations. In comparison, these costs could be high in small projects, with those responsible for credit generation in these cases often subcontracting these services to another entity.

2.3.6 Ensuring necessary permanence

A mitigation activity is considered permanent if it does not experience a reversal — the partial or complete release of GHG that occurs after a credit has been issued (Seymour, 2020). Permanence is a keystone element of NCS crediting as climate change impacts are driven by the concentration of emissions in the atmosphere (IPCC, 2022). In some cases, the accumulated benefits of years of mitigation activities can be quickly undone, or reversed, by a relatively brief change in practices or local conditions. For example, hard-to-manage external risks can alter the carbon stored in forests, through events such as wildfires, pest outbreaks, diseases and drought-induced die-offs. Recognition of this risk, known as non-permanence, has led to intense scrutiny of NCS crediting systems (Anderegg, 2021; Coffield et al., 2021). It has also spurred the development of approaches that can account for these GHG fluctuations as they occur, conservatively factoring in the risks of such reversals beforehand, and making adjustments to crediting over time.

The concern about non-permanence lies in the potential for non-permanent reductions to be used to offset a permanent emission.[38] Permanence is also important when considering the efficiency of NCS efforts relative to other actions with less permanence risk, even if there is no offsetting. But allowing for impermanence of specific NCS activities in specific places can be equitable (not locking local communities into specific land uses) and efficient (allowing changes in land use in response to different economic conditions), so tools to enable reversals without impact on atmospheric GHG concentrations are valuable.

The timescale over which permanence is assessed adds another layer of complexity to this topic. Conventionally, permanence has been assessed in terms of likelihood of a reversal over a 100-year window — which is the period commonly used to assess the global warming potential of different GHGs.[39] At the time of writing, carbon market quality initiatives, such as the IC-VCM, are evaluating the validity of the 100-year window as a benchmark of quality and are developing new approaches for assessing permanence.[40] There is also growing interest in the carbon market community in crediting the value of short-term storage as part of more ambitious emissions reduction trajectories, although no consensus yet exists. Box 2.7 discusses the case for alternative definitions of permanence and some of the potential accounting tools that could be used to facilitate crediting that recognizes these alternative approaches.

37 In the United States, the ANSI National Accrediting Board accredits verification bodies, qualifying them to provide verification and validation services. In Mexico, Entidad Mexicana de Acreditación, A.C. (EMA) accredits verification bodies. Countries may have their own accrediting bodies.
38 Permanence is also an issue for fossil fuels, as coal that is not mined today can be burnt anytime in the future, releasing emissions.
39 An IPCC supported model found that, for a 100 gigaton emission pulse of carbon, roughly 20% of it will still be in the atmosphere after 1,000 years (Joos et al., 2013).
40 ICVCM set a 40-year minimum permanence threshold for assess the quality of carbon credits (The Integrity Council for the Voluntary Carbon Market, 2023)

BOX 2.7

POTENTIAL ALTERNATIVE APPROACHES TO CONCEIVING OF PERMANENCE

Something 'permanent' exists forever –and in the context of carbon credits, 'forever' is how many people (and policies) have historically conceived of the required duration of the mitigation benefit represented by a single emissions credit. In the case of carbon credits, the concern about non-permanence lies in the potential for non-permanent reductions to be used to offset a permanent emission. However, some argue that a strict requirement for 'true' permanence may be unnecessarily narrow for the reality of the role emissions credits play in long-term climate mitigation. This could lead to useful tools in the fight against climate change being overlooked.

Rising GHG levels are the result of ongoing changes in the chemistry of the atmosphere – a net imbalance, or **flux,** across the sum of all human and natural processes that add or subtract GHGs to or from the air. Requiring that all units of mitigation to be truly 'permanent' may ignore the reality of climate change as the product of a system in flux. To explore these ideas, one approach is to reconceptualize what it means to keep GHGs out of the atmosphere as an **ongoing process,** rather than only a set of "permanent" one-time actions. This idea is illustrated in Figure 2.4 and further described below.

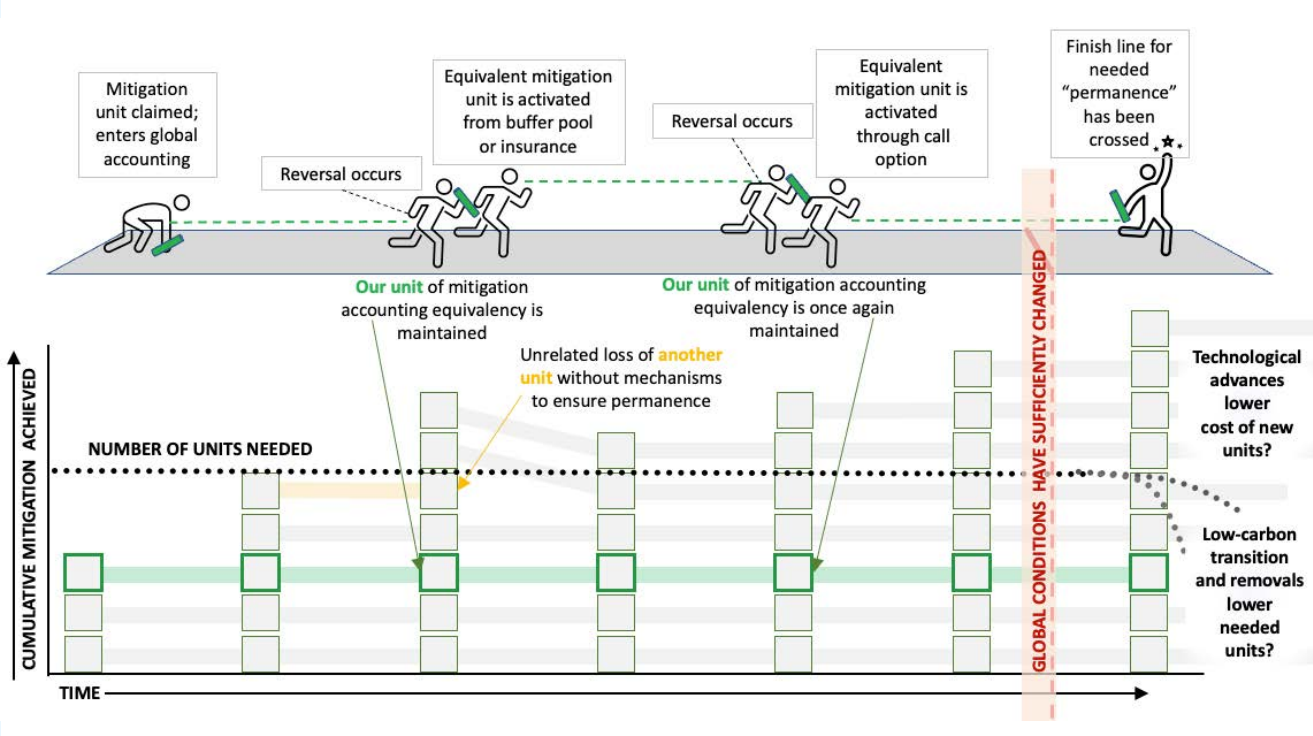


FIGURE 2.4

Permanence visualized as a relay race

The figure above illustrates an alternative conceptualization of mitigation permanence. In this model, permanence is conceived as a relay race, with "runners" (representing single units of mitigation) coordinated together to deliver the equivalent of one unit of mitigation across a hypothetical "finish line" – that is, a time in the future after which maintaining the same level of total cumulative global mitigation becomes unnecessary, due to technological, economic, and political change. The effective continuity for each of the square "units" of abatement is shown by the transparent lines that run with them over time. A series of events representing the single unit equivalence highlighted in green is illustrated by the running figures at the top of the diagram;

each handoff of the relay baton represents how mechanisms to avoid reversals can carry forward the same unit equivalence over a long GHG accounting timeframe. If we assume that storage is temporary, and account for this, we can create systems to credit them differently. Mechanisms under discussion to incentivize effective use of temporary carbon storage include:

- **Tonne year accounting** – In this concept, short-term storage is worth a fraction of a permanent emission. The main methods currently used to establish this equivalence, the Lashof method and the Moura-Costa method, choose ratios to calculate an equivalent warming effect between the temporary storage and a current one-ton CO_2 emission reduction over a hundred-year window.
- **Rental credits** – In this concept, mitigation is secured for a set period of time, rather than being required to remain in place indefinitely. As a credit expires, the entity that 'rented' the credit (which could be a jurisdiction) would need to purchase a replacement credit, or make an emission reduction. This idea is closely related to the potential for a "call option" to be bundled with each credit when it is transacted.

A growing set of tools and safeguards is available to suppliers to reduce risks of undesirable reversal. Once NCS activities start, the risk of reversals can be reduced through various 'deterrence' measures. These can include legal enforcement of the contracts which oblige the party undertaking NCS activities to maintain them, with fines or other sanctions for any violations. In cases where a contract with a credit buyer has already been agreed, provisions within these contracts can also help deter activities that could lead to reversals (see Section 5.4.2 for more information).

There are also two – potentially complementary – ways to mitigate the impact of reversals if and when they do occur.

- Carbon crediting programs can embed approaches into their governing credit generating rules. A particularly common method is a **buffer pool** arrangement which has been introduced in almost all project scale and jurisdictional scale standards. Buffer pools require assessing reversal risks (e.g., their vulnerability to specific natural disasters or economic failure), then a contribution of a proportion of credits to a buffer pool proportional to the estimated risk. In the event of an unintentional reversal, credits from the buffer pool are used to replace the reversed credits, or to buffer against their non-permanence. Standards may also require that reversed credits be replaced by the credit owner, especially when they are reversed intentionally due to human intervention.
- Reversals may also be buttressed by regulatory requirements for **credit replacement** and supported by related **contract provisions** between the credit supplier and buyer to ensure that replacement does occur. Provisions to ensure replacements occur may include requirements for insurance, call options, liability provisions or private contract buffer pool arrangements (see Section 5.4.2).

The drivers of reversals differ between project-based crediting and jurisdictional-based crediting, which may influence how credit suppliers develop their NCS activities. Individual projects are more susceptible to reversals due to risks caused by humans, such as the bankruptcy of the project owner, or natural threats like disease outbreaks that can have devastating impacts on an entire project. In contrast, for jurisdictional crediting, the larger geographic scale means that the impact of natural disasters or the circumstances of a single landowner may be less material (Schwartzman et al., 2021). By contrast, jurisdictions are vulnerable to policy reversals that can occur after elections, corruption, or when the government stops enforcing the law. However, recent modeling suggests that even a temporarily-enforced policy to reduce deforestation at jurisdictional scales can lead to a permanent shift away from the business-as-usual trajectory (McCallister et al., 2022). In addition, jurisdictional governments can implement policies or provide incentives to minimize large-scale drivers of reversals which is not possible at the individual project-scale (Schwartzman et al., 2021).

2.3.7 Incorporating effective and ethical safeguards for people and the environment

Environmental and social impacts are closely linked, especially for those groups whose lives and cultures are deeply intertwined with the landscapes where NCS activities may take place. NCS activities themselves can potentially bring considerable non-climate environmental and social benefits to IP and LC groups, but these groups may also be at risk of harm. Environmental and social safeguards are thus critical dimensions of credit integrity – but the implementation

of such safeguards has historically fallen short (Dawson et al., 2018).

The evolving discussion of NCS crediting is taking place against a backdrop of rising global standards for respecting the rights and agency of IPs and LCs. This recent surge of relatively mainstream interest follows centuries of marginalization of these same communities, and of other stakeholders who have traditionally lacked political power or visibility. Guidance on the fair and equitable inclusion of local groups has therefore been historically limited and inconsistent, although it is rapidly evolving, often with help and leadership from these communities. For example, the Coordinator of Indigenous Organizations of the Amazon River Basin (COICA) is in the process of developing an Indigenous-led jurisdictional REDD+ approach. In addition to prioritizing the holistic management of forests and Indigenous territories, this proposed strategy not only ensures respect for territorial and land rights and the Free, Prior and Informed Consent (FPIC) for IPs, but also the effective participation of IPs as active partners, and fair distribution of benefits (Ilhardt and Barata, 2022).

Meaningful and effective inclusion of IPs and LCs is essential to the long-term success of crediting programs (Wissner and Scnneider, 2022). Reviews of PES systems suggest that programs which empower local community stakeholders and facilitate a sense of autonomy have higher success rates (Akers and Yasué, 2019). Systems that do not successfully achieve this buy-in, with IP and LC stakeholders incorporated as a fundamental part of project or program design, may have higher risks of reversal and program collapse, as stakeholders may not have meaningful incentives (or might even have active disincentives) to cooperate with and participate in program activities. The inclusion of local knowledge from these groups in the design process for such programs may be essential to their success.

Aspects of safeguards implementation are sometimes, but not always, formally incorporated into the standards and protocols established by credit-issuing bodies. For example, Verra's VCS standard requires project proponents to conduct local stakeholder consultations, prior to project validation, to inform project design and maximize stakeholder participation (Verra, 2022b). Safeguards may also be required as part of regulations within the jurisdiction where the NCS activity takes place. The Architecture for REDD+ Transactions structures its safeguards requirements on the Cancun Safeguards (ART, 2021a) (see Box 2.8 below), while the California Tropical Forest Standard requires compliance with the Cancun Safeguards and a series of Guiding Principles for Collaboration and Partnership between Subnational Governments, Indigenous Peoples, and Local Communities that were developed by IP and LC organizations.[41] However, even in those crediting contexts where there are no formal requirements, or in which requirements are not very specific, the credit supplier should ensure that high-integrity practices are followed for the sake of the success of the initiative, to meet the rising expectations of buyers in global markets, and because it is ethical behavior.

Effective solutions in this area are not one-size-fits all – so meaningful engagement is an essential element of crediting program design. A good engagement process allows stakeholders to learn from each another to understand real needs and concerns and to incorporate these lessons into project or program design. This should include learning from the traditional knowledge and practical experience of IPs and LCs who manage the landscapes that may be the focus of NCS activities.

In the forest sector, and specifically REDD+, efforts to define the scope and scale of safeguards have focused on a list of guiding principles known as the Cancun Safeguards, developed by the UNFCCC in 2010 (UN-REDD Programme, 2021). As discussed in Box 2.8, more recent efforts to define high-integrity criteria for carbon credits or specific NCS-based credits have incorporated many of the same principles as their starting point. However, these more recent efforts have also highlighted additional needs. For example, the global conversation on climate change has brought additional focus to the need to support adaptation and resilience also (IPCC, 2022). Other relevant models or frameworks for safeguards in the forest sector include the Governors' Climate and Forests Task Force (GCF Task Force) Guiding Principles for Collaboration and Partnership Between Subnational Governments, Indigenous Peoples and Local Communities ((GCF Taskforce, 2021); and the New York Declaration on Forests (New York Declaration on Forests, 2021).

For blue carbon, the High-Quality Blue Carbon Principles and Guidance (High-Quality Blue Carbon Principles and Guidance, 2022), **a first-of-its-kind blue carbon framework on high-quality blue carbon projects and credits, includes empowering peoples as a core principle.** This guidance stresses the importance of FPIC (see box 2.9), ensuring inclusive participation and leadership of IPs, LCs, women and other marginalized

41 See GCF Task Force, https://www.gcftf.org/resource/guiding-principles/.

groups, having in place effective grievance mechanisms, respecting traditional land use and legal rights, and empowering local communities to define equitable benefit sharing. Other work has developed a framework for how to develop climate-just ocean commitments under the Paris Agreement which includes components focused on blue carbon science, laws and policies and finance (Reiter et al., 2021). Frameworks for safeguards continue to be explored in non-forest NCS activities as they develop.

BOX 2.8

BEYOND CANCUN – RAISING THE BAR ON ETHICAL SAFEGUARDS

In 2010, at its annual meeting in Cancun, Mexico, the UNFCCC established the Cancun Safeguards to guide REDD+ activities. The safeguards include "respect for the knowledge and rights of indigenous peoples and members of local communities," and the "full and effective participation of relevant stakeholders," while taking into account "the need for sustainable livelihoods of indigenous peoples and local communities and their interdependence on forests in most countries." The Cancun Safeguards have been used globally as the standard for safeguarding REDD+ activities, including by Architecture for REDD+ Transactions, a carbon credit standard which focuses on jurisdictional scale REDD+ activities and which has based its safeguard requirements on the seven Cancun Safeguards. These state that REDD+ initiatives promote and support:

- Actions that complement or are consistent with the objectives of national forest programs and are relevant to international conventions and agreements;
- Transparent and effective national forest governance structures that take into account national legislation and sovereignty;
- Respect for the knowledge and rights of Indigenous Peoples and members of local communities by taking into account relevant international obligations, national circumstances and laws, and noting that the United Nations General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;
- The full and effective participation of relevant stakeholders, and in particular Indigenous Peoples and local communities;
- Actions that are consistent with the conservation of natural forests and biological diversity, ensuring that the actions referred to in paragraph 70 of Decision 1/CP.16 are not used for the conversion of natural forests but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services and to enhance other social and environmental benefits;
- Actions to address the risks of reversals; and
- Actions to reduce displacement of emissions.

While the Cancun Safeguards focus specifically on REDD+, they laid the groundwork for initiatives to be developed further in the forest context and beyond. In 2018, The Governors' Climate and Forests Task Force released the Guiding Principles for Collaboration and Partnership between Subnational Governments, Indigenous Peoples and Local Communities. In the context of forests, these principles, which were developed by IP and LC organizations and then endorsed by all GCF Task Force Governors, recognize and highlight the critical role Indigenous peoples and local, forest-based communities play in "building and maintaining successful, territorial approaches to forest conservation and low-emissions development."

There is a growing recognition of the importance of also supporting and facilitating adaptation and resilience as a cornerstone of safeguards. The global community is experiencing the impacts of climate change on a regular basis. Developing nations and small island developing states (SIDS) are increasingly vulnerable to these impacts but bear little responsibility in driving up GHGs. Despite their undersized contribution to climate change and their abilities to safeguard and contribute to mitigation of carbon emissions, IPs and vulnerable communities are still often excluded from conversations about NCS activities. Solutions must take into account environmental justice, equity and recognition of rights and sustainable practices of Indigenous peoples and local communities. NCS are most durable and effective when they are designed with the expertise and complementary needs of local communities at the forefront of the process.

Sources: (GCF Task Force, 2021; UN-REDD Programme, 2021)

Building on this work, discussions of safeguards coalesce around four important themes (although there are overlaps among them):

- Full and Effective Participation of IP and LC Stakeholders as active partners,
- Equitable Benefit Sharing Framework,
- Social and Environmental Impact Assessment and Monitoring, and
- Support for Adaptation and Resilience.

Full and effective participation of IP and LC stakeholders

Ethical partnership between credit suppliers and other stakeholders, especially IPs, LCs, women and other marginalized groups, is a key element of high-integrity crediting. This starts with credit suppliers and other market actors approaching these stakeholders with respect for their rights, culture, and traditional knowledge. It also requires suppliers to engage with Indigenous People as true partners, not just as beneficiaries. The Principles of Free, Prior and Informed Consent (FPIC), developed and codified under various international legal agreements, serve as a guiding framework for these engagement processes. The term FPIC originates from the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) (Office of the High Commissioner for Indigenous Peoples, 2007) and allows communities to "give or withhold consent to a project that may affect them or their territories. Furthermore, FPIC enables them to negotiate the conditions under which the project will be designed, implemented, monitored and evaluated." In particular, FPIC is required for the relocation of Indigenous Peoples. FPIC is obligatory for the states which have ratified the UNDRIP (over 145 in total), but a number of voluntary market standards also explicitly require FPIC when credit generating activities impact property rights, resources, or livelihoods. Further detail on these Principles, and some of their practical implications, are discussed further in Box 2.9.

BOX 2.9

FREE PRIOR AND INFORMED CONSENT

Free, Prior and Informed Consent is a specific right and protection for Indigenous people to give (or withhold) the use of their lands, resources, knowledge, or intellectual property. FPIC also allows IPs to negotiate the terms under which NCS activities that may affect them or their territories are designed, implemented, monitored and evaluated. In more detail FPIC refers to:

- **Free** - consent is given voluntarily without coercion, intimidation, or manipulation.
- **Prior** - consent is sought sufficiently in advance of commencement or authorization of activities.
- **Informed** - rights holders are provided with transparent information on all aspects of a proposed project or activity in a manner that is accessible and understandable.
- **Consent** - collective decision made by rights holders reached through customary decision-making process.

The principles are most clearly stated in the UN's Declaration on the Rights of Indigenous Peoples, a non-binding resolution passed in 2007, which sets out the rights that "constitute the minimum standards for the survival, dignity and well-being of the indigenous peoples of the world." These right were also acknowledged recognized to the adoption of UNDRIP by the International Labour Organization's 1989 Indigenous and Tribal Peoples Convention (ILO Convention 169) which is "based on the recognition of indigenous and tribal peoples' aspirations to exercise control over their own institutions, ways of life and economic development and to maintain and develop their identities, languages and religions, within the framework of the States in which they live." The right to FPIC has also been incorporated by the Convention on Biological Diversity, the World Bank, the FAO, and other international organizations as a cornerstone of project development and stakeholder engagement.

FPIC differs from other safeguards approaches in that it places Indigenous peoples' and their rights at the center of all aspects of project design and implementation. Rather than viewing IPs as potential beneficiaries, it values the role they play and emphasizes the importance of transparent and understandable information sharing, communicated in culturally appropriate ways, and recognizes the right of IPs to not give their consent.

Despite its widespread adoption as a global standard, the FPIC process is not always recognized, which can lead to a violation of IPs' rights of IPs and conflict, both in the implementation of NCS activities and beyond. In Norway, for example, the recent construction of Fosen Vind, Europe's largest onshore wind complex, was

challenged by the Indigenous Sami peoples as encroaching on their territory, threatening critical biodiversity and endangering their way of life. Indigenous leaders specifically pointed to a need for stricter enforcement and application of FPIC by Norway and other countries. NCS actors, and those responsible for generating credits in particular, must learn from negative experiences in other fields to ensure the rights of IPs are protected.

Sources: (Buli and Solsvik, 2021; Earthworks, 2023; FAO, 2023; Office of the High Commissioner for Indigenous Peoples, 2007)

Equitable benefit sharing

Since crediting is fundamentally an effort to provide resources and incentives to suppliers for the implementation of NCS activities, a fair and equitable distribution of these resources is a core element of high-integrity crediting. Benefits can include financial rewards that exceed the costs of supporting NCS activities, whether derived from concessional up-front financing or from revenues generated by the sale of credits, as well as non-financial benefits such as technical training, improved infrastructure, or other types of resources the involved community values. The overall benefit to suppliers from the project or agreement might therefore be shared locally in a financial form but also through non-financial goods, services and other rewards. For example, a negotiated benefit sharing agreement between supplier jurisdictions and local stakeholders might include provisions for improved access to social services and technical training for local communities contributing to a crediting project, or improved security of land tenure and access rights, rather than just providing direct payments. A WWF-sponsored review of benefit-sharing mechanisms across a diversity of REDD+ programs found that successful benefit sharing mechanisms are highly context-specific, as success depends "on a sound understanding and consideration of the social dynamics and land use governance in each targeted area, on the meaningful engagement of local stakeholders in line with their specific needs and priorities, and on the accountability, transparency, and financial management capacity of the involved administrations"(Bertzky et al., 2021).

The literature on effective benefit sharing mechanisms suggests the need for frameworks that balance the "3E" performance criteria (Bertzky et al., 2021):

1. **Effectiveness:** ensuring that those who contribute to NCS activities receive commensurate benefits and create adequate and appropriate incentives to continue these activities in the long term.
2. **Efficiency:** minimizing transaction and implementation costs and delivering benefits from NCS activities in a reasonable timeframe.
3. **Equity:** distribution of benefits to all actors who have legitimately contributed to the results of the NCS activities results in a manner that is perceived as fair.

Successful benefit sharing depends on the perception of fairness of outcomes by involved stakeholders (Dunlop and Corbera, 2016; Durbin et al., 2019). For example, a forest conservation program in Mexico faced backlash from participants and negative international press coverage when it became evident that participants were being paid less than half of the global market price per forest-based credit unit. Reports at the time suggested that local leaders had been led to expect that the returns from the community's participation would be greater than they were receiving, and that participating farmers who had limited access to information about the global carbon market felt betrayed when the disparity was revealed. The credit-buying company eventually renegotiated the level of payment for future credits, resulting in higher compensation for the community for the work they were doing (De Haldevang, 2022; Radwin, 2022).

Some practical considerations for suppliers for ensuring equitable processes and outcomes are endorsed by groups in the forest crediting space. These include, but are not limited to:

- **Direct allocation of funds and/or other benefits** to IPs and LCs, and especially women, whenever possible;
- Processes to ensure that the **costs of transactions and intermediary services are transparent,** and fully understood and agreed upon in advance by all parties;
- Recognition of the critical role IPs and LCs play in forest protection (including high-forest, low deforestation regions; see Box 2.6 above), **and compensation levels that fairly value these contributions;**
- Fair and effective **dispute resolution mechanisms** that are also perceived as fair and impartial.

Pre-project impact assessment, monitoring and reporting

Impact assessments, both before and after NCS activities commence, can play a key role in ensuring that environmental and social safeguards are being met. The potential for negative impacts from NCS activities will vary depending on the context of the activities. Post-activity evaluation and reporting can help document issues and increase credit integrity for other crediting efforts in the future, as new best practices and potential pitfalls are identified and shared.

Meaningful impact assessments rely on investing in an understanding of local environmental and social contexts, particularly of groups whose livelihoods and cultures are deeply intertwined with the landscapes where NCS activities take place. For example, restrictions on the use or management of lands placed under conservation as a credit-generating activity could directly or indirectly impact the material or cultural well-being of local communities in ways that may not be obvious to those who are not members of the impacted groups. There could also be important impacts to consider that stem from the crediting and benefit-sharing processes themselves, such as conflicts or challenges associated with the distribution of new income streams from carbon projects.

New focus on support for adaptation and resilience

Guidance on safeguards increasingly suggests that credit suppliers should design programs to support adaptation and resilience in addition to climate mitigation. The link between many NCS activities and co-benefits such as ecosystem services provides an opportunity to address the urgent need for adaptation. There are a range of ways suppliers can address this, from incorporating NCS activities that support both adaptation and mitigation activities into project and program designs (for example, wetland restoration which both increases carbon sequestration and buffers against extreme weather events), to allocating revenues from NCS activities to adaptation. In addition, the Paris Agreement includes a requirement that five percent of proceeds from trading credits under the Article 6.4 mechanism (see Section 4.4) will be transferred into the Adaptation Fund to help developing countries finance adaptation efforts (Di Leva and Vaughan, 2021).

Safeguards at scale

Both project- and jurisdictional-scale approaches should include social and environmental safeguards. However, jurisdictional-scale initiatives offer a unique opportunity to advance the Indigenous rights and land tenure issues at the policy level. A significant proportion of the world's forests are managed by Indigenous Peoples and local communities, yet they rarely benefit from formal land tenure or receive benefits for this conservation (Rights and Resources Initiative, 2018). In addition, jurisdictions can exercise latitude in the design of benefit sharing systems and can bring government capacity and resources to bear in a coherent way that contributes to economic development and land-use planning objectives. Jurisdictional programs can reward Indigenous and local communities for their stewardship and sustainability, channel critical investments, and carefully account for emissions to ensure that results are real (See Box 2.10 below below).

BOX 2.10

SAFEGUARDS AT SCALE – THE CASE OF MATO GROSSO

The Brazilian state of Mato Grosso provides an example of effective and inclusive program design. The state has historically experienced high rates of deforestation, primarily driven by soy and cattle production, which generates significant GHG emissions. To curb this deforestation, the state partnered with the German Development Bank's REDD Early Movers (REM) Program to receive funding for jurisdictional forest protection. A unique and critical element to the success of Mato Grosso's REM Program was the Indigenous territories sub-program.

Mato Grosso, located in in the center of Brazil, is home to 43 Indigenous peoples in 116 territories covering approximately 25% of the state, or 21.6 million hectares. In 2016, the state federation of Indigenous peoples, the Mato Grosso Federation of Indigenous Peoples and Organizations (FEPOIMT), was established. Like many other Indigenous Amazonian organizations, FEPOIMT faced communication and transportation challenges across the vast territory as well as limited infrastructure and technical capacity.

The REM Indigenous subprogram, which focused on participatory governance based in FPIC and ILO Convention 169 (See Box 2.9), was designed through a series of workshops including with 42 of the state's 43 Indigenous peoples and underwent extensive consultation on policy proposals with local stakeholders. In

2017, the REM Program allocated about $54 million to Mato Grosso to reduce deforestation between 2015 and 2019. Of this, 13% ($7.13 million) was allocated to Indigenous projects developed and implemented by the Indigenous organizations, as well as an emergency plan to combat the COVID pandemic, and helped strengthen the Mato Grosso Federation of Indigenous Peoples and Organizations (FEPOIMT) through enhanced coordination and capacity.

Sources: (Alencar et al., 2018; Schwartzman, 2021)

2.3.8 Supply side integrity tools in practice

Ensuring integrity in practice relies on a combination of the requirements of standard setters alongside a range of complementary mechanisms and actions by credit suppliers and intermediaries. Table 2.4 below provides more detail on the different approaches embedded in these standards, as well as other mechanisms. Building on the discussion above, it distinguishes between the approaches that are more relevant for project-based crediting from those more frequently used for jurisdictional crediting. Importantly, while crediting standards provide starting points for ensuring that credits are high integrity, credit suppliers must also take proactive steps to ensure this.

TABLE 2.4

Approaches to support high-integrity credits at project and jurisdictional scale

Integrity Element	Project-scale	Jurisdictional-scale
Real (unique, no double counting and accounting for leakage)	Most standards rely on accounting frameworks and assign a unique serial number, use a CITSS, or a registry to avoid double counting. Most estimate leakage attributable to the project and deduct credits issued. Gold Standard does not allow activities with leakage.	Most require labelling of credits and disclosure, deduction, and retirement of any issued emissions reduction. Most require reporting on leakage risk without requiring increase in buffer pool. ART TREES and Vera JNR classify leakage risk and requires deductions.
Quantifiable (monitoring and modeling of emissions)	Some schemes define baselines project-by-project, some offer standardized baselines, some offer both; Some schemes offer net mitigation through conservative baselines and limited crediting periods.	Most use a 4-20-year historical reference period depending on standard; Most use historical average baselines, VCS allows for historical trend; Some require 5-10 year revisions, though FCPF has no guidance on revisions. Under ART and FCPF, HFLD baselines are based on deforestation trends.
Additional (not likely to have occurred in the absence of crediting incentives)	Approaches to additionality demonstration differ by project, with different levels of stringency and positive lists. Additionality tests sometimes involve a demonstration that an activity is not economically viable without crediting, or is an economically attractive activity but faces prohibitive barriers or other eligibility requirements. Tests can combine: (i) prior consideration; (ii) investment analysis; (iii) common practice analysis; (iv) barrier analysis.	Most rely on conservative baselines and scale for additionality, while FCFP and Verra's JNR require jurisdictions to implement new or enhanced policies or actions.
Verifiable (transparently documented and confirmed by third parties as appropriate)	Monitoring reports, some with no specified frequency; Verified and validated by accredited body (e.g. regulator, CARB, DOE, VCS, third-party).	ART TREES and Verra JNR require regular validation and verification of monitoring reports.

Integrity Element	Project-scale	Jurisdictional-scale
Permanent (not facing a reversal within agreed-upon mitigation timescales)	Most require assessment of reversal risk, some provide tools to assess risks; most require buffer stocks, with monitoring (25-100+ years) and require replacement of credits that reverse; Most require 5-20% buffer contributions, proportional to reversal risks.	Most require a reversal risk assessment and provide a tool to assess risk. Buffer contributions range between 5% and 60%; Reversals are monitored, with some differences in regularity across protocols; Detected reversals are deducted from buffer stock.
Equitable (incorporating social and environmental safeguards including equitable partnerships, governance, and benefit sharing)	Some require a listing, impact assessment, or to adhere to safeguarding principles of the UNDP. Some project-scale standards require assessments pre and post, some have no specific sustainability objective.	Most jurisdictional-scale approaches have safeguard requirements; Some approaches require adhering to Cancun Safeguards or UNFCCC safeguard requirements, require implementing structured processes and outcomes and must show progress and conformance.

2.4 Unlocking global potential of NCS through jurisdictional scale and project nesting

The discussion in Section 2.3 above highlights the significant differences that can arise between mechanisms and actions that promote high-integrity credits from project-based crediting versus jurisdiction-based crediting. However, these two very different approaches to crediting already co-exist; as both new projects and new jurisdictional initiatives come into being and evolve in the coming years, understanding and reconciling these different frameworks will be an increasingly important element of ensuring integrity in global NCS credit supply. 'Nesting' is a term commonly used to describe this reconciliation between project- and jurisdictional-scale crediting efforts that occur (or may occur) in overlapping geographic territories.

Regardless of scale, overlapping crediting systems create the potential – whether real, or only perceived – for double counting or claiming to arise. However, there are situations in which it may be acceptable, or even beneficial, for the same credited unit of emissions reductions or removals to receive payments under more than one crediting program or framework. Ultimately, the environmental integrity of such credit – generated or transacted under more than one framework – depends on how these credits are used and how that use is aggregated in global accounting of emissions.[42]

Against this backdrop, this sub-section discusses the potential for synergies between project- and jurisdiction-based crediting, and the need to facilitate alignment and complementarity between these efforts when they occur within the same geographic boundaries. Specifically, it considers:

- Potential benefits and challenges of combining project-based and jurisdictional crediting approaches;
- different models for **'nesting'** of project-based crediting within a jurisdictional crediting framework; and
- tools and opportunities available to policymakers to support and facilitate nesting, now or in the future.

2.4.1 Necessity and challenges of aligning jurisdictional and project-scale crediting systems

As discussed above, jurisdiction-scale approaches to NCS crediting have potential to drive the large volume of high-integrity NCS activity needed to keep high-ambition climate mitigation pathways within reach. There is a growing civil society support for the proposition that jurisdiction-scale approaches – if done well – offer a necessary pathway toward higher integrity,

42 For example, the purchase of certain types of "credits" may be useful as a vehicle for a philanthropic buyer to allocate funding in a quantifiable way toward efforts that support global mitigation; there may be circumstances in which some of the same projects or jurisdictional programs under which these credits were generated are also receiving results-based funds from other sources as well, or even in which the same credits are then being subsequently sold to buyers in domestic markets or internationally. In such a situation, this "stacking" of funds to finance or reward the same units of emissions reductions may not pose any issue from the perspective of environmental integrity – if the situation is transparent to all parties, and if the involved buyers are not using or claiming these credits in ways that threaten the integrity of global emissions accounting. This aspect of integrity relies on ethical and transparent use of credits, as discussed further in the later sections of this text addressing demand-side issues and markets.

greater impact and higher volume credit generation than project-based crediting efforts alone; scale is one of the factors understood to drive both of these benefits (Schwartzman et al., 2021). For example, in the tropical forest crediting space, recently published guidance from a coalition of NGO and IP representatives organizations encourages a transition towards jurisdictional scale crediting frameworks that integrate project scale approaches with existing or future jurisdiction-scale standards (Coordinator of Indigenous Organizations of the Amazon Basin et al., 2023).[43] However, this guidance also recognizes the importance of the near-term supply of project-scale crediting efforts from which jurisdictional scale programs may initially develop – and that the integration and alignment of these two approaches is essential to maintaining integrity of credits generated under either framework within a jurisdiction.

Readiness and potential for effective jurisdictional crediting depends on the institutional context of the jurisdiction. Jurisdictional crediting involves the successful development and implementation of policies and programs to incentivize NCS activities across an entire geographic region, which may be large and diverse. It therefore requires sufficient technical and administrative capacity to plan for and implement these large-scale NCS activities across that region, as well as the capacity to meaningfully enforce laws and regulations that support these plans. It further requires effective coordination of NCS activities, and negotiation of benefit-sharing, among diverse stakeholders who may hold unequal political and economic influence. Jurisdictional approaches may therefore require an enormous investment of institutional resources, from directly allocated funding to expenditures of political capital. These investments will unfold across a unique landscape of the jurisdiction's existing technical and governance capacity, fiscal constraints, influential stakeholders, physical environment, socioeconomic context, and other distinguishing features.

Depending on this landscape, existing projects have the potential to help or hinder the development of jurisdictional NCS systems. On one hand, projects put in place prior to the essential components of a jurisdictional framework could prove to be technically or politically irreconcilable with later alignment efforts, putting the integrity of some or all credits sold by actors within the jurisdiction at real or perceived risk. On the other hand, the experience and learning engendered by project-scale efforts might ultimately help facilitate the development of jurisdictional systems. By effectively serving as pilots of innovative approaches in different regions, projects might provide important case studies of what works and what does not, informing later jurisdictional program design and implementation.

Ultimately, a failure by jurisdictions to plan and account for project-level activities could have potentially serious consequences, at local and global scales. At the most basic level, misalignment of accounting frameworks among projects within the same jurisdiction could lead to overestimation of ERRs through double counting, as described in Section 2.3.2. If a country begins to establish the reference levels and frameworks needed to implement a jurisdictional scale program after there are pre-existing carbon projects within its borders, the country and the project(s) will need to determine how the emission reductions from the project will be included in the jurisdiction's accounting process, to ensure that they are not unintentionally counted or claimed as offsets twice, and that benefits are appropriately distributed. A lack of coordination on this could have implications for the country's ability to meet national goals under the UNFCCC framework – as discussed further in Section 4.5.

Alignment on key technical and management aspects among entities at the jurisdictional and project scale can facilitate effective nesting. As described in Section 2.3 and summarized in Table 2.4 above, there are often significant differences in how major aspects of ensuring credit integrity are addressed at these different scales. Well-designed nesting can present an opportunity to leverage learning and benefits from both projects and jurisdictional efforts in regions where both carbon crediting pathways co-exist. Failure to actively consider and account for such overlap could threaten crediting integrity, if such misalignments lead to an overcounting of creditable emissions, or negatively impact the equitable implementation of environmental and social safeguards.

2.4.2 Approaches to nesting

Several different theoretical approaches to nesting may help credit suppliers conceptualize and plan for these scenarios. A number of approaches are illustrated and compared in a simplified manner in Figure 2.5 below. However, because jurisdictional scale crediting is an emerging concept, there are limited mature examples of nesting approaches in practice. Understanding of the lessons learned from real-world efforts is evolving along with these systems themselves and the details of how these generalized principles might apply to a jurisdiction's unique context may vary widely in practice.

43 Further information about this guide, the Tropical Forest Credit Integrity guide, is provided in Section 3.2 below.

The approaches illustrated below differ primarily in how rights to the credits resulting from those ERRs are distributed, to the jurisdiction or to individual nested projects within it. This aspect of nesting is sometimes described in terms of the degree of **centralization:**

- **Centralized** nesting describes a system in which the jurisdictional government is the primary administrator and arbiter of all ERRs credited within its territory. The jurisdiction's ERR goals, such as emissions reductions targets under the Paris Agreement, are considered first in distribution of generated credits. This is illustrated by the two examples on the left of Figure 2.5:
  - In the first of these (from left to right), projects and their credit generation potential are fully subsumed by the jurisdictional program, and all distribution of credit rights or benefits comes through the jurisdiction.
  - In the second, credits generated by projects are subject to the jurisdiction's ownership only up to the point that the jurisdiction's external obligations (such as NDC goals or negotiation sales) have been met; credits generated by projects that surpass these sovereign goals might still belong to the project stakeholders directly.

In a **decentralized** nesting model, the jurisdictional government might not be the final arbiter of whether projects receive credits directly from an issuing agency, or might for some reason choose to allow some project-scale credits to be generated outside of the boundaries of the jurisdictional accounting framework. Such a situation would still require alignment of accounting of these credits with that of the jurisdictional framework, through adjustments made by the jurisdiction's program to ensure that there is no double counting or other conflicts between the jurisdiction's programs and baselines. This is illustrated by the third scenario shown in Figure 2.5.

The final illustration included in Figure 2.5 involves no active NCS credit pursuit by the jurisdiction, but does involve the jurisdictional government setting rules and regulations that govern how all NCS crediting efforts within its territory may be conducted. As discussed in Section 2.4.3, such rule-setting could help create important alignments among projects (such as requiring the use of common methodologies to set baselines and estimate credits generated) that create an easier path toward implementing a nested jurisdictional program in the future.

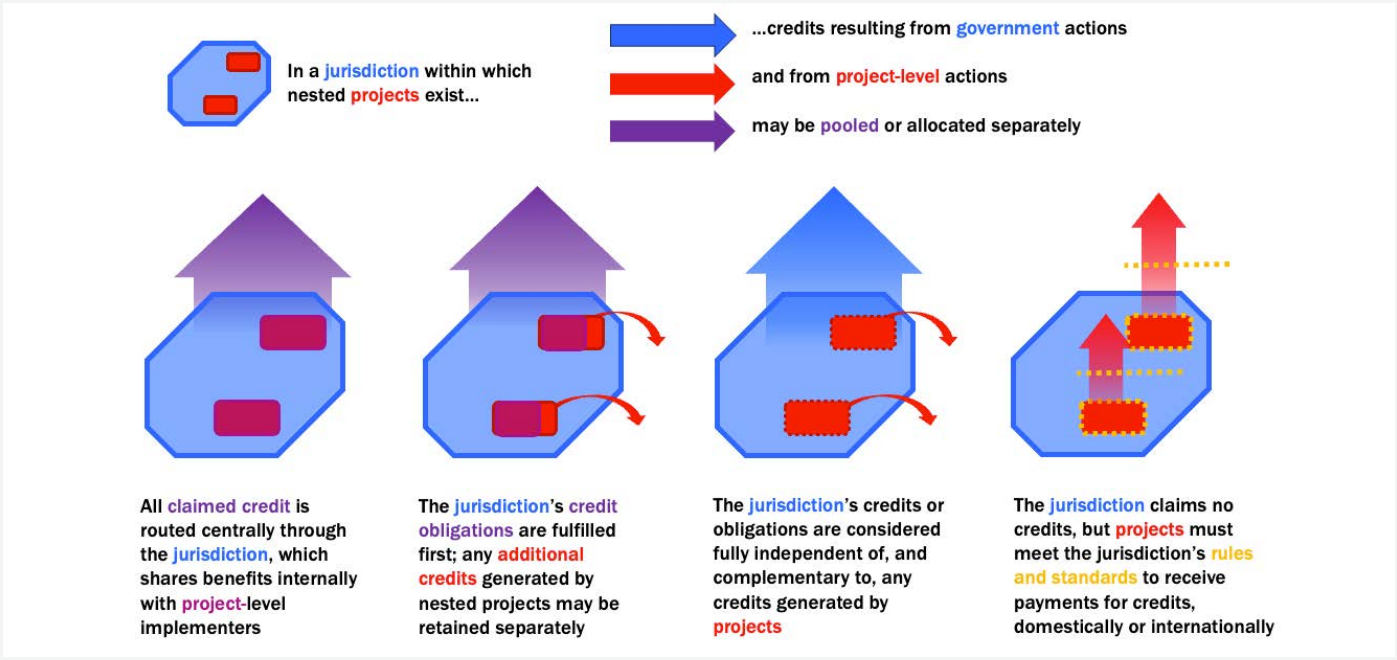


FIGURE 2.5

Comparative approaches to nesting (or policies that facilitate nesting). The jurisdiction (in blue) contains several projects (shown in red); these vary by degree to which the jurisdiction shares credit for the NCS activities conducted within the bounds of the project (represented by the red project areas being "shaded blue" and turning purple. Concepts are informed by examples discussed in Hamrick et al., (2021), ART (2021), and World Bank (2021)

For tropical forests, several jurisdictional crediting standards have developed or are developing provisions for nesting project-scale initiatives within jurisdiction-scale programs. As this is an evolving area, these and other methods are still being tested, or have yet to be tested in practice. Some of the key features and differences among these standards are summarized in Box 2.11 below.

BOX 2.11

COMPARING JURISDICTIONAL NESTING FRAMEWORKS

Jurisdictional scale standards often include different frameworks for nesting projects within jurisdictions — creating a common accounting system integrating smaller REDD+ projects into jurisdictional scale programs. The main jurisdictional standards, FCPF, ART-TREES, and Verra's Jurisdictional Nested REDD+ Methodology, all take slightly different approaches.

- The Forest Carbon Partnership Facility, which sunsets in 2025, has both centralized (crediting at national level) and decentralized (crediting at both national and project scale) nesting approaches. However, the FCPF acknowledges that the on-the-ground reality will likely be a mixture of the two approaches at different extents depending on the contexts.
- ART only issues credits at the jurisdictional level, to national or large subnational governments. That being said, ART recognizes the role projects play in implementation REDD+ Strategies and as such, has five nesting scenarios. The different scenarios depend on if the jurisdiction has reached an agreement with the owner of the carbon rights, if the NCS project activities participate in a different carbon program, and how the baselines of the project activities are set.
- Verra issues credits to both project and jurisdictional scale REDD+ projects. In the context of their Jurisdictional Nested REDD+ Methodology, there are three nesting scenarios. In these scenarios, credits can either be issued to only projects, to both projects and jurisdictions, or to jurisdictions which allocate benefits through a benefit sharing mechanism to projects.

Generally, nesting has been a challenge for both projects and jurisdictions. With jurisdictions just beginning to explore potential for nesting different possible scenarios, the global community is continuing to strive for clarity with nesting in practice. Carbon credit suppliers should be aware of the particular nesting scenarios that could apply to the NCS activities they are considering and the regional context in which their activities would be carried out.

Sources: (ART, 2021b; Verra, 2022c; World Bank, 2021b)

2.4.3 Policy opportunities to facilitate effective nesting

While accounting alignment to protect the emissions integrity of credits generated within nested systems is essential to their success, the establishment of frameworks for stakeholder coordination and benefit sharing may depend deeply on the unique context of the jurisdiction's institutional and socioeconomic landscapes. Elements of the simplified approaches illustrated in this section may have benefits or drawbacks in the context of the goals of particular jurisdictions. However, a common understanding of best practices is still evolving, as more jurisdictions start to pursue jurisdictional NCS approaches in practice.

Clear legal and institutional frameworks can help lay the groundwork for coordinating project-scale crediting with evolving jurisdictional systems. Establishing the regulatory infrastructure to standardize key GHG accounting elements and clarify carbon rights can help facilitate the establishment of crediting at the jurisdictional scale, while also unifying and enhancing the integrity of project-level efforts within these jurisdictions. Potential and existing credit suppliers need to understand such frameworks as they are developed, to effectively engage with the evolving policies that may govern their landscapes.

Governments can establish ground rules now to help make project-level accounting compatible with jurisdiction-level accounting frameworks later. Establishing unifying rules prior to the implementation of jurisdictional crediting efforts can help facilitate the nesting of future projects as and when the need arises. Such rulemaking processes could also help ensure project- and jurisdictional-level alignment of credits with emerging compliance market requirements such as those set by the International Civil Aviation

Organization focused on reducing emissions from air travel discussed in the Demand Section (see Section 3.2). By promoting standardization of elements directly related to NCS crediting, jurisdictions will be facilitating the transparency and integrity of NCS initiatives at all scales, now and in the critical years to come for climate mitigation.

RECOMMENDED REFERENCE MANUALS AND FURTHER READING

Beyond Beneficiaries: Fairer Carbon Market Frameworks (The Nature Conservancy, 2023)

Nesting of REDD+ Initiatives: Manual for Policymakers (World Bank Group, 2021)

Securing Climate Benefits: A Guide to Using Carbon Offsets (Broekhoff et al., 2019)

Comparative Analysis of Benefit-Sharing Mechanisms in REDD+ Programs (World Wildlife Fund, 2021)

High-Quality Blue Carbon Principles and Guidance: a triple-benefit investment for people, nature, and climate (2022)

Nesting REDD+: Pathways to Bridge Project and Jurisdictional Programs (The Nature Conservancy, 2021)

Tropical Forest Credit Integrity Guide (2023)

Jurisdictional REDD+: Comparing requirements for three carbon finance opportunities (Forest Trends, 2021)

3. DEMAND SIDE OF THE MARKET

DEMAND SIDE: KEY TAKEAWAYS

In this section we discuss the demand side of the NCS credit market.

1 We start by exploring the different types of end buyers – voluntary market participants, compliance market participants, international airlines operating under the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) scheme, and sovereigns. The relative importance of these buyers differs, and is expected to change further in the future. They can also have different motivations for purchasing NCS credits.

2 End buyers, or their regulators, need to decide how much strategic importance to place on credit purchases. There are a range of factors that point to greater or lesser NCS (and other) credit use. The balance of these considerations typically leads to restrictions on the use of NCS (and other) credits. For example, in compliance markets, regulators often set limits on the extent to which NCS credits can be used, sometimes with variation between NCS credits sourced domestically and those sourced from overseas. Within the voluntary market, it is generally accepted best practice that NCS (and others) credits should only be used for those emissions that cannot be technically and economically reduced using other methods.

3 End buyers will need to consider which credits to purchase. This will depend on factors including cost, co-benefits, the presence of benefit-sharing mechanisms, execution risk and strategic alignment. However, in addition, buyers and, in compliance markets, their regulators, will need to consider three issues that have attracted broader policymaker interest. These are: the weight to give to project-based versus jurisdictional credits; the balance of reductions versus removals credits; and, within the class of reduction credits, the priority to give to high-forest low-deforestation (HFLD) credits.

4 End buyers often face challenges in determining which credits to buy and, in particular, how to identify high-integrity NCS credits. In response to this, a series of coalitions and initiatives have emerged, especially focused on the voluntary market. A range of civil society and private sector tools and products are also emerging to help to address this challenge.

5 Within the voluntary market, there has been growing scrutiny on what end buyers should communicate to investors, customers and others regarding their use of NCS (and other) credits, with a range of support tools helping buyers to navigate this evolving landscape.

In this section, we explore the key issues that buyers need to consider when making decisions about the purchase and use (retirement) of NCS credits. We look at five key issues:

- Section 3.1, an introductory section, identifies **who** the major users of NCS credits are, considers their current importance and the factors driving their interest in purchasing NCS credits.
- Section 3.2 considers the factors that end buyers (and their regulators) should think about when deciding on **how many** credits, including NCS credits, should be used to meet compliance obligations or voluntary commitments.
- Section 3.3 looks at the factors that end buyers (and their regulators) need to consider when determining **which** NCS credits to buy in order to meet regulatory or voluntary commitments.
- Section 3.4 considers the challenges that end buyers face in determining the quality of NCS credits and some of the tools they can use to help them overcome information gaps.

- Section 3.5 looks at what claims end buyers can make when retiring credits[44]) and what information disclosures they should make, especially those operating in the voluntary market.

Throughout this discussion, we focus on the actors and processes involved in purchasing NCS credits on the market. We ignore questions about who and how people might generate these credits, which are discussed in Section 2 above. In other words, we 'assume a credit' and focus on the issues that those who might buy that credit need to address.

3.1 Who are the main end buyers of NCS credits?

There are four main (potential) end users of NCS credits (Figure 3.1). These are: compliance market participants subject to emissions constraints imposed by national or subnational jurisdictions; voluntary market participants; companies operating under international sector commitments to reduce their emissions, which currently refers to airlines operating under the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) scheme[45]; and governments/ sovereign countries. All of these are likely to purchase NCS credits with the intention of retiring them, in other words, reporting to the registry that issued the credits that they have been used. Retirement implies that, so long as the rules are properly followed, the credits cannot be used by anyone else. In addition to these end users, various other investors and financial institutions may purchase NCS credits as part of an investment strategy, hoping to realize a return from price appreciation between the time of purchase and time of sale[46], but without the intention of retiring the credit. The focus of this section is on the end users of credits.

FIGURE 3.1
Key end buyers of carbon credits

44 As noted in the introduction, retirement refers to when a user claims the carbon benefit represented by the credit and this is recorded in the issuing registry so as to try and avoid double counting

45 Emissions from fuels used in international aviation and maritime transport are presently not included in national emissions totals and hence the system of Nationally Determined Contributions (NDC) covered by the Paris Agreement. In the absence of a sectoral agreement, there would be no regulatory constraint on emissions from these sources. Consequently, if companies operating under a sectoral agreement make use of NCS credits to reach targets under a sectoral agreement, this represents an additional source of credit demand.

46 As discussed further in Section 5, above, there are a range of derivate products associated with NCS credits. These can also be traded with the intention of realizing a financial return.

Companies subject to carbon pricing regulation represent an important source of demand for NCS credits. So-called compliance market entities, these are companies – often large emitters in the energy, industrial and transport sectors – participating in either an emissions trading system (ETS)[47] or that are subject to a carbon tax. Under an ETS, the regulator may allow companies to use NCS credits as part of meeting their compliance obligations, instead of allowance units. Under a carbon tax, the regulator may allow companies to pay the carbon tax only on those GHG emissions not 'offset' by an NCS credit. In these situations, companies will choose to purchase NCS credits primarily when it helps to reduce the costs that the ETS or carbon tax would otherwise impose. The regulator will typically set rules on what type, and how many, NCS (and other) credits, companies may use.

There are a number of systems in which regulators allow compliance entities to use NCS credits. For example, California's Cap-and-Trade Program allows regulated entities to use carbon offset credits — including some types of NCS credits — to meet a percentage of their compliance obligation. Specifically, they can use Compliance Offset Credits to meet up to 4% of their compliance obligation from 2021-2025; and 6% for emissions from 2026-2030, of which at least half of the credits must derive from activities that are deemed to provide direct environmental benefits in the state (DEBS) (California Air Resources Board, 2023b). At present, this is equivalent to around 12 million tons of credit demand, a significant proportion of which is being met using NCS (forestry) credits. Other carbon pricing mechanisms which allow the use of credits, including NCS credits, include those in Alberta, Colombia, Chile, Australia, New Zealand and South Africa (World Bank, 2022a). Further growth is likely as more jurisdictions look to implement carbon pricing systems to help meet their NDCs.[48]

Companies and other non-state actors that purchase NCS credits in the "voluntary market" are a further source of demand. These are typically organizations that have introduced a net zero or other voluntary GHG emission reduction goal. For example, the Net Zero Tracker provides information on the emissions reduction targets made by 2000 of the largest publicly traded companies. As of summer 2023, 963 of these had committed to achieving net zero in some or all parts of their value chain,[49] while most of the rest had set other types of target (Net Zero Tracker, 2023). These companies and other actors may use (NCS) credits to help meet these targets – in other words to help them counterbalance their scope 1-3 emissions that they are not able to eliminate. In addition, there is growing interest from this demand source in the use of NCS credits to deliver 'beyond value chain' impact. This refers to the idea that these buyers are seeking to support emission reductions and removals above and beyond their targets within their own value chains. The motivation for delivering 'beyond value chain' impact stems from the recognition that the world remains off-track for meeting the temperature goals of the Paris Agreement.[50] By definition, buyers in the voluntary market are subject to few legal or regulatory mechanisms concerning the setting of, and compliance with, their targets, or with the associated purchase and retirement of NCS credits. Furthermore, as discussed later in this section (section 3.5) there is also some ambiguity regarding how these buyers make use of terms such as net zero or carbon neutral that help determine their credit demand, although consensus on this topic is emerging. Buyers in the voluntary market come from a wide range of sectors with service companies (such as the finance sector and technology companies) being particularly important but with manufacturers, fossil fuel companies and infrastructure providers also active in the market.

The overall voluntary market has grown rapidly in recent years, and likely represents the largest current source of NCS credit demand, but has recently slowed. In 2021, the total value of carbon credits traded in the voluntary market was around USD $2bn (Ecosystem Marketplace, 2022). As Figure 3.2 shows, this is about four times the size of the market in 2020, while the market has grown more than 13-fold since 2017. However, data for 2022 suggests that the total volume of corporate purchases in the voluntary market fell by around 4% between 2021 and 2022 (Bloomberg NEF, 2023), with data on credit retirements – dominated by voluntary buyers – declining by 1.3% in 2022 compared to 2021 (World Bank, 2023b).

47 This may also include baseline and credit systems – such as those operating in Australia and Alberta – that are sometimes labelled as emissions trading systems.

48 For example, the World Bank reports that the share of global emissions covered by carbon taxes and emissions trading systems (ETSs) has grown from 7% to around 23% over the 10-year period to 2023, and identifies further carbon pricing systems in development or being considered in, among others, Malaysia, Thailand, Vietnam, Turkiye, Chile (World Bank, 2023b).

49 The emissions in a company's value chain are its scope 1, 2 and 3 emissions. Scope 1 emissions are emissions from an actor's owned or controlled sources; scope 2 emissions are those associated with the production of purchased energy; scope 3 emissions are those emissions within the value chain of the actor's products or services, both upstream and downstream of the sources that they own or control.

50 In June 2023, the Science Based Targets Initiative (SBTi) launched a public consultation to support the development of future guidance on this topic. This guidance is expected to be completed before the end of 2023 (Science Based Targets, 2023).

This is due to both increasing market guidance suggesting that credits should only be used in targeted circumstances and fears of reputational risk from purchasing low-quality credits and (see sections 3.2 and 3.4 respectively below). Nevertheless, some market projections indicate a potential for significant voluntary market growth, with projections suggesting the market could be worth$10-$40 billion in 2030 and between $25 billion and $1 trillion in 2050, if supported by appropriate guidance (Macquarie, 2023).

NCS credits are the credits most commonly used in the voluntary market. In 2021, the largest number of credits traded in the voluntary market were from forestry and land use projects – in other words, they were NCS credits. In total, forestry and land use credits accounted for 46% of the voluntary carbon market in 2021 when measured by volume of traded credits. This rose to 67% when measured by the value of transactions. The difference between these two percentages indicates that NCS credits have historically commanded higher market prices than credits from other activities. However, data indicates that NCS credits have been disproportionately impacted by the headwinds that the voluntary market experienced in 2022[51] with NCS credit prices traded on exchanges[52] having fallen from a peak of around $15/tCO2 to less than $5/ tCO2. The lower price is broadly comparable to credit prices from, for example, renewable energy projects (World Bank, 2023b). However, there is still evidence that when buyers can be confident about the quality of NCS credits, and especially when they are derived from jurisdictional crediting mechanisms, they are willing to pay a premium compared to renewable energy credits (Ponce de Leon Barido et al., 2023).

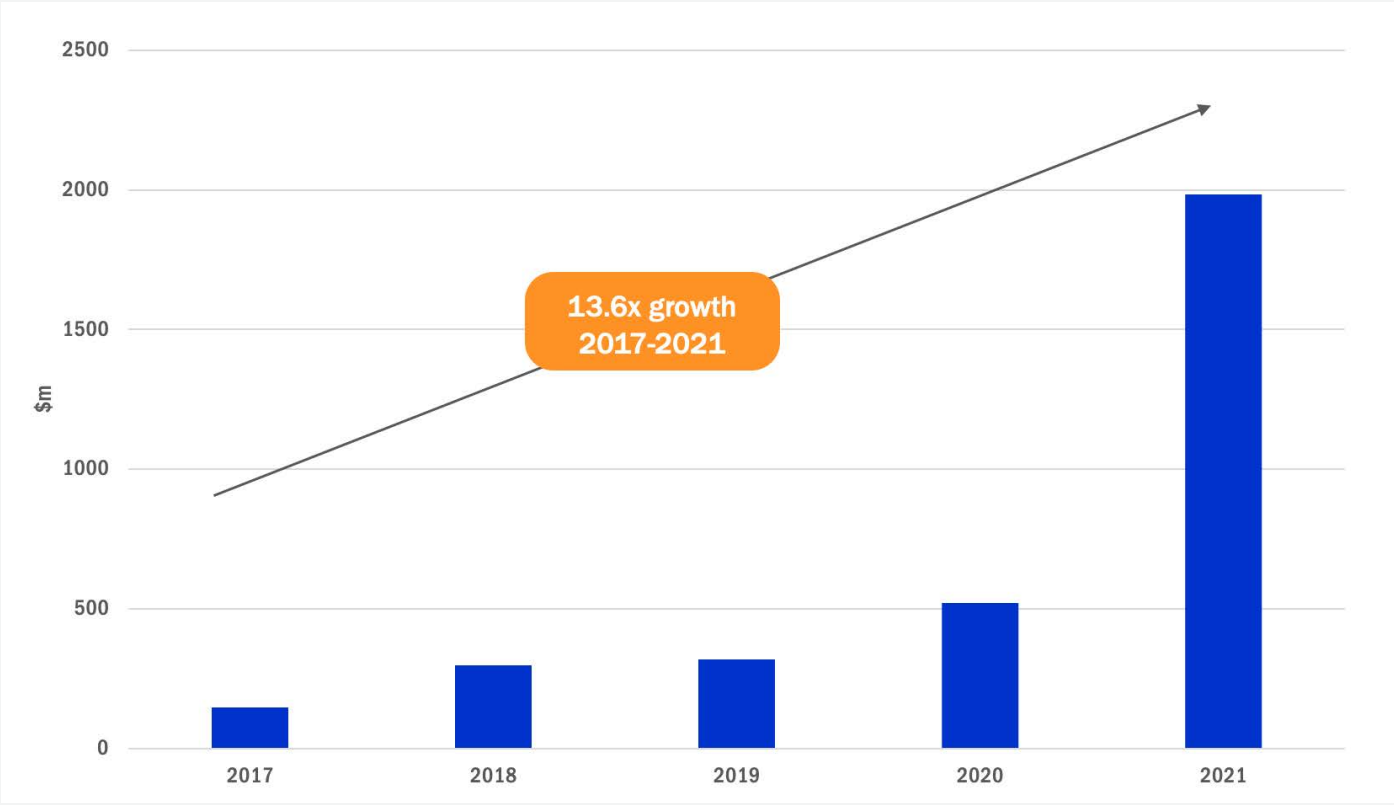


FIGURE 3.2
Value of voluntary market credit transactions 2017-2021 (all credit types)

51 For example, data from Trove Research suggest that NCS credit retirements fell by around 6% in 2022 compared to 2021, compared to either continued growth or much smaller declines in retirements of credits from other sectors (Trove Research, 2023).
52 See Section 4.2 for discussion on different approaches for transacting credits

A third (potential) source of demand comes from airlines under the CORSIA scheme.[53] The international aviation industry has adopted the CORSIA scheme to reduce its climate impact. Implementation of the scheme is proceeding in three phases. In the pilot (2021-23) and first phase (2024-2026), member states of the International Civil Aviation Organisation (ICAO) can volunteer to participate, with CO2 reduction requirements in place for international routes connecting states participating in the Scheme. From 2027, member state participation will become mandatory, although a small number of states can exempt themselves based on aviation-related or socio-economic criteria. As of mid 2022, 112 states had announced their intention to participate in CORSIA from 2023 (International Civil Aviation Organization, 2022a). The scheme requires that the sector's CO2 emissions during the voluntary pilot phase (2021-23) should not exceed a 2019 emissions baseline. The baseline drops to 85% of the 2019 emissions level emissions during the first phase (2024-2026), which is also the baseline that will apply from 2027-2035. Airlines will meet the targets through technological and operational improvements and by retiring Eligible Emissions Units (EEUs). EEUs include credits derived from programs that recognize NCS activities, including, notably, the Architecture for REDD+ Transactions and the Forest Carbon Partnership Facility both of which recognize jurisdictional NCS activities (International Civil Aviation Organization, 2023).[54] This source of demand is currently low (World Bank, 2022a). One market forecast suggests annual demand could be around 0.1-0.2 GTCO2e by 2030 (Climate Change Committee, 2022). In the longer term, ICAO analysis identifies that aviation industry emissions, which would also represent credit demand in a scenario in which the sector commits to and delivers net zero emissions, could be between 0.2-0.9 GTCO2e in 2050 (International Civil Aviation Organization, 2022b).

A fourth (potential) group of NCS credit buyers are sovereign countries. These end buyers could use NCS credits as a method for meeting the emission reduction goals in their NDCs or other national targets/goals. In this case, as discussed in section 4 below, these purchases would follow the processes set out in Article 6 of the Paris Agreement. Alternatively, they could retire the credits purchased without using them to count towards their NDC or related national target.[55] In this instance, the credit purchase would be a means of providing international climate finance.

This demand source, especially when used towards the buying country's NDC, is in its infancy but could become significant. Until recently, this source of demand has been limited due to the difficulties in concluding negotiations regarding the operationalization of Article 6 of the Paris Agreement. However, with this obstacle overcome, demand could become more significant in the future. For example, Singapore has signed Memoranda of Understanding with countries including Colombia, Indonesia, Morocco, Peru, Papua New Guinea and Vietnam on carbon credit collaboration under Article 6 of the Paris Agreement (National Climate Change Secretariat, Singapore, 2023), with the potential that future credit transactions could include credits derived from NCS activities. Other countries actively exploring credit purchases as part of their NDC attainment strategy, which might include NCS credit purchase, include Korea, Switzerland and Sweden.

3.2 How much emphasis should be given to credit purchases within emission reduction strategies?

End buyers and/or their regulators need to balance a number of factors when deciding whether and how much to make use of (NCS) credits (and indeed any credits[56]) as part of their emissions reduction strategy. These factors include considerations of efficiency and achieving emission reductions at low cost. However, they will also need to consider equity and fairness. In this sub-section we describe the main arguments for greater use of NCS credits as well as factors that suggest less use, as summarized in Figure 3.3. We distinguish where these factors will be more or less relevant for different types of end buyer. Throughout this section, we assume that the credits in question are high-integrity, in other words, following the discussion in section 2.2 that they represent emission reductions that are real, quantifiable, additional, permanent and arise from activities that incorporate effective and ethical environmental and social safeguards. We also assume that the high integrity of these credits can be

53 In July 2023, the International Maritime Organization released its 2023 IMO GHG Strategy. As the emissions from the international maritime sector, like the international aviation sector, are not counted in national totals, efforts by this sector to reduces its emissions could represent an additional source of demand for NCS credits. However, the strategy does not discuss whether the sector expects to use (NCS) credits in order to meet the targets specified (Smith and Shaw, 2023).

54 As of March 2023, FCPF credits are approved for use in the 2021-2023 compliance period. ART+ credits are approved for use in both the 2021-2023 and 2024-2026 period.

55 In other words, without applying a 'corresponding adjustment'. See Section 4.5 for more discussion.

56 Many of these issues apply equally to NCS credits as to other credits from other activities. Where this is the case, we recognize it by placing the NCS term in brackets.

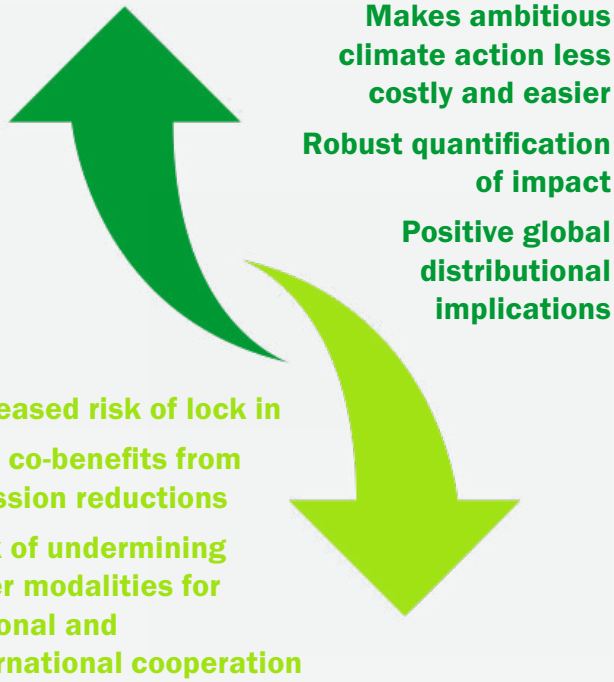


FIGURE 3.3
Value of voluntary market credit transactions 2017-2021 (all credit types)

demonstrated by the buyer. Section 3.4 below describes some of the tools and options that buyers can use to help ensure credit integrity. Finally, it excludes discussion as to why NCS crediting might be an attractive way to provide incentives to undertake NCS activities, which is covered in section 2 above.

Factors supporting greater use of NCS credits

1. **Expanding the range of mitigation options to help reduce the cost of emissions reductions and facilitate enhanced ambition.** The option to purchase credits expands the range of mitigation options that are available to buyers. In the same way that expanding the coverage of a carbon tax or an ETS means that the policy incentivizes mitigation across a wider range of sectors, so enabling buyers to use high-integrity credits represents an efficient way to provide them with a wider pool of mitigation options, opening up opportunities in sectors that it is widely recognized are critical for achieving global mitigation goals (see Introduction). This expansion means that either buyers can achieve the same emission reduction objective at a lower cost, or a more ambitious reduction objective can be realized for the same cost. By contrast, if NCS credits are not used or not available then, for a given climate goal, end buyers would need to allocate extra funding to reduce emissions, which would ultimately come from some combination of owners, workers, customers, and current and future taxpayers. In turn, if end buyers (and regulators) know that (NCS) credits can be used as part of meeting climate goals, they are likely to be more willing to set ambitious climate goals in the first place.

This cost reduction perspective may be particularly pronounced for buyers (and their regulators) considering the use of (NCS) credits in compliance markets, where firms face an explicit carbon price. There are two reasons for this.

- **First,** explicit carbon prices are often reflected in final product prices. In developed countries, purchases of carbon-intensive products represent a relatively larger share of low-income households' expenditures. This can mean that carbon pricing can be regressive within the jurisdiction where it is implemented. Regulators may choose to allow for the greater use of (NCS) credits to reduce the price increase of carbon intensive goods resulting from explicit carbon pricing as one way to protect low-income households.

- **Second,** the application of carbon pricing to firms that face international competition may raise concerns about carbon leakage. This refers to the possibility (or the concern) that carbon pricing will cause production to shift to locations where carbon costs are lower. While the extent of the risk of carbon leakage remains disputed, with many studies low or negligible impacts (World Bank and International Carbon Action Partnership, 2021), if carbon leakage does emerge, it both lowers the global emission reductions achieved and may reduce employment and economic activity in the jurisdiction with the carbon price. Moreover, this reduction in economic activity and employment may be concentrated in less affluent areas within that jurisdiction. Given these concerns, regulators may consider providing an option to purchase NCS credits to meet compliance obligations as a way of reduce the cost of carbon pricing and hence the risks of carbon leakage.

Similar arguments may also be relevant for voluntary carbon market buyers. Awareness of, and the ability to access (NCS) credits, may be important when these companies and other actors are deciding what value chain emissions targets to set, and will influence the credibility of efforts to reach any targets. This may be both because (NCS) credits

provide confidence that targets can be met and also because, through engagement with (NCS) credit markets, companies become more broadly engaged in decarbonization efforts. Consistent with this, indicative analysis in one recent report found that companies that that buy carbon credits appear to be cutting their Scope 1 and 2 emissions more quickly than companies that don't use carbon credits (Sylvera, 2023). The ability to access NCS credits may be an even stronger consideration when these buyers are considering whether and how to pursue a beyond value chain mitigation strategy.

2. **Robust quantification of impact.** As described in detail in section 2, the generation of high-integrity NCS credits requires credit suppliers to follow various crediting standards and methodologies. These should mean that, by the time an end buyer comes to purchase and then retires an (NCS) credit, they can be confident that it represents 1 ton of real, quantified, additional, verified, permanent[57] and equitable CO2 reduction or removal. The confidence that buyers can have in what an NCS credit represents can be contrasted with alternative options that:

   - may be uncertain at that point in time, as the emission reductions or removals will only be delivered in the future; and/or
   - even if/when the emission reductions and removals have been delivered, may not have been assessed and measured using such robust methodologies

   This is likely to be a particularly important consideration in the voluntary market.

3. **Positive global distributional implications.** Some buyers, particularly in the voluntary market, may particularly value the global distributional benefits associated with NCS activities. These may come from at least two sources. First, the activities that generate NCS credits provide a range of socioeconomic co-benefits such as preserved/enhanced ecosystem services, rural employment, and capacity building. Second, as NCS credit markets mature, credit prices may become less related to the idiosyncratic costs of generating specific credits and instead become increasingly set in competitive markets. This will allow low-cost (infra-marginal) credit providers, which may include some related to NCS activities (see discussion on NCS crediting costs in section 1), to realize a surplus from the difference between the cost of credit generation and the market price of the credit. This surplus could then be re-invested, for example, in education and health provision. The location of many NCS activities in low-income countries and amongst marginalized communities in the global South implies NCS crediting could have significant development co-benefits.

Factors supporting reduced use of NCS credits

1. **Increased risk of carbon lock-in.**[58] While NCS activities are an important source of emission reduction and sequestration, they cannot achieve climate stabilization alone. Even preventing all land use change CO2 emissions and preserving all ecosystem carbon sinks would not be sufficient to halt the rise in atmospheric CO2 concentrations. Given this, if end buyer purchases of NCS credits mean that they put less effort into reducing their own GHG emissions than is globally equitable and efficient then two inter-related issues arise.

   - First, global emissions may not decline at a scale and pace consistent with the Paris Agreement's temperature targets, increasing the risks and damages of climate change.
   - Second, the potentially significant benefits of investing in low-carbon technologies provide, in terms of cost savings or quality improvements, will be pushed into the future. There is a risk that the short-term failure to achieve cost reductions and quality improvements in these technologies could lead to greater challenges deploying them widely in the longer term.[59]

   These risks will be magnified if end buyers use their purchase of (NCS) credits to successfully argue that their CO2 emissions resulting from their direct and indirect energy use, or other emissions, need not be subject to aggressive pricing or other regulation (Cullenward and Victor, 2020) .

57 Or that measures are in place to manage risks around permanence.

58 Carbon lock in can be defined as the inertia of carbon emissions due to mutually reinforcing physical, economic and social constraints (Seto et al., 2016)

59 There is a contrary argument, closely linked to the argument on cost saving above, that not allowing NCS credit use could result in end buyers deciding to prematurely deploy abatement options, when it would be preferable for these technologies to benefit from further R&D investment before they are deployed. See (Fuss et al., 2011; Szolgayová et al., 2014)

2. **Lost co-benefits from emission reductions.** If buyers purchase (NCS) credits instead of reducing their own emissions then the potential for local co-benefits from emission reductions will be lost.[60] For example, if a coal-fired power producer chooses to buy (NCS) credits instead of switching to renewable power generation then it will continue to be responsible for releasing a whole range of local pollutants, such as PM or NOx emissions, into nearby communities. These are known to cause significant health problems. Moreover, many large companies have high-emitting facilities and operations concentrated in low-income and Black Indigenous and People of Color (BIPOC) communities. While this concern is most often raised when regulators consider whether to allow compliance entities to use (NCS) credits under an ETS or carbon tax, the same issues could also arise if a highly-polluting company decides to meet its voluntary climate targets with (NCS) credits rather than by reducing its own emissions.

3. **Risk of undermining other modalities for (inter) national cooperation.** As noted above, the purchase of (NCS) credits can often result in a transfer of money from the Global North to the Global South. However, this can lead to concerns, most commonly expressed by some NGOs and academics, that this will lead to a reduction in support for climate action in the Global South through other forms of international cooperation such as international climate finance.[61] In turn, purchasing credits may be seen as a way for companies and countries to avoid responsibility and accountability for the damage caused by their current and past emissions; this will be particularly concerning if these (NCS) credits are being used to meet unambitious targets. Some critics also see credit purchases as a way of cementing existing power and wealth structures, pointing out that they may lead to economic activity being concentrated in countries that are already relatively well developed, or because they are concerned that crediting activities do not require technology transfer[62] (Sovacool, 2011). Similarly, in the US, there are concerns that NCS crediting could be used as a less effective alternative to providing federal funding for climate-smart agricultural practices, such as the use of cover crops or rotational grazing (National Sustainable Agriculture Coalition, 2021).

In compliance markets, regulators have typically responded to this balance of factors[63] by choosing to set limits on the purchase of (NCS) credits. These limits may be quantitative and/or qualitative (in other words, only allowing the use of (NCS) credits with certain characteristics). The discussion above identified the quantitative limits on credit use (including NCS credits) imposed by California, with the rules distinguishing between those credits that do and do not provide direct environmental benefits in the state. Washington State has developed an innovative approach in its cap-and-trade system. While allowing a certain amount of NCS credit use, the state's Department of Ecology, together with the Environmental Justice Council, may reduce a regulated entity's offset limit if the entity may "contribute substantively to cumulative air pollution burden in an overburdened community" (Department of Ecology, Washington State, n.d.). While this provision is at the discretion of regulators, it creates an avenue for addressing the distributional impacts of credit use.

Other design features surrounding credit use in compliance markets can help reduce the potential disadvantages of credit use. For example, Washington State, as well as having quantitative limits on the use of (NCS) credits, also places (NCS) credit use 'under the cap'. This means that, for every credit used, future allowance allocation is reduced on a 1:1 basis, meaning that the cap-and-trade system has the same prices as it would without credits and that the regulated sources within it make the intended contribution towards the state's emission reduction commitment (Department of Ecology, Washington State, n.d.). This provides some of the advantages of (NCS) credit use, especially in terms of mobilizing a wider set of mitigation options, while reducing concerns around lock-in risk.

In the voluntary market, best practice also emphasizes that (NCS) credits should not be used to offset emissions that should technically and economically be reduced – this is often referred to as the mitigation hierarchy. For example, the Science-Based Targets Initiative (SBTi) supports companies to set targets

60 This same challenge also arises if the firm pays a tax or purchase allowances rather than reduce their own emissions.
61 In this context, international climate finance refers in particular to Article 9 of the Paris Agreement which states that "Developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation." The Paris Agreement further states that "Developed country Parties should continue to take the lead in mobilizing climate finance from a wide variety of sources, instruments and channels, noting the significant role of public funds through a variety of actions, including supporting country-driven strategies, and taking into account the needs and priorities of developing country Parties. Such mobilization of climate finance should represent a progression beyond previous efforts."
62 While technology transfer may be somewhat less relevant for NCS activities than, for example, emission reductions in the energy and industry sectors, there is still significant scope for technology use, for example in relation to remote sensing technologies (see Section 2.3.3).
63 As well as potential concerns regarding the integrity of credits, as discussed in Section 2.

based on emission reductions through direct action within their own operations and/or their value chains. It aims to help companies set internal targets that are aligned with the temperature goals of the Paris Agreement. This initiative stresses that credits, including NCS credits, may not be used as a substitute for reducing value chain emissions in line with a Science-Based Target (SBT). Instead, as companies move towards their SBT, carbon credits, including NCS credits, should be purchased as part of a beyond value chain mitigation strategy (as discussed above) (Science Based Targets, 2021). This perspective is reinforced in the Tropical Forest Credit Integrity Guide for Companies (see section 2.2) which notes that: "Voluntary markets for tropical forest carbon credits can play an important complementary role in helping to limit global warming to 1.5 degrees Celsius when augmenting companies' deep decarbonization within their operations and supply chains … The greatest benefit of this complementary role occurs when (a) the carbon credits are transacted as part of a company's beyond value chain mitigation strategy…" (Coordinator of Indigenous Organizations of the Amazon Basin et al., 2023)

3.3 Which NCS credits should end buyers purchase?

An end buyer must decide which types of NCS credits to purchase. After deciding how many (NCS) credits to purchase (or after regulators have set the maximum allowable purchase of NCS credits), buyers must decide which credits to buy. This will largely depend on choosing the types and locations of the activities that will generate NCS credits. In addition to meeting any regulatory restrictions (in compliance markets) and, as discussed further in section 3.4, assuring themselves of the quality/technical robustness of the credits (in all cases), some of the basic factors that are likely to influence this decision include:

- **Cost** Buyers will clearly consider the cost of different NCS credits. This may be particularly important for those purchasing credits in compliance markets where there is an easily available alternative to credit purchase of either purchasing an allowance (in an ETS using NCS credits) or paying the carbon tax (where the carbon tax scheme allows credit use to offset a tax liability). However, voluntary market purchasers and government buyers will also have a strong interest in managing the cost of their credit purchases.
- **Co-benefits** Some buyers will place a strong emphasis on obtaining NCS credits from activities that are expected to provide high levels of co-benefits, which may or may not be explicitly valued. As noted above, the value that buyers place on these co-benefits is a key reason why buyers focus on NCS credits and it is one of the plausible reasons why NCS credit prices have historically been higher than those of other credits. Buyers may place different weights on different co-benefits. For example, some may place more weight on credits from activities that are associated with significant biodiversity benefits, which may also help them achieve any nature-positive[64] strategy they have established. Others may place a stronger emphasis on supporting rural livelihoods. (See also strategic fit below.)
- **Benefit-sharing** Often buyers will look for the establishment of explicit benefit-sharing mechanisms (as discussed in section 2.3.7 above). These provide reassurance that an appropriate share of both the revenues from credit sales, as well as the co-benefits from the activities that lead to credits, will be captured by the farmers and communities who are ultimately responsible for the actions (or inactions) that take place on the ground. In addition to the intrinsic attraction of these mechanisms, they can be an important way to ensure the sustainability of NCS activities and reduce reputation risk for the buyer.
- **Generation risk**[65] While many end buyers purchase credits that have already been issued, it is possible for buyers, including end buyers, to purchase credits through a forward contract, where the buyer commits to purchase a certain amount of credits at a certain price prior to the start of the activity that actually generates credits (see section 5.4 for more detail). This arrangement can be attractive to a buyer because it can establish a strong relationship with those undertaking the activity and it may also allow it to secure favorable pricing terms. Conversely, the increased certainty of revenue for the seller may help it secure the financing necessary to commence the activity. However, under these arrangements, a buyer faces generation risk – the possibility that the activity will not generate as many credits as expected. Buyers will likely want to be prudent and purchase credits from activities with varying degrees of generation risk (i.e. from different activities in different geographies etc.) and to complement forward contracts with spot market purchases.

64 Nature-positive is the term used to describe a world where nature – species and ecosystems – is being restored and is regenerating rather than declining (Cambridge Institute for Sustainability Leadership, 2021).

65 This is sometimes also referred to as delivery risk. However, in the Handbook, we use the term delivery risk to refer to the possibility that contracted credits, once generated, are not delivered to the buyer pursuant to the terms of an agreement. See Section 5.4 below.

- **Strategic fit** Some buyers will likely want to purchase credits from activities that align with their broader interests. For example, companies involved in value chains associated with tropical deforestation may have a particular interest in activities that help to reduce emissions in the geographies and ecosystems where their historic footprint has been most pronounced. Government buyers may prefer to purchase credit from countries with which they have strong diplomatic and/or historic ties (see discussion of climate clubs in section 4.4).

A Buyer's Guide to Natural Climate Solutions Carbon Credits provides further guidance on determining which credits to purchase (Natural Climate Solutions Alliance, 2023). It has a particular focus on the voluntary market, and addresses practical issues buyers need to address, including how to set budgets for credit purchases, the role of internal versus external expertise in credit procurement, and options for conducting due diligence on credits. It also provides specific guidance on how buyers can focus on purchasing credits that also deliver significant biodiversity and livelihoods co-benefits.

Within this mosaic of commercial and strategic factors, buyers and/or their regulators, may also need to address at least three questions that have attracted broader policymaker/regulatory interest. These are:

- What should be the appropriate balance between credits purchased from project-based activities versus jurisdictional activities?
- What is the appropriate mix of credits purchased from emission-reduction activities versus emission removal activities?
- Within the mix of credits from emission-reduction activities, what weight (if any) should be given to emission-reduction activities associated with HFLD countries? (And how should the use of these credits be reported?)

The wider interest surrounding these questions, and how the appropriate response may vary over time depending on progress towards global emissions objectives, means that they are also questions that regulators may wish to reflect on when setting rules around eligibility of NCS credits for meeting compliance obligations. We discuss each of these issues separately below, although in practice buyers will need to consider them alongside those factors already listed.

3.3.1 Project-based credits versus jurisdictional credits

Section 2.1 discusses how jurisdictional crediting can in many cases be an attractive way to deliver high integrity NCS credits at scale (Schwartzman et al., 2021). Advocates argue that it is typically easier to account for emissions and ensure additionality, including by managing (intra-jurisdictional) leakage risks. They also argue that permanence risks can be better managed and that jurisdictional crediting can also offer greater scope for ensuring the participation of indigenous peoples and local communities. Critically, all of these potential benefits are combined with the ability to achieve a greater scale of mitigation.[66]

However, very few jurisdictional credits are currently available on the market. At the time of writing, there have only been a handful of jurisdictional scale credit transactions. One example is the agreement between the Hess Corporation and the Government of Guyana for 37.5m jurisdictional carbon credits under the ART's The REDD+ Environmental Excellence Standard (TREES) 2.0 (Hess Corporation, 2022), while Mercuria Energy Trading has signed a ten-year contract with the State of Tocantins in Brazil[67] for sale of verified jurisdictional credits issued pursuant to the TREES standard of the Architecture of REDD+ Transactions (Governors' Climate and Forests Task Force, 2023). There have also been some payments made to countries for independently verified jurisdictional REDD+ emission reductions through the Forest Carbon Partnership Facility, including for Mozambique (World Bank, 2021a) and Costa Rica (World Bank, 2022b). However, at present the supply of jurisdictional credits is significantly lower than that of project-based credits. This lack of supply may make buyers nervous about developing a purchasing strategy that relies heavily on jurisdictional based credits.

Buyers – recognizing the long-term benefits that developing the jurisdictional credit market may bring[68] – can play an important role in supporting the development of jurisdictional credits. The TFCI guide, focusing specifically on tropical forest credits, identifies three key roles that interested buyers can play in supporting jurisdictional crediting while the market is

66 Although as discussed in Section 2.4, jurisdictional crediting requires significant technical and administrative capacity to plan for wide-scale implementation of NCS activities across a region.

67 The State of Tocantins is a member of the Governors' Climate and Forests Task Force (GCF Task Force).

68 These benefits may be both direct– for example, jurisdictional crediting may help ensure a robust supply of low costs credit – and indirect – for example, if the buyer considers that jurisdictional crediting is a highly effective tool for addressing deforestation.

thin (Coordinator of Indigenous Organizations of the Amazon Basin et al., 2023):

1. increase the proportion of credits purchased from jurisdictional programs or from fully nested projects within a jurisdictional program over time
2. signal demand through the forward purchase of jurisdictional-scale credits and/or through making financing commitments
3. encourage project developers and existing projects to take all possible steps to promote high-quality jurisdictional-scale crediting and associated accounting frameworks, and to nest within them (see section 2.4 for more discussion on nesting).

The TFCI guide also provides a ranking of jurisdictional scale crediting standards and associated nesting scenarios to help buyers and other market participants better understand the opportunities for developing high-integrity jurisdictional scale crediting.

Other stakeholders, especially donors and Development Finance Institutions (DFIs), will also have an important role to play in supporting the growth of jurisdiction scale crediting. Section 5.5 discusses this further.

3.3.2 Emission reductions versus emission removals

Buyers will need to determine the proportion of credits they purchase from emission reduction activities versus emission removal activities. To recap, emission reduction activities are those that avoid the release of GHGs into the atmosphere. In the context of tropical forests, the most scalable activities are forest protection activities that avoid emissions associated with deforestation and forest degradation. These can be contrasted with emission removal activities that remove CO2 from the atmosphere, such as afforestation and reforestation.[69]

It is generally recognized that the appropriate balance between reductions and removals will vary over time – however, different guidelines make different suggestions about the pace and extent to which emission-reduction activities should be replaced by emission removal activities. All of the relevant guidelines recognize that reduction credits are a larger part of the market today. They also recognize that the proportion of removal credits should increase in the future as progress towards net-zero global emissions advances. However, there are differing views on how quickly and to what extent this transition should occur.

The Tropical Forest Credit Integrity Guide, for example, places a strong emphasis on buyers focusing heavily on the purchase of emission reduction credits. It emphasizes the size and irreversibility of emissions from tropical deforestation, and notes that newly restored forests have much lower carbon storage potential, over relevant timeframes, than the mature forests that they could replace if deforestation rates continue. It therefore recommends that buyers should only consider "increasing the share of removals credits in their corporate portfolio in alignment with global achievement of halting deforestation and ecosystem loss" (Coordinator of Indigenous Organizations of the Amazon Basin et al., 2023).

An alternative perspective is provided by, for example, The Oxford Offsetting Principles which suggests buyers should shift their focus to credits from removal activities in the near term. It states that "Users of offsets must increase the portion of their offsets that come from carbon removals, rather than from emission reductions, ultimately reaching 100% carbon removals by midcentury to ensure compatibility with the Paris Agreement goals." It argues that removal activity needs to be significantly increased to meet global temperature goals, and that purchasing emission reduction credits could divert attention away from this vital activity (University of Oxford, 2020).[70]

These differing positions may be explained by the different perspectives/assumptions about the importance of credit purchases – compared to other approaches – for providing the financial incentives needed to protect tropical forests. Indeed, the Oxford Principles are explicit on this point, stating that "the protection and restoration of ecosystems must be rapidly scaled up, irrespective of any carbon benefits they may or may not provide. While carbon offsets can help to fund some of this work, such efforts should be valued and funded for the broad suite of benefits and values they create, not incidentally through carbon offsetting" (University of Oxford, 2020). From this perspective, the financial incentives needed to protect

69 The balance of removal versus reduction activity is often influenced by a misunderstanding of SBTi guidance. This guidance identifies that companies might use either reduction or removal credits as part of a beyond value chain mitigation strategy coupled with the use of removal credits for the 'neutralization of residual emissions'. This is sometimes interpreted as meaning that removal credits should be preferred to reduction credits. However, the guidance recognizes that both reductions and removals have an important role to play with a beyond value chain strategy (and that neutralisation should only ramp up as company gets closer to reaching its net zero targets).

70 Moreover, within the class of removals credits, the Principles suggests that focus should be given to credits from activities that offer long-lived storage.

(and restore) forests are assured (or assumed). This allows credit buyers to focus attention on purchasing credits that align with the other principles. In contrast, the stronger emphasis on purchasing emission reduction credits in guidelines such as the TFCI is based on the (implicit) assumption that the resource flows resulting from the decisions made by buyers will be critical for forest protection.

This issue will continue to generate debate. Buyers will need to reach their own conclusions about this debate, taking into account, for example, how confident they are that mechanisms other than carbon credits will support tropical forest protection (although at present it is estimated that around 10 million hectares of forests were cut down each year between 2010 and 2020, heavily concentrated in tropical regions (Ritchie and Roser, 2021)). By presenting both sides of the debate, and the explicit or implicit assumptions that underlie them, we hope to allow buyers to make more informed decisions.

3.3.3 Role for reduction credits from HFLD jurisdictions

Another consideration that buyers may need to address is the extent to which they purchase HFLD credits and what claims they can then make. As discussed above in section 2.3 on supply, there is a vigorous debate about how to conduct carbon crediting in jurisdictions that have, historically, had low rates of deforestation. From the perspective of buyers, the critical question is whether they should purchase HFLD credits and, if so, what claims they should be entitled to make once they have bought these credits.

Those in favor of HFLD crediting, (EDF, 2023) including many environmental conservation organizations, argue that buyers should treat such credits as fully fungible with other carbon credits. This is also reflected in some market practice: for example the ICAO has approved HFLD credits issued on the ART TREES HFLD crediting approach to be used in CORSIA. According to this perspective, there are a number of reasons why buyers should feel confident in purchasing these credits. These reasons include that the revenues associated with their credit purchases:

1. can help sustain ongoing interventions that help to resist deforestation pressures
2. have a high likelihood of benefiting Indigenous Peoples and local communities
3. will help to avoid the risk of international leakage
4. can avoid creating a perverse incentive to increase deforestation rates in order to set a higher baseline to make future crediting more lucrative
5. will help to secure other ecosystem benefits beside carbon, including biodiversity protection.

Proponents of HFLD crediting express concern that attempts to distinguish HFLD credits from other forms of carbon credits, and to change the way they can be used, would lead to reduced demand for these credits and the loss of these crucial benefits.

Alternative perspectives argue for a more limited, or no, use of HFLD credits. Some argue that concerns over additionality mean that buyers should never make use of HFLD credits (Sebastian, 2022). The implication would be that HFLD countries would continue to protect their forests for local reasons or receive international funding to preserve their forests through international climate finance. Others argue that buyers should still be encouraged to purchase HFLD credits, but that buyers should be careful in the claims that they make on the basis of these purchases. This perspective recognizes the importance of providing financing incentives to HFLD jurisdictions but argues that there is a high risk that the credits generated under HFLD methodologies may not reflect additional emission reductions. As such, they argue that buyers in the voluntary market should not use these credits to make carbon neutrality/net zero claims, airlines should not use these credits to meet their CORSIA obligations, and in the future, countries should not use these credits to support NDC attainment. Rather, voluntary buyers should be careful to claim only that the credit purchase reflects their broader support for climate goals, and that countries should provide this support as part of the international climate finance contribution (Streck et al., 2023). This is one element of a broader debate regarding claims can be made with credit purchases, explored further in section 3.5 below.

Buyers will need to evaluate these different arguments when considering whether to purchase HFLD credits. As with the debate over reductions versus removals, a key consideration will be whether there are effective alternative approaches in place for supporting forest protection in HFLD countries and how this is expected to vary over time. Market perceptions of the integrity of HFLD credits will also be a critical factor.

3.4 How can end users decide which credits to buy?

End users can face serious challenges in understanding the source and quality of the credits they may be

purchasing. Section 2 discussed the characteristics of high-integrity credits and how various supply-side tools can be used to try and ensure that these characteristics are achieved. In practice, however, and has been well reported in the press, not all NCS credits currently meet these criteria. This creates significant problems for the well-intentioned buyer who wants to purchase high-integrity credits but is confused about how to do so. As the Taskforce on Scaling Voluntary Carbon Markets noted: *'Buyers struggle to navigate various standards and to find high-quality carbon credits at transparent prices. For a new market participant, it may be difficult to understand what constitutes a high-quality credit'* (TSVCM, 2021). In this context, buyers are exposed to reputational risks if they buy credits that are later found to lack high integrity. This information gap may also allow opportunistic actors to trade in low-integrity credits, reducing overall confidence in NCS credits globally.

These challenges are particularly acute in the voluntary market. Voluntary market buyers can, in principle, choose from a vast array of credits. These may originate from a wide range of (NCS) activities, be based on different standards that apply different criteria,[71] and be registered (or not) with a number of different programs. In contrast, in compliance markets, some of the responsibility for determining which credits are acceptable for purchase is outsourced to regulators. However, even in compliance markets, buyers may want to be sure they are buying the highest quality credits among those eligible, while regulators need to decide which credits they wish to allow. The extent to which the need to distinguish quality will become a challenge in sovereign purchases is not yet clear, although in many cases it is likely that sovereign purchasers will take a proactive role in identifying the activities that generate credits.

A number of initiatives and tools are emerging to help buyers respond to this challenge. These responses are informed by the principles for high-integrity credits set out in section 2.2. In their different ways, they aim to help buyers make informed assessments of integrity in a manner consistent with these principles. Three prominent examples are discussed below, while a previous report by The Nature Conservancy provides an empirical analysis of the different approaches that buyers take to due diligence (Hamrick and Myers, 2023).

First, voluntary market coalitions and initiatives are forming to support buyers. The most significant of these is the Integrity Council for the Voluntary Carbon Market – an independent governance body for the voluntary carbon market. It has published both a set of Core Carbon Principles (CCP) and an associated Assessment Framework (AF). The Core Carbon Principles set threshold standards for high-quality carbon credits. The Assessment Framework is then intended to assist in the application of the CCPs, in part by defining which types of carbon-crediting programs and methodologies are CCP-eligible (The Integrity Council for the Voluntary Carbon Market, 2023). This should make it easier for buyers to determine whether programs and associated standards possess or lack some of the essential elements that can promote integrity such as independent third-party verification and validation. The use of the CCPs has been further supported by another industry initiative, the Voluntary Carbon Markets Integrity Initiative (VCMI), which has set out guidance regarding the claims that might be made by voluntary buyers (as discussed further in section 3.5 below). The VCMI recommends that companies should only purchase and retire CCP-Approved credits (Voluntary Carbon Markets Integrity Initiative, 2023).[72] A further relevant body is the International Carbon Reduction and Offsetting Accreditation (ICROA) which seeks to certify best practice in GHG emissions reduction and offsetting through the use of high-quality carbon credits, with accredited organizations permitted to use the ICROA Accreditation Label (ICROA, 2023).

Second, NGOs are providing assessment tools. One example of this activity is the Carbon Credit Quality Initiative developed by EDF, WWF-US and Oeko-Institut (CCQI, 2022) which has assessed several project types, including afforestation and reforestation projects, and plans to assess additional project types, including REDD+ and J-REDD+ soon. This initiative identifies key criteria for assessing quality and provides a methodology for evaluating credits against these criteria. This takes into account the project type, the rules and

71 The quality of credits available from some platforms have proven to be particularly controversial, especially REDD Reduction Units (RRUs) derived from REDD.plus. RRUs are established through countries following the UNFCCC's REDD+ framework but with the results of these activities then used as the basis for credits. As such, it can be seen as a move towards jurisdictional crediting. Advocates for purchases of these credits argue that these units provide an important way for scaling up finance. flows to tropical forest countries (Müller et al., 2022; REDD.plus, 2023). However, many other stakeholders, including EDF, have argued that that RRUs lack integrity in important ways, including the lack of an independent third-party audit (Alvarez Campo and Rattenbury, 2022; Moroge, 2022).

72 In the period before an assessment of CCP eligibility has been undertaken on a particular program and methodology, the VCMII recommends use of credits recognized as Eligible Emission Units under the CORSIA scheme which, as noted in Section 3.1, includes credits derived from ART+.

methodologies used by the carbon crediting programs, and the host country in which the project is implemented. The initiative offers a web-based scoring tool supported by these assessments.

Third, private sector rating agencies provide assessments of credit quality. Relevant companies include Sylvera, Be Zero, Calyx, and Renoster, among others. These companies assess the quality of credits based on a number of criteria such as additionality, permanence, and co-benefits. They typically provide both an overall score and a score for each key criterion. In the case of NCS credits, these agencies often make use of remote sensing data. In some ways, their role is analogous to that performed by credit rating agencies for debt/bonds. However, concerns have been raised that the methodologies used in these assessments are opaque (Filmanovic, 2022).

3.5 What information should buyers report about the use of credits?

Particularly in voluntary markets, there is emerging best practice on how, at the point of retirement, end-users can credibly communicate how they are using carbon credits and where they source them. This best practice has emerged as a result of concerns about greenwashing – that companies make can make claims regarding their climate change performance in order to generate positive brand image while their actual performance falls (significantly) short of the image portrayed. Buyers face increasing scrutiny in relation to two issues:

1. *The nature of the climate claim being made.* Voluntary market credit buyers can make various claims about their climate goals or the status of their emissions reductions. For example, buyers often claim to be "carbon neutral" (or "negative"), "climate neutral" (or "negative"), "carbon free", "climate friendly", "climate positive" or to have achieved or be working towards "net zero goals." While there remains some ambiguity about these terms, and differing practices in different countries, there is growing agreement, at least among some academics and civil society groups, on some aspects, and especially on the difference between a net zero and a climate/carbon neutrality claim. Specifically, a claim that a buyer will achieve or has achieved net zero would apply to a buyer's whole operations and would require that, at the point of reaching net zero, the buyer is only purchasing removal credits to neutralize residual emissions that cannot feasibly be eliminated. By contrast, a claim of carbon or climate neutrality is likely to mean that the emissions associated with a company, product or service have been offset by an equivalent number of credits, which might be sourced from either reduction or removal activities (Trouwloon et al., 2023).
2. *The nature of the credits used to deliver against any claim.* There is growing pressure for buyers to be more transparent about the provenance of the credits they use including, as discussed further below, country, vintage, standard-setting body etc.

These two issues are closely inter-related. As noted above, there is a growing but contested view that a voluntary market buyer claiming to be net zero should purchase credits for offsetting purposes only from emission-removal activities. Some argue that this restriction should apply only when we reach global net zero. But, even beyond this, some have argued that credits from a range of activities should not be considered equivalent to a voluntary market buyer reducing its own emissions, in other words, that they should not be considered as 'offsets'. The implication would be that the credit should not be used to support the achievement of a quantified emission target (e.g., climate neutrality). Instead, the credit purchase would (only) demonstrate that the buyer is helping to contribute to global decarbonization efforts. In other words, they should make a contribution claim, potentially as part of a beyond-value-chain mitigation strategy. As noted above, some academics and activists have argued that buyers of HFLD credits should only use them to make these contribution claims, although, as also noted, others take a very different view due to the concern that the business case for purchasing such credits will be lower, which will reduce the financial support that crediting provides for these activities. A similar debate also arises in relation to some of the credits purchased under Article 6 of the Paris Agreement, especially those credits not associated with a credible corresponding adjustment, as discussed in more detail in section 4.5 below.

Pressure for buyers to improve disclosures is coming from both policymakers and industry initiatives. Buyers need to stay attuned to developments in relation to both elements.

Policymakers addressing these issues are looking to leverage company sustainability disclosures. These disclosures are often, but not always, targeted at the investment community. Box 3.1 explores some high-profile examples. At the time of writing, the outcome of these draft regulations and/or recommendations have not all been finalized. However, they all indicate a growing regulatory emphasis on transparent communication of credits/offsets within the voluntary market.

A growing number of guidelines are available to buyers to support them in making careful and credible climate-related claims. For example, the Science Based Targets initiative (SBTi), referred to above, provides support on target setting and influential guidance on what it means to be net zero, although it provides less guidance on the claims than should be made based on credit purchases. The Climate Pledge, the Race to Zero campaign and the Voluntary Carbon Markets Integrity Initiative also provide guidance and support, while the International Standards Organization is developing a standard on carbon neutrality (ISO, n.d.). There is an ecosystem of other actors and initiatives that support this work including The Greenhouse Gas Protocol, which provides a framework for companies to calculate and categorize their GHG emissions. Various consulting firms can provide verification of companies' emissions reporting and carbon/climate neutrality claims. However, despite the good intentions associated with each of these initiatives, and the support that is available, some express concern that the range of different activities can cause confusion.

The Voluntary Carbon Markets Integrity Initiative encourages, and provides a framework to support, buyers in the voluntary market to improve the transparency of the information they provide on the use of credits. This initiative has developed a four-step Claims Code of Practice . The second step "Select a VCMI claim to make" identifies three tiers of claims according to the extent to which purchases and retirements of high-quality credits relate to a company's remaining emissions. The third step – "Meet the required carbon credit use and quality thresholds" - requires that users report information on, among others, the number of credits purchased and retired, the certification standard used for the credits, the project ID and retirement serial number and date, the host country, the credit vintage, the methodology/ project type, and whether the credit was associated with corresponding adjustment. The fourth step requires obtaining third-party assurance of the reported information (Voluntary Carbon Markets Integrity Initiative, 2023). This approach aligns closely with the equivalent principle articulated in the Tropical Forest Credit Integrity Guide for Companies and the guidance on reporting transparency in the Natural Climate Solutions Alliance Buyer's Guide to Natural Climate Solutions.

Currently, actors from the Global South and supply-side countries are underrepresented in the groups focusing on improving transparency. Indigenous peoples are particularly underrepresented. Inadequate opportunities for participation risk procedural inequities that could lead to outcomes that do not adequately reflect the needs and challenges of the most vulnerable communities and/or result in guidelines that are not implementable by credit suppliers. Capacity building for credit suppliers to ensure that they can provide buyers with necessary disclosure information will also be important.

BOX 3.1

EMERGING GUIDANCE AND RULES CONCERNING CREDIT USE WITHIN COMPANY SUSTAINABILITY DISCLOSURES

In the U.S., a proposed rule by the Securities and Exchange Commission would require public companies to "disclose the role that carbon offsets or [renewable energy credits (RECs)] play in the registrant's climate-related business strategy." (Securities and Exchange Commission, 2022)

This is largely in line with the suggestion emerging from the International Sustainability Standards Board (ISSB). Established after COP26, the ISSB aims to establish a global baseline of best practices for corporate sustainability disclosures and many countries are expected to adopt ISSB recommendations as mandatory requirements. Its climate standards envisage that companies must disclose their use of credits, including their use of NCS credits, when describing their climate transition planning (International Sustainability Standards Board, 2023).

In the European Union, the European Sustainability Reporting Standards (ESRS) , which will apply to both public and private companies above a certain size, require companies to disclose their use of carbon credits in cases where the company has made a public climate commitment. Otherwise disclosures about credit use would be optional. One feature of the European regulation is that when those making disclosures are making public claims about GHG neutrality that involves the use of carbon credits, it shall explain "the credibility and integrity of carbon credits used, including by reference to recognized quality standards". However, it does not

specify which standards should be used. These proposals have recently been complemented by a Proposal for a Directive on Green Claims. This would require that those making climate-related claims about their organization or products to prioritize their own emission reductions and to be clear about the extent to which any claims depend on the purchase of offsets, whether these are reductions or removals, and the methodology used to generate them (European Commission, 2023).

In the UK, listed companies, as well as asset managers and regulated asset owners will be required to provide transition plans from 2023. The UK's Transition Plan Taskforce has been set up to provide guidance on what these plans should contain. Its recommendations include that companies making disclosures should disclose their use of credits separately from their GHG emission reduction targets and provide information on why the company is using carbon credits, and how the use of credits supports progress towards targets. It also reinforces the expectation that companies should use credits in a manner consistent with the mitigation hierarchy, as set out in Section 3.2 (Transition Plan Taskforce, 2022).

RECOMMENDED REFERENCE MANUALS AND FURTHER READING

Ecosystem Marketplace website

Hamrick, K. and Myers. K. (2023) Offsets as Ordered: Buyer Due Diligence to Ensure Carbon Credit Quality

Natural Climate Solutions Alliance (2023) A Buyer's Guide to Natural Climate Solutions Carbon Credits

SBTi (2022) Net Zero: Urgent Beyond Value Chain Mitigation is Essential

Tropical Forest Credit Integrity Guide

Trowloon, D., Streck, C. Chagas, T. and Martinus, G. (2023) Understanding the Use of Carbon Credits by Companies: A Review of the Defining Elements of Corporate Climate Claims, https://doi.org/10.1002/gch2.202200158

Voluntary Carbon Markets Initiative (2023) Claims Code of Practice

World Bank, State and Trends of Carbon Pricing (updated annually)

4. MARKETS FOR NCS CREDITS – DOMESTIC AND INTERNATIONAL

KEY TAKEAWAYS

In this section we discuss the key issues that arise when NCS buyers and sellers come together in market transactions for NCS credits.

1. Buyers and sellers can exchange credits either through over-the-counter (OTC) transactions, that might either be directly negotiated between a credit supplier and an end buyer or mediated through a broker, or they can transact on a market exchange. The former offers buyers and sellers the flexibility to tailor the transaction to meet their respective needs. The latter offers the prospect of scale, liquidity and greater market transparency. The majority of NCS credits are currently traded in OTC transactions, although exchanges are becoming more popular.

2. Buyers and sellers of NCS credits may be based in the same country. However, the greater benefits for both buyers and sellers comes from international transactions. This has the potential to significantly reduce the global costs of decarbonization which, in turn, could increase the willingness of parties to raise their mitigation ambition.

3. The institutional/organizational options available to sellers and buyers who are contemplating the transaction of NCS credits across borders vary according to the extent of government involvement in the transaction. For sellers, significant government involvement can allow them to realize the benefits of jurisdictional crediting; increased control over whether they realize their NDC; and opportunities to invest the gains from trade towards other development goals. This should be traded off against the risk that strong government involvement erodes competitive dynamics between suppliers, making the credits from the country less attractive to buyers. On the buyer side, strong government involvement provides close control over the role of NCS credits in national climate strategy, and the possibility to align credit purchase decisions with wider foreign policy objectives. However, it may reduce the extent to which buyers compete to explore new ways to source credits and reduce emissions, while credit purchase may become distorted by non climate policy objectives. These different demand and supply options interact to create a range of potential institutional options for international transactions including Climate Action Teams and ETS linking.

4. When NCS and other credits are traded across international borders a critical question is whether the host-country government – the government in the country where the NCS activity takes place – should make a 'corresponding adjustment' to its emissions inventory to reflect the international transfer. In cases where the NCS credit is to be used to meet NDC commitments in the buyer's country the need for a corresponding adjustment is clear. This will prevent double counting of efforts towards the Paris Agreement targets. However, if the purchased credit will be used to meet a voluntary commitment, rather than being used to meet NDC (or equivalent) requirements, then the Paris Agreement rules do not require a corresponding adjustment, leaving the decision on whether to make a corresponding adjustment to the government in the host country (and leaving it up to buyers to decide whether they wish to purchase credits with or without a corresponding adjustment). In these cases, whether to make a corresponding adjustment will require more careful consideration between the buyer, seller and host country government.

4.1 Introduction

In this section, we examine how demand and supply side actors in the NCS credit market come together to create markets, how these markets can be organized, and what design features are needed to ensure that markets deliver robust outcomes. We explore how buyers and sellers transact credits, and the role that different intermediaries play in facilitating these transactions (section 4.2). We also examine the particular opportunities and challenges that arise when market transactions involve NCS credits that cross international borders (section 4.3) and the ways in which buyers and sellers can organize themselves in order to effect these international transactions (section 4.4). Finally, section 4.5 considers some of the specific emissions accounting issues that arise when NCS credits are traded across international borders and, in particular, the question of whether these transactions should be accompanied by host countries making a so-called 'corresponding adjustment'.

We do not examine in detail the different contracting structures i.e., spot market transactions or various derivative contracts such as forwards or options, that may underpin relationships between buyers and sellers. This is covered in section 5.4, as these contract structures have a significant impact on the ease of access to capital for NCS activities.

4.2 What are the options for buyer and sellers to trade credits?

Buyers and sellers can choose from two main ways to trade NCS credits (or derivatives of NCS credits):

- Over-the-counter (OTC) transactions take place between one or more buyers and a seller. Potentially with the involvement of a broker, they negotiate and execute the contract and together decide what information about the transaction will be made public. The seller of credits is sometimes the project developer or the jurisdiction responsible for the activities that generate credits. For example, Hess Corporation purchased jurisdictional REDD+ credits directly from the Government of Guyana (Hess Corporation, 2022). Most trades are done through either trading houses such as Mercuria, Trafigura or Marex or through the trading desk of an energy company or bank. Alternatively, the seller may be a retail trader, such as TerraPass or atmosfair, who purchases credits from a number of suppliers and bundles them into portfolios before selling to an end user. When arrangements are facilitated by a broker, they will help match buyers and sellers, support due diligence and facilitate the development of contracting arrangements. They will receive a brokerage fee for these services, typically calculated as a percentage of the total sale price.
- Buyers and sellers may also transact through exchanges, which are private electronic trading platforms that centralize the communication of bid and offer prices for credits to all market participants, who may respond by buying or selling at one of the quotes, or by offering a different quote. Examples of exchanges where physical NCS credits can be bought – known as 'spot' markets – include Xspansiv, CBL and AirCarbon Exchange. There are also futures exchanges such as CME, ICE and Nodal. The nature of exchange-trading facilitates the creation of standard products where all credits have certain characteristics, with limited customization for individual buyers. For example, the N-GEO product on the CBL exchange consists only of credits from AFOLU projects that have been accredited and verified under Verra's Delivering Climate, Community and Biodiversity (CCB) program as 'creating net positive benefits for climate change mitigation, for local communities and for biodiversity' (Verra, 2022d).

While these two models are presented as alternatives, in many cases transactions may involve a combination of credits being negotiated OTC but with financial settlement – in other words the delivery of the credits or derivatives in exchange for money – making use of the services provided by an exchange.

OTC transactions provide a high degree of flexibility for both buyers and sellers of NCS credits. The buyer can choose credits from a particular NCS activity in a particular location or implemented by a particular partner. The seller can choose to transact with a buyer with whom it has a trusted relationship and/or, if the arrangement is made early enough in the process, who it can work with to increase the likelihood that credits will be successfully generated. Specific contracts can be structured to manage various risks in ways that work for the seller and buyer. In addition, the customized nature of the relationship may make it easier for sellers whose NCS credits are associated with activity attributes that buyers particularly value (such as significant co-benefits or well-designed benefit-sharing mechanisms) to command a higher price for such credits.

Exchanges help reduce transaction costs, while the standardized contracts facilitated by exchanges reduce 'search costs' and help promote transparency and liquidity. The ability to trade standardized products via exchanges means that buyers and sellers do not have to spend a lot of time searching for a specific

counterparty and then both evaluating the risk and making administrative arrangements to transact with that counterparty. Instead, both buyers and sellers on an exchange can directly face the exchange and be confident that the (standard) contract will be delivered, making the transaction process easier and quicker. The exchange will also attract traders/market-makers who will further increase market liquidity. In addition, the information provided by the exchange – for example on prices or quantities transacted – increases market transparency, making it easier for all market participants to make informed decisions. As the market grows, this transparency makes it less likely that buyers (or sellers) can exploit information or power asymmetries that may be more prevalent in OTC transactions.

To date, most transactions of NCS credits[73] have been negotiated OTC, either bilaterally or through brokers. The dominance of these transactions in part reflects the importance of the relationship between credit buyers and sellers in supporting the development of the NCS activities and credits, as well as the significant heterogeneity in NCS activities and related credits. The underlying heterogeneity can make some market participants reluctant to accept standardization and therefore make it difficult for exchange operators to provide the necessary information and infrastructure to support trading of NCS credits and derivatives. The early phases in the trading of other commodities, such as agricultural commodities, were also dominated by OTC trades. However, mirroring the historic pattern seen for commodities, the approach to trading NCS credits may be changing. As noted above, there are now a number of exchanges providing a platform for NCS credits and associated products. This growth is attracting greater regulatory interest with, for example, the US's Commodity Futures Trading Commission recently announcing an alert notifying the public on how to identify and report concerns related to fraud and manipulation on exchanges facilitating carbon credit transactions (Commodity Futures Trading Commission, 2023).

Credit transactions will be reflected in the relevant registries. As discussed in section 2 (supply), the issuance of carbon credits, including verification that the number of credits is consistent with the expected change in net GHG emissions, is typically undertaken by a carbon crediting program. These programs require that any information regarding the change of ownership of a credit be recorded in their registry. Similarly, if the buyer decides to retire the credit – meaning that it has been claimed by a particular buyer and cannot be resold or used again – this claim will also be recorded in the relevant registry.[74] As noted in section 2.3 above, the Climate Action Data Trust, founded by the International Emissions Trading Association and World Bank, provides a peer-to-peer connection between different registries with the aim to link, aggregate and harmonize the underlying data across different registries. This is intended to increase transparency concerning credit transactions and retirements and hence build further trust in the market (Climate Action Data Trust, 2023).

4.3 Should buyers and sellers transact NCS credits across international borders?

In some situations, buyers may choose, or be required, to purchase credits generated only (or largely) from activities that take place in the same country or region. For example, in compliance markets, regulators may want to limit credit purchases to those generated within the same jurisdiction in order to ensure that the jurisdiction as a whole gains from the co-benefits of emission reductions, or because they may find it easier to get reassurance that domestically generated credits are of high integrity. For example, in the California cap-and-trade program, there is both a quantitative limit on the use of offsets and a requirement that at least half of these offsets come from projects or activities that provide direct environmental benefits within the state (California Air Resources Board).[75] Similar considerations, such as reputational benefits, may also drive voluntary market participants to prefer to purchase credits from their 'home' jurisdiction.

However, well-designed systems that allow international trading can enhance the benefits of NCS crediting. For sellers, an expanded pool of potential buyers makes it more likely that they can find partners and structure contractual and commercial relationships that suits their needs and preferences. For buyers, meanwhile, the wider range of suppliers available in a global market can help ensure they are able to purchase credits based on activities that reflect their preferences.

More broadly, allowing the trading or transfer of NCS credits can help make global mitigation efforts more effective, enabling a faster transition, while also providing a bigger, and hence more lucrative, market for

73 Although most derivatives of NCS credits, especially futures, have been exchange-traded.
74 Although the identity of the retiree is not required, which makes it more difficult to match claims against action.
75 Entities regulated under California's cap-and-trade program may use compliance offset credits to meet up to 8% of their emissions reduction obligations for emissions through 2020; 4% for emissions from 2021-2025; and 6% for emissions from 2026-2030. At least half of these must be sourced from projects that provide direct environmental benefits (DEBS) in California. (California Air Resources Board, 2023b).

sellers. Ambitious global climate mitigation goals will require technical and political changes to the global economy to deliver energy and industrial emission reductions, as well as major changes in land management to deliver NCS. As significant volumes of NCS-based mitigation are relatively low-cost (Roe et al., 2021),[76] and are already technologically feasible at globally relevant scales, the near-term global deployment of high-integrity NCS can scale up in the near term, allowing ambitious global goals to be met even while deployment of more technologically complex and costly mitigation actions in other sectors occurs more slowly. The corollary is that the growth of international markets allows (potential) credit sellers to have a larger market for credits, making it more attractive to pursue NCS activities, secure the associated co-benefits and realize the revenue flows from credit sales.

In turn, with appropriate checks on global accounting systems and investment frameworks, expanded international markets can the improve the cost-efficiency of global mitigation efforts and facilitate an increase in overall climate ambition. If companies, countries, or others who are considering goals for reducing their emissions are concerned that ambitious mitigation targets will be too costly to achieve, they may be less likely to commit to these targets in the first place. By contrast, knowing that there are opportunities to purchase (more, and potentially higher integrity and lower cost) NCS credits from overseas, they may be willing to commit to more emission reductions (subject to sufficient clarity over the rules and expectations regarding the purchase and use of those credits). In addition, the jurisdictions, farmers, or other land managers who receive revenue from the sale of credits can use these funds for any number of objectives, including deeper emission reductions. The broader the range of mitigation opportunities and geographies that are available to buyers, the greater these potential benefits will be (Piris-Cabezas et al., 2023).

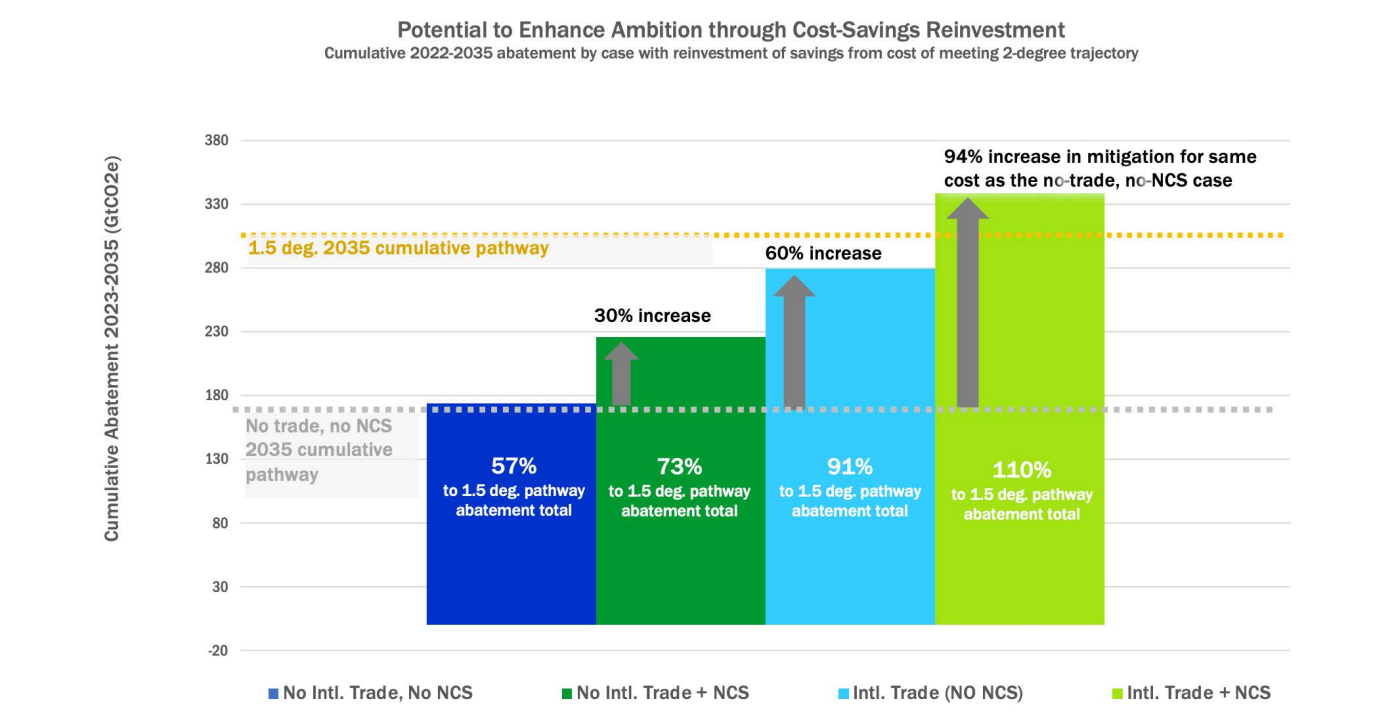


FIGURE 4.1

Results of analysis of mitigation potential from reinvestment of costs savings under various trade circumstances either restricting or including the use of NCS-based abatement credits, compared to a baseline case in which neither international trade of emissions nor NCS credits are used to meet a 2-degree pathway (Gerbode et al., in preparation).

76 Top-down studies of the cost of NCS activities may be likely to underestimate the costs associated with implementation, with monitoring and reporting or ensuring the activities also deliver community and biodiversity benefits.

Economic analysis can help to illustrate the potential magnitude of the impacts of facilitating effective trade of high-integrity emissions reductions. Analyses over the past decade support the idea that cooperative international funding of mitigation activities, whether through market-based trade of credits or through other efficient transfer and cost-sharing mechanisms, has the potential to use global resources more efficiently to address climate change (Edmonds et al., 2021; Piris-Cabezas et al., 2023; Yu et al., 2021). By using trade to allow funds to flow preferentially to the most cost-effective international mitigation options, more funds can in theory be freed up for use to support additional mitigation. Modeling the reinvestment of these cost savings to fund additional mitigation shows the extent to which such trade could help close the emissions reductions gap between current global trajectories and more ambitious pathways.

For example, modeling the economic gains from inclusion of NCS credits in global mitigation trading highlights the potential for large-volume flows of NCS credits to enable huge gains in global ambition. Recent analysis of global mitigation markets by EDF illustrates the potential benefits of trading a broad suite of terrestrial NCS mitigation,[77] assuming high-integrity crediting, to bring higher mitigation goals within reach. As illustrated and described in the caption to Figure 4.1 above, this modeling suggests that cost effective reinvestment of cost savings from global trade of ERRs from a range of NCS activities could nearly double the volume of mitigation achievable worldwide, for the same total cost of mitigation needed to meet only a 2-degree emissions pathway (roughly on par with 2022 Nationally Determined Contributions (NDCs)) in a no-trade, no-NCS baseline. While such analyses are inherently stylized (that is, the true achievable potential for cost-effective mitigation and efficient trade are likely to be somewhat smaller, due to transaction costs and other imprecisions stemming from globalizing NCS cost curves), the results nonetheless illustrate the massive potential of cooperative funding of NCS to amplify global climate efforts.

If NCS activities are conducted under high-integrity systems of crediting and accounting, international trade and cooperation also have great potential to generate benefits for countries in the global South in particular. Under the modeling scenarios described above, the additional NCS activity available through trade—and associated finance flows and revenues from credit sales—would be concentrated in the Global South, especially in tropical forest countries in South America, Sub-Saharan Africa and South-East Asia. Other work supported by EDF also suggests that expected demand for NCS credits from international buyers in the voluntary carbon market could provide the resources to help tropical forest countries exceed the ambition in their NDCs in the period beyond 2030 (Environmental Defense Fund, 2022).

In reality, approaches to international cooperation are likely to be more patchwork or piecemeal than the results of stylized global models. For example, policymakers may only allow a certain amount of overseas credit purchases in order to prioritize domestic emission reductions that secure local co-benefits or reduce lock-in risks (see Section 3.2). Alternatively, only certain countries may choose to explore international cooperation opportunities in more or less exclusive arrangements (see the discussion on Climate Action Teams in Section 4.4 below). Nonetheless, the results help to illustrate how international trading can increase the efficiency of climate action and the scale of the additional mitigation that this increased efficiency can help unlock.

There are also other practical challenges to unlocking these market benefits:

- First, achieving efficiency benefits from global trade of NCS mitigation relies on the assumption that the traded credits – like all mitigation units – meet the standards of high integrity discussed in Section 2.2. While all aspects of integrity are important, the issue of baselines (see discussion in Section 2.3.4) is particularly relevant in the context of raising ambition. All else being equal, international crediting can provide an incentive to set unambitious baselines: for sellers, a weak baseline will maximize the number of credits that can be sold to international partners; for buyers, a weak baseline will tend to make credits cheaper (World Bank et al., 2016). This form of moral hazard can be overcome by ensuring that the approach to determining baselines is transparent and subject to independent scrutiny. It is also less likely to occur if partners can demonstrate that they have similar goals in terms of addressing climate change at pace and scale.
- Second, the analysis assumes that buyers will 'recycle' (some of) the cost savings associated with international cooperation into increased ambition. This assumption is closely aligned with the NDC

77 Gerbode et al., in preparation, uses NCS mitigation curves derived from bottom-up analyses of potential from 13 mitigation pathway, based on estimates and datasets aggregated in Roe et al. (2021). Country/region level abatement responsibilities are distributed based on NDC commitments as of June 2022.

ratcheting process whereby countries are expected to regularly update their NDCs, with each update representing their highest possible ambition at that time. If international cooperation can help reduce the cost of mitigation, then countries (and buyers within countries) may be more willing to engage in this ratcheting process. The dynamic of recycling cost savings into increased ambition will also be more likely if there is a mechanism that can 'punish' those that threaten not to increase their ambition. This may be most likely at the country level, where it might be achieved through trade measures or other tools of international diplomacy. At present, however, there is no formal mechanism to ensure that cost savings are ploughed back into further mitigation ambition.

- Third, the economic models assume that the potential credit sellers in developing countries will be able to implement effective actions and policies that accelerate climate action to globally efficient levels. This is a strong assumption for countries with weak institutions and access to capital.

4.4 What are the different models for international cooperation that governments can choose between?

Recognizing the potential benefits available from international markets in NCS (and other) credits, countries have explored a range of different institutional options for such market transactions. One way of categorizing these is by reference to the degree of government influence over the transactions. On both the supply and demand side, three stylized options, that are not necessarily mutually exclusive, can be identified:

- Government-led. In this case, the government is the contracting party and is responsible for either selling NCS credits (and acquiring the revenues) or purchasing NCS credits (and acquiring the right to claim the CO2e reduction or removal that the credits represent).
- Private-led but with government regulation/control. In this case, private parties are responsible for buying and/or selling credits, but the authorities in the location where they are located exercise strong influence over the nature of the transaction. For example, on the demand side of the market, the government authority might set rules regarding which types of credits will be recognized in that jurisdiction as representing a ton of CO2e reduction or removal. On the supply side, regulators might set rules, or provide specific incentives, concerning the NCS activities favored for credit generation, as well as undertake careful scrutiny before granting approval to sell the credit (overseas).
- Private-led but with little or no government regulation/control. Under this arrangement, buyers and sellers transact NCS credits across international borders with no specific additional regulatory requirements beyond those that apply to the trading of other intangible assets. On the demand side of the market, this would mean that buyers could purchase and retire whichever NCS credits they choose and broadly reflects the current set up in the voluntary market (although, as explored in section 3, there is growing guidance and market expectation regarding NCS credit purchase in the voluntary market). On the supply side, governments would set few rules (or provide few incentives) regarding NCS credit generating activities. At the point of international transfer, they would apply little scrutiny over the transfer of the credit.[78]

The differing extent of government involvement brings a series of advantages and disadvantages on the supply side of the market. Significant government involvement in organizing credit supply, and the institutional and regulatory tools that only they can apply, is necessary for the development of jurisdictional crediting, and the associated benefits that many analysts have identified for this model (see Section 2.3). Greater government involvement also means that it is more likely that any difference between the price received for credits and the cost of generating credits can be re-allocated towards other social or development objectives. Close government involvement also means that the potential implications from the international transfer of the credits for the country achieving its NDC will be taken into account.[79] On the other hand, reducing the extent of government involvement in the supply of credits will give more latitude for different credit suppliers to compete against each other to best meet the interests of buyers. It also avoids the corruption risks that might

78 This refers to the issues of corresponding adjustments which is discussed more fully in Section 4.5. Limited scrutiny could result in one of two outcomes regarding the application of corresponding adjustments. Either no corresponding adjustment would be issued, or corresponding adjustments would be issued without careful consideration.

79 This refers to how carefully the host country government considers whether or not to apply a corresponding adjustment. As discussed in more detail in Section 4.5, if the absence of this careful scrutiny means that the host country government issues corresponding adjustments liberally then it could threaten the country's ability to meet its NDC. On the other hand, if the limited government involvement means that no corresponding adjustment is issued then, depending on who the expected buyer is (and how they intend to use the credits) this may result in the credits being perceived as having low environmental credibility, reducing their value.

arise if the government officials manage rents arising from the difference between credit prices and credit supply costs.

Likewise, governments need to consider various factors when deciding how much direct involvement they will have over NCS credit purchases. Greater government involvement in the purchase of credits, particularly for use for compliance with regulations, will make it easier for the government to ensure that the use of NCS credits is consistent with its overall mitigation strategy. In many cases, this would be expected to lead to greater demand for high-quality credits. Governments may also value close involvement in NCS credit purchase as it will allow greater alignment with broader policy and diplomatic objectives. On the other hand, greater government involvement may reduce the ability or incentives of buyers to compete in finding innovative ways to procure credits, while close government involvement could lead to credit purchase decisions (in terms of the types of credits purchased, or the countries from which they are sourced) being driven by considerations that lead to less desirable outcomes from a climate mitigation perspective.

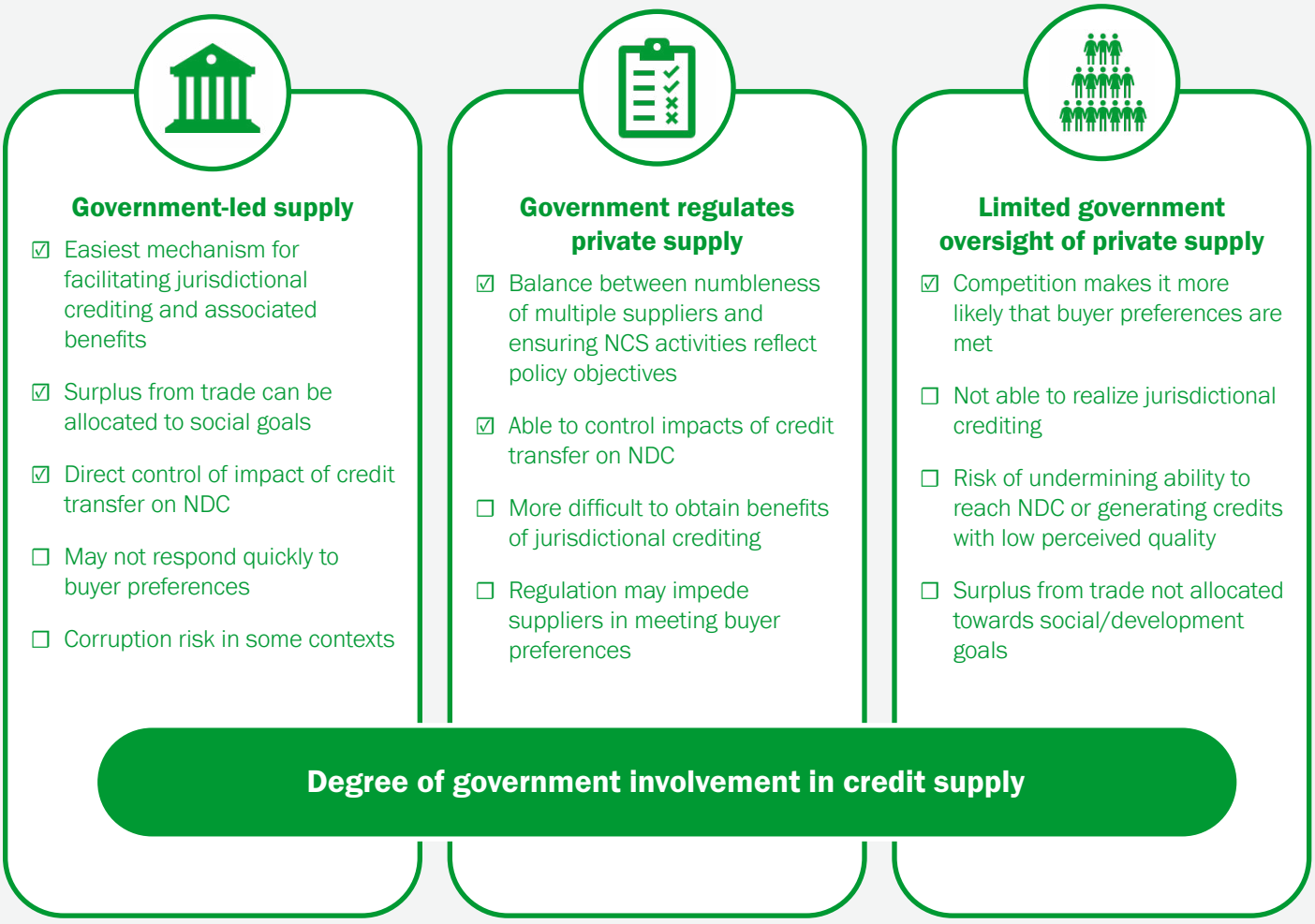


FIGURE 4.2
Pros and cons of different institutional options for organizing international supply of NCS credits

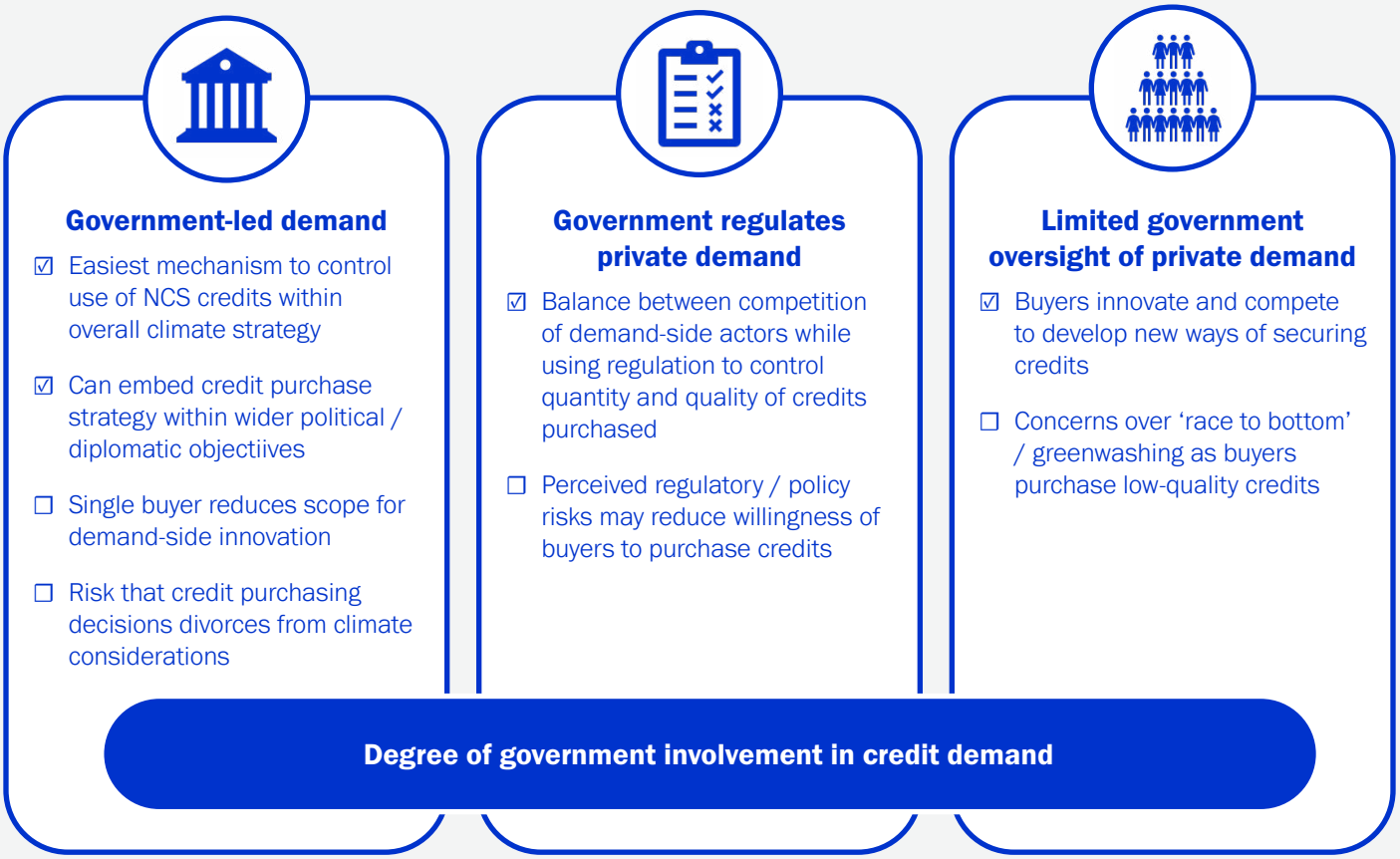


FIGURE 4.3

Pros and cons of different institutional options for organizing international purchase of NCS credits

The range of different institutional options available in relation to both supply and demand imply a wide range of different cases through which international transfers can take places. Consideration of the different cases provides a number of insights.

- It is possible to arrange international transfers in a number of different ways that allows for close government cooperation. One way in which this can be achieved is the idea of a Climate Action Team, where the governments of two or more countries reach a political agreement determining the transfer of credits. Box 4.1 explores this model in more detail. Another model that also requires close government cooperation is Emission Trading System (ETS) linking, but in this case and, as explained in Box 4.2, specific buying and selling decisions are undertaken by private actors. A further option involving government involvement on the demand and supply side are models like Japan's Bilateral Credit Mechanism (BCM). In this case the demand for credits is provided by a government entity but supply is provided through private actors, with a political agreement between the buyer and host country government determining which credits will be transacted.
- Unregulated buyers can enter into a wide range of different arrangements. This can include direct purchases with governments – such as the Government of Guyana/Hess transaction discussed in Section 4.1 above. These buyers can also purchase from private actors on the supply side subject to varying degrees of regulatory oversight. Section 4.5 looks at the key issues that arise in these cases in more detail.
- The most unlikely combination is that of government buyers purchasing from unregulated suppliers. Government-led purchases can be expected to require agreement with the host country where the NCS crediting activities are located, while limited regulation on the supply side of the market may raise significant concerns regarding the credibility of any NCS credits purchased (as explored further below) that may be of particular concern to government buyers.

BOX 4.1

CLIMATE ACTION TEAMS

A Climate Action Team would involve co-operation between the governments of a small group of countries (team members). Countries with high marginal abatement costs, typically developed countries, would provide finance and/or technical assistance to facilitate emission reductions and/or removals in host countries with lower abatement costs, typically developing countries. This cooperation would allow the host country to accelerate its mitigation ambition beyond that implied by its NDC (or a mutually acceptable baseline with greater ambition), including with respect to emission reductions available from NCS activities and pathways. The additional emissions reductions would then be transferred to the high-abatement cost developed country to help it meet its NDC. The credits would be transferred at a price within a range, and a minimum volume of total payments if sufficient credits can be created, established at the outset of the agreement.

Governments working together through a Climate Action Team have a number of advantages.

- By combining NCS credit transactions with broader diplomatic relations, the model can help to overcome some of the mistrust between developed and developing countries on climate (generally) and on the role of carbon markets and crediting (specifically).
- The host country government retains flexibility in how it chooses to incentivize emission reductions. This means that the Climate Action Team model is open to a wide range of countries. This is in contrast, most notably, to the ETS linking model (see Box 4.2) which requires all parties to both have an ETS and then be willing to make regulatory compromises over that ETS in order to realize the benefits of linking.
- Determining ranges for key parameters of the transaction at the outset of the agreement means that the host country has more certainty about the value of carbon credit revenue they will receive if they are successful in accelerating mitigation.
- It allows the potential benefits from jurisdictional crediting outlined in section 2.3 to be realized, including the reduced risk of leakage and the use of national inventories to monitor performance and reduce transaction costs.

However, interested governments need to be aware of a number of potential pitfalls.

- The model relies on finding a small number of like-minded country governments to be part of the 'team'. At present it is unclear how these agreements will evolve and how long negotiations might take. Furthermore, while the model derives many of its benefits from its focus on a small number of like-minded countries, this may make it difficult to scale up to the global level.
- Committing to purchase large numbers of credits in advance reduces later opportunities for competition and price discovery to drive down costs or encourage innovation. For example, if a small country like New Zealand and Chile were to participate in a Climate Action Team, this would likely make it more difficult for New Zealand (or compliance entities in New Zealand) to later enter into an transaction to support innovative NCS solutions in a third country such as Brazil, even if the opportunities in Brazil were intrinsically more attractive, for example because they were lower cost or had higher co-benefits.

BOX 4.2

ETS LINKING WITH NCS ACTIVITIES

ETS linking refers to the idea that units issued in one ETS can be used to meet compliance obligations in the ETS of the other jurisdiction. A 'unit' refers to the right to emit one tonne of CO2e. A unit can include credits, as well as 'allowances' that might either be purchased at auction or freely allocated to compliance entities.

To use linking as a means of facilitating the transfer of NCS credits would require that at least one ETS in the linked system covers NCS activities. In this case, NCS activities undertaken by compliance entities that reduce emissions would mean that those entities would need to surrender fewer units, potentially providing a surplus to sell to other compliance entities in the linked system. The most plausible way to incorporate NCS

activities that result in emission removals within an ETS would be through establishing 'removal units' that would be issued when removal activities are successfully delivered. These units could either be used to meet the compliance obligations of the entity responsible for the removal activity, or sold to other compliance entities in the linked system.

There are examples of countries including NCS activities within their ETS. This is the case, for example, in New Zealand, whose ETS covers the forestry sector (although its ETS is currently not linked with any other system).

The benefits of linking ETSs have been discussed extensively (World Bank & International Carbon Action Partnership, 2021). In essence linking allows for the cost-saving benefits of international credit trading to accrue to the ETS participants. Especially in smaller ETSs, linking may also help to reduce price volatility that might otherwise occur due to liquidity shortfalls. Because linking ETSs promotes price convergence, it can also help reduce concerns around emissions leakage and/or competitiveness that may arise from asymmetric emissions pricing across multiple jurisdictions. The linking of the California and Quebec ETSs shows how linked ETSs across international boundaries can be sustainable and deliver important benefits.

However, ETS linking also poses challenges in general and specifically in the context of NCS activities. Despite the well-publicized benefits of linking, there are relatively few examples of links between ETSs. One reason for this may be that, rather than reducing price volatility, it may increase volatility as it exposes participants to factors that affect prices in other countries. More fundamentally, when two jurisdictions link their ETSs, their respective regulators must agree on key design elements which subsequently limit their flexibility to shape market outcomes. In particular, jurisdiction-specific regulators will have less ability to influence the ETS price – which will converge across the linked jurisdictions – or to influence where emission reductions take place – which will be concentrated in the jurisdiction with the lower cost abatement options. The need to relinquish some or all regulatory control over these outcomes means that linking tends to be undertaken by jurisdictions with high levels of mutual trust and often with similar climate policy aspirations. Paradoxically, however, these similarities across jurisdictions may then reduce the gains from linking. Finally, few jurisdictions currently include sectors where NCS activities predominate within the sectoral scope of their ETSs, largely because of some of the perceived challenges of monitoring emission changes and permanence. While the case of New Zealand suggests that these challenges can be addressed, this limits the extent to which this mechanism can currently support international trade in NCS credits/units.

4.5 When should host country governments make a corresponding adjustment?

4.5.1 Introduction

Recognizing the potential benefits from international carbon markets, including for NCS credits, the Paris Agreement sets out two mechanisms through which international transactions of NCS (and other) credits could take place.

- Article 6.2 of the Paris Agreement sets out a 'bottom-up' accounting framework for bilateral or multilateral cooperation between one or more Parties to the Paris Agreement. This is deliberately intended to cover a wide range of approaches for organizing the international transfer of NCS and other credits, including emissions trading systems that link across national borders and Climate Action Teams. It covers both NCS credits derived from bottom-up projects and from jurisdictional mechanisms.
- Article 6.4 of the Paris Agreement establishes a centralized UN mechanism that, once the detailed rules and methodologies are agreed, will issue credits resulting from specific projects and activities. This is expected to build on the experience of operating a similar centralized mechanism, the Clean Development Mechanism, under the Kyoto Protocol.

Within these mechanisms, the concept of authorization and 'corresponding adjustments' has been developed to address the concern of double counting. A big concern that emerged in the negotiation of these articles was the risk of double counting: the possibility that the emission reduction or removal underpinning the credits might be counted towards the NDC in the host country, while the resulting credit is counted towards the NDC in the buying country. To address this, under the Paris Agreement, NCS and other credits transferred through these mechanisms will, in certain cases, be 'authorized' by the host country as Internationally Transferred Mitigation Outcomes

(ITMOs). It is only once a credit has been recognized as an ITMO, that it can be counted towards the NDC in the buying country. This is to be achieved through the countries involved in the trading of the ITMOs having their GHG emissions inventories[80] adjusted:

- The host country would have its emissions inventory increased by the number of authorized ITMOs sold
- The country associated with the buyer would have its emissions inventory reduced by the same number of authorized ITMOs purchased

All else being equal, a trade of authorized credits will therefore reduce the buying country's emissions balance, helping the buying country to meet its NDC emissions targets. But for the country selling authorized credits, this adjustment to its emissions inventory could mean that it needs to raise the level of other mitigation in order to meet its NDC targets. This act of adjusting the national emissions inventories of transacting parties to account for internationally transferred credits (and other ITMOs) is referred to as making a **'corresponding adjustment' (CA).**

All units transferred under Article 6.2 and intended for use in the buying country's NDC need to be authorized, and for a CA to be made. It is also expected that many of the units transferred through A6.4 will also be authorized and hence be associated with a CA. Authorized A6.4 are also commonly referred to as ITMOs.

However, for Article 6.4, the Paris Agreement rules recognize the possibility for the transfer of unauthorized, so-called 'mitigation contribution' units. These would not require a CA. Because they are not authorized, these units could not be used towards the NDC of the buying country, but are intended to recognize that the activities that have led to the credit being generated have 'contributed to the reduction of emission levels in the Host Country.' At present, the concept of 'mitigation contribution' units is recognized only under A6.4.

Figure 4.4 illustrates these options.

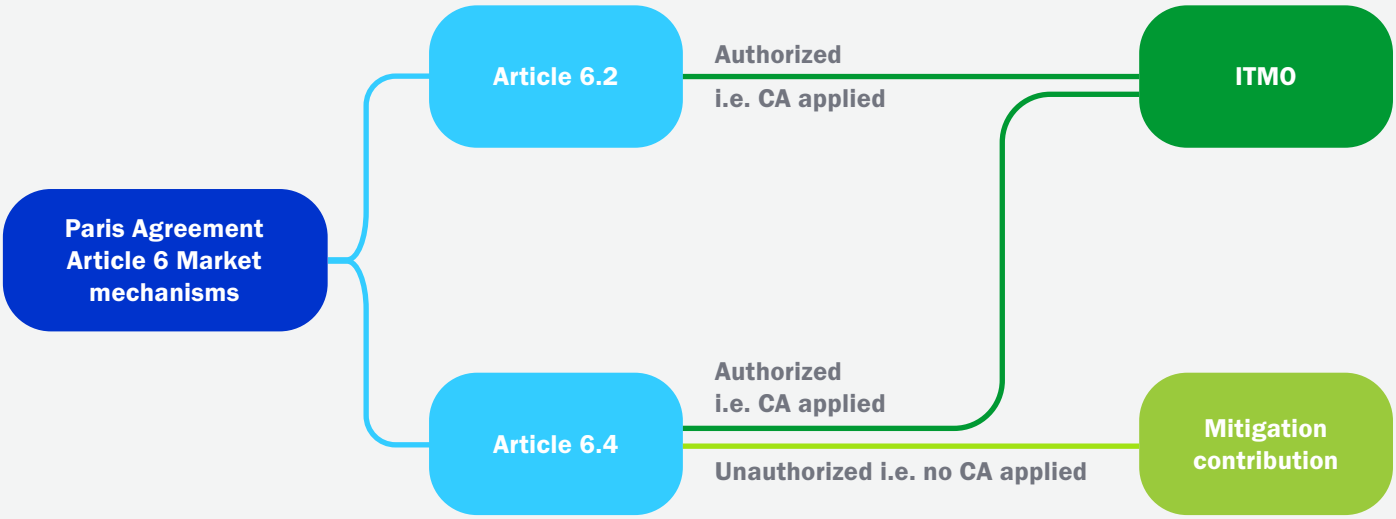


FIGURE 4.4
Application of corresponding adjustments under Article 6 of the Paris Agreement
Source: Adapted from Granziera et al., 2023

80 A GHG emissions inventory is an accounting of the GHG emissions released into the atmosphere from all source categories in a certain geographical area and within a specified time span (typically a year). The UNFCCC has established various rules and procedures regarding the compilation of national GHG emissions inventories (UNFCCC, n.d.).

The landscape is further complicated by CORSIA and voluntary market trading, which were developed outside of these Paris Agreement mechanisms. The 'rulebook' for Article 6 was agreed at COP26 in Glasgow at the end of 2021 and key operational details remain subject to an international negotiating process. At the same time, as documented in Section 3, there has been a significant increase in voluntary market purchases of credits, particularly since 2020, while CORSIA entered into operation in 2021.

Within this context, there has been nuanced disagreement historically over which international transactions of (NCS) credits should be subject to a CA. The following discussion considers this issue in relation to each of the four types of buyers identified in Section 3:

- Sovereign countries that are parties to the Paris Agreement
- Corporates or other entities purchasing (NCS) credits to meet domestic regulatory compliance obligations
- Airlines purchasing (NCS) credits under the CORSIA scheme which, as noted in section 3, has been developed as emissions from international aviation sit outside the Paris Agreement and its system of NDCs to reduce emissions.
- Corporates and other entities purchasing (NCS) credits in the voluntary market.

4.5.2 CAs for sovereign, domestic compliance market and in CORSIA

In each of these cases, the answer is relatively simple and uncontroversial: a CA is typically necessary to ensure there is no double counting of mitigation credits within key global accounting frameworks (as discussed in Section 2.3.2).

The simplest case relates to sovereign purchases of emission credits by Parties to the Paris Agreement where the buyer wants to use the credits to meet its NDC. These purchases will be made under either Article 6.2 or Article 6.4. In both cases, the sovereign will make the purchases as part of a strategy to meet its NDC; in these cases, the need for the host country to make a CA to avoid double counting is clear. Without a CA there would be a significant risk that the host country would both claim to have reduced its emissions/increased its removals and also sell the same emission reduction or removal to another party, creating the impression of more mitigation achieved globally than has actually occurred. In this case, CAs are a necessary though not sufficient condition for ensuring environmental integrity.[81]

The same logic will typically apply to the purchase of NCS credits by compliance entities. In many cases, the compliance mechanism (typically an ETS or carbon tax) will be an important means by which the country, as a party to the Paris Agreement, is intending to meet its NDC target.[82] Since the emissions performance of each entity covered by the compliance mechanism will help determine whether the country meets its NDC, any use of international credits by these compliance entities should be matched by CAs by the host country government. Again, this will ensure that emission reductions or removals counted towards one NDC are not also counted towards another NDC.

The need for a CA is also recognized when airlines purchase NCS credits to meet their CORSIA obligations. International aviation emissions are not covered by the Paris Agreement. In order to ensure that the emission reductions delivered by the sector under CORSIA are additional to those achieved under the Paris Agreement, host country governments would need to make a CA when airlines purchase NCS (or other) credits to meet their CORSIA obligations. This is captured by the language of the decisions made at COP 26 that, under Article 6, host countries, as well as authorizing emission credits for the purposes of meeting another country's NDC, can also authorize the use of emission credits for 'other international mitigation purposes'. This is understood to refer to CORSIA.

4.5.3. CAs in the voluntary market

In contrast to these first three cases above, the appropriate treatment of NCS credits when purchased by companies or other actors in the voluntary market has been much more controversial. Currently, voluntary credit transactions take place outside the requirements of Article 6 – although, as the Article 6.4 mechanism develops, many observers expect that a growing volume

81 While the avoidance of double counting is an essential component for environmental credibility in this context, it does not remove the importance that the credits also meet the other high-integrity features discussed in Section 2.3. A CA also does not guarantee that the host country meets its NDC.

82 In some cases the compliance mechanism may operate at a sub-sovereign level, such as a state or region. In those cases where the emissions performance at the state or regional level will be aggregated to assess whether the country has met its NDC (in other words, when the accounting for the state/regional compliance mechanism aligns with the accounting in the national emissions inventory) then the logic stated above applies. However, there may be some cases where the accounting mechanism for the compliance mechanism is not aggregated to determine performance against the country's NDC. This, for instance, is the case for California and the US. In these cases, the arguments for and against applying a corresponding adjustment are more similar to those discussed below in relation to voluntary market purchases.

of voluntary trades will be mediated through this mechanism. As this transition takes place, there is a vociferous debate as to whether purchases made through this mechanism by voluntary market participants should be associated with a CA.

At present, it is up to host countries to decide whether to issue CAs for credits sold internationally in the voluntary market and, likewise, for buyers to decide whether they wish to buy credits with or without CAs. In this context, we summarize below the core arguments on either side of the debate that buyers and sellers need to take into account.

The core argument in favor of requiring CAs for international voluntary market purchases is that they more fully ensure the environmental integrity of the purchase and any related GHG impact claims made by the buyer. Voluntary market buyers, most often companies, often purchase NCS credits from overseas to make progress towards their climate goals. Those in favor of host country governments making CAs for these purchases argue that the credibility of progress towards these targets will be undermined if the emission reductions/removals associated with these credits are also counted towards meeting the host country's NDC. They argue that the host country would have achieved the emission reduction or removal anyway – given the expectations and obligations the host country faces under the Paris Agreement – and that therefore the apparent progress made by the purchaser towards a corporate target does not achieve any additional emission reductions at the global level. This, in turn, leads to concerns that international voluntary market purchases of NCS credits constitute 'greenwashing' – especially since the vast majority of stakeholders receiving the corporate's (or other actor's) communication about its climate goals will not understand the intricacies of the mechanisms for accounting for emissions.

This argument will be particularly salient in certain contexts. In particular, it is more persuasive if there is good evidence that the host country is on track to achieve its NDC without the contribution of the crediting activity, as this increases the likelihood that the resulting credit is not associated with additional emission reductions at the global level. This concern will be exacerbated in those cases where apparent progress towards the NDC is actually a consequence of the NDC itself being insufficiently ambitious.

The crux of the argument against host country governments making CAs for international voluntary market sales of NCS credits rests on the fact that voluntary market transactions are made in a parallel accounting system to that used for NDCs. These parallel accounting systems mean that when a voluntary buyer purchases an NCS credit, it will not be used to meet the NDC of the country associated with the buyer. Indeed, in the case of multinational companies, it may not even be possible to identify which country's NDC should be affected by the credit purchase. Proponents of this argument claim that, since the transfer is not being used towards the NDC of one Party to the Paris Agreement, there is no need for the other Party (i.e., the host country) to make a CA. Instead, according to this argument, the purchase of credits can be seen as a contribution by the buyer to helping the host country meet its NDC. Moreover, it is argued that this type of external support is particularly valuable given the wide range of financial and structural barriers that can otherwise make it difficult for the host country to achieve its NDC – especially given that many NDCs have been developed on a limited analytical basis, resulting in goals that will prove ambitious or challenging to achieve in practice. Proponents of this argument stress that the existence of these parallel accounting systems makes voluntary market purchases fundamentally different from those made by (or on behalf of) sovereigns – where both parties are part of the same accounting system – or by airlines in CORSIA – where an international agreement has decided to align the emissions accounting systems for CORSIA with the emissions accounting system used for NDCs.

From this flows a second argument against host country governments making CAs for voluntary NCS credit transactions: that requiring them would undermine the benefits otherwise provided by voluntary (NCS) carbon markets. Requiring host country governments to make a CA for voluntary market purchases would, by definition, mean that these emission reductions or removals could not then be counted by the host country towards its NDC. This will make NDC achievement more difficult, particularly in those cases where the credits are sold at a price lower than the marginal cost of achieving the NDC, or if the government does not receive the value of the credit sales but does have to bear the cost of achieving the extra domestic emission reductions. Estimates from the World Bank suggest that these concerns imply that the cost of providing a CA could be well above US$25 per credit (World Bank, 2023c). This could significantly reduce the willingness of host countries to participate in the voluntary carbon market, as illustrated by India announcing a ban on the sale of carbon credits, although this has subsequently been reversed (Dutta, 2023). Alternatively, they may choose to authorize for international transfer only those emission reduction or removal options that have high abatement costs (often

expressed as "leaving the high-hanging fruit" for the voluntary carbon market) or introduce a tax on the sales to compensate for the cost that the sale of the authorized credit imposes on the country. In the short term, the combined effect of these outcomes would be to reduce the overall size of the voluntary carbon market, and the associated investment flows and co-benefits, which could disproportionately harm developing countries (Hamrick and Granziera, 2023). Proponents also argue that this will make it less likely that the host country will achieve its NDC and that, in the longer term, countries may be less willing to set ambitious NDCs if they do not think they will be able to benefit from the international voluntary carbon market finance and funding to help them meet their targets.

Finally, a number of practical concerns have been raised regarding the process required, if CAs are expected for voluntary market purchases. In particular, the process for obtaining authorization (i.e., for a host country to decide that it was willing to make a CA) may be time-consuming and costly. Part of this challenge is that, in some countries, targets set as part of NDCs do not cover all of the country's industrial sectors or emissions sources. While it has been determined that, if a CA is to be made, it should be made regardless of whether the emission reductions are in sectors covered by the host country's NDC, the process for adjusting emissions reductions expected for sectors not covered by the NDC remains unclear. There could be significant transaction costs stemming from this complexity if the credited voluntary market activity is associated with emission reductions across multiple sectors, only some of which are covered by the NDC.

Table 4.1 below summarizes some of the key arguments for and against making a corresponding adjustment.

TABLE 4.1

Key arguments for and against the use of CA

Arguments made by those **in favor of** making a CA for international voluntary market transfers (of NCS credits)	Arguments made by those **against** making a CA for international voluntary market transfers (of NCS credits)
Makes it more likely that the purchased credits are associated with emissions reductions or removals that would not otherwise have occurred.	CAs not required as the transferred credit will not be used towards meeting an NDC commitment of another country.
Reduces risk that companies purchasing credits are making misleading claims.	Applying a CA creates a liability for the host country that intends to achieve its NDC. Voluntary trades with CAs increase the risk that the host country cannot meet its NDC and could lead to distributional issues depending on who benefits from the trades.
	Requiring a CA would lead to a reduction in the size of the voluntary market and the associated investment volumes and co-benefits. Host countries may be less willing to set and achieve ambitious NDCs as a result.

4.5.4 Looking forward – mitigation claims as a potential solution to the debate on CAs in the voluntary market

The introduction of A6.4 mitigation contribution credits, as discussed in Section 4.5.1, may help resolve this debate. One of the intentions of introducing this credit type[83] is to temper the debate on whether to require CAs on voluntary market purchases by allowing end users of (NCS) credits to provide greater clarity about the claims being made by those using voluntary market credits. Under this perspective, end users should not use unauthorized 'mitigation contribution' credit to make claims about offsetting or achieving net zero, due to the concern expressed on the left hand side of Table 4.1. However, they may still purchase, retire and report on the purchase of these credits, as part of a strategy that demonstrates how they are helping host countries meet their NDCs, and providing funding to help make the global transition to net zero more equitable. This is intended to recognize the risks/concerns associated with making a CA summarized on the right hand side of Table 4.1. This is consistent with the discussion around the claims that buyers in voluntary markets should make when purchasing NCS credits, discussed in Section 3.4.

However, this debate will continue. It remains to be seen whether this distinction between authorized and mitigation contribution ERs will be recognized in market practice. Moreover, the relative persuasiveness of different arguments for the need for CA may change over time, as other aspects of the voluntary and compliance carbon markets evolve. For example, if the voluntary market grows in size, and continues to attract criticism in terms of distracting from own-emissions effort, then the case for host country governments to make CAs for these transactions will grow. On the other hand, further development of the institutional and analytical processes concerning the impacts of climate policies will help better illuminate whether requiring a CA will affect NDC attainment. Research efforts exploring how future market developments may affect the case for and against CAs for transactions of voluntary NCS credits remain valuable.

As long as this debate continues, it will be important for end users to provide clarity on the claims they are making with the credits they purchase and retire. In line with good practice – and likely future regulatory requirements (see Section 3.4 above) – buyers should provide clear information on whether any (NCS) credits they retire are associated with CAs, and comment where possible on why they consider their approach to be appropriate, in the context of both their internal climate change strategy and the global debate.

RECOMMENDED REFERENCE MANUALS AND FURTHER READING

New Climate Institute (2020) Future Role for Voluntary Carbon Markets in the Paris era

Granziera, Hamrick and Verdieck (2022) Article 6 Explainer

Hamrick and Granziera (2023) To trade or not to trade? Options for Operationalizing Corresponding Adjustments under Article 6

83 Another rationale was to recognize the role of domestic credits within the Article 6.4 architecture. It allows credits that are generated in the same country that they are used (in which the buyer retires them) can be recognized as mitigation contribution A6.4 ERs as they will be contributing to the reduction of emission levels in the host party and for which no CA would be required.

5. FINANCING FOR NCS CREDITS

CONTRACTS AND FINANCING: KEY TAKEAWAYS

- The creation of thriving NCS credit markets requires both that NCS credits be appropriately valued and also that actors are willing to provide the capital needed to invest in the credit-generating activities. While these two concepts are closely linked, both require attention from policymakers if NCS credit markets are to scale.
- The current architecture for financing NCS activities (including, but not limited to, credit-generating activities) appears to be heavily dominated by development finance institutions, although this partly reflects the challenges of tracking flows from other sources.
- Key private sector actors who could make substantial contributions to the financing of NCS activities – such as institutional investors and large agro-processing corporates – have, so far, contributed little capital.
- A number of barriers make it difficult to invest in credit-generating NCS activities. Some of these relate to issues associated with realizing revenues from the successful delivery and sale of high-integrity credits. These include generation risk, price risk, policy risk and reversal risk. Other challenges relate to the characteristics of NCS activities and the geographic, political and economic environments in which many crediting activities are located.
- Some of the barriers associated with the crediting process can be addressed through using different types of contract to structure the sale of credits. For example, forward/future contracts can help reduce the price risk that credit suppliers and their investors might face. Similarly, donors or philanthropists can offer 'put options' that give NCS credit suppliers the right, but not the obligation, to sell NCS credits at a certain fixed price. Contracting structures can also be used to help reduce reversal and delivery risk.
- However, other barriers to investment in NCS activities are less easily addressed by contracting structures. To overcome these barriers, policymakers may need to increase their support for jurisdictional crediting and make greater use of carefully designed blended finance solutions. In particular, these solutions offer the potential for engaging institutional investors in financing NCS crediting activities.

5.1 Introduction

In this section, we explore the most important issues that arise in relation to the financing of NCS activities. The discussion is structured into four sections

- In Section 5.2 we highlight the difference between the revenues arising from the sale of NCS credits and the financing of the activities that generate monetizable credits.
- In Section 5.3 we describe the current financing landscape for NCS activities, the key players currently providing this financing, and why financiers may be reluctant to allocate capital towards NCS activities.
- In Section 5.4 we discuss the different forms of contracts that credit buyers and sellers can adopt, and how these can make it more or less attractive for finance providers to provide capital.
- In Section 5.5 we outline some of the ways in which international actors could help to increase financial flows towards NCS activities.

Throughout, this section uses a number of terms related to finance and financial transactions, the most important of which are defined in the Box 5.1 below.

BOX 5.1

KEY TERMINOLOGY USED IN THIS SECTION

Capital/finance – these terms are used interchangeably. In the context of this section, it refers to the provision of financial resources to meet the initial costs of an (NCS) activity before it starts to deliver financial (as well as socio-economic and environmental) benefits. This implies that those providing the capital are likely to be taking (some of) the risk if the activities fail to deliver the financial and non-financial benefits anticipated. Capital/finance can either come from the internal resources, such as the retained profits of a company, or it can be provided by an external party, such as a bank or investment fund, to the party undertaking the NCS activity. Capital can be provided through a number of different financial instruments, which imply different contractual relationships and responsibilities between those providing the capital and those undertaking the NCS activity.

Equity financing – refers to the process of raising equity capital through the sale of shares. Shares are a financial instrument that provide an ownership stake in the company/vehicle, such that if a company/vehicle becomes more financially valuable, this benefit is shared among its shareholders. However, shareholders only have claims on the financial value of the company/vehicle after all debts have been paid. Shares can be either publicly held – in which case they can be bought and sold by a wide range of investors on a stock exchange – or privately held which means they are not available for buying and selling on an exchange and are only traded infrequently when specific buyers and sellers agree to the sale.

Debt financing – refers to the process of raising capital (debt) through debt instruments such as loans or bonds (see below). Debt instruments are expected to be repaid over a (defined) period of time, with repayment also including interest payments that compensate those providing the debt for the risk that they may not be repaid. A key feature of debt instruments is that those providing debt are entitled to receive their payments before shareholders can make a claim on the financial value of a company or vehicle.

Loans – a financing instrument whereby one party, such as a bank, lends money to another party. The lender sets the repayment terms, including the expected interest rate. The interest rate may either be set at a commercial rate, where the rate will be set according to how much risk different (competing) loan providers associate with the loan's repayment, or at a concessional rate, a rate explicitly lower than the commercial rate, typically offered as an incentive to help realize the benefits of the NCS activity.

Bonds – a debt financing instrument in which the bond issuer sells the promise of repayment. A bond has a face value which is the amount that the holder of the bond can expect to receive at the maturity date. Bonds will also have a coupon rate or interest rate which specifies the amount the bondholder can expect to receive periodically before the maturity date. The coupon rate is expressed as a percentage of the bond's face value. Bonds are traded between investors on exchanges. Key types of bonds include those issued by countries (sovereign bonds) where the repayment comes from tax revenues; companies (corporate bonds) where the repayment comes from the cashflows of the company as a whole; or specific projects (project bonds) where the repayment comes from the cashflows of that project. In recent years, thematic bonds, relevant for all of the above issuer types, have become more significant. These take one of two forms. One version is a use of proceeds bond, where a bond issuer commits to use the funds raised from the bond issuance towards certain sustainable activities. The other is a sustainability linked bond where bond repayment terms depend on how an issuer performs against pre-defined key performance indicators.

Grants – a financial instrument where capital is provided without the requirement for a financial return. The provision of capital grants is sometimes referred to as funding, to distinguish from financing – through debt or equity – where financial returns are expected.

Opportunity cost – the value of the benefits foregone in choosing one course of action over another.

Liquidity – a measure of the ease with which an instrument can be converted into cash without affecting its market price.

5.2 Distinguishing revenues from finance needs

The revenues generated from the sale of credits are distinct from the finance required to cover the upfront (and ongoing) costs of implementing NCS activities. As discussed in Section 2, a number of groups can be involved in selling credits; but ultimately, most credit generation requires landowners or land stewards (including Indigenous Peoples), sometimes supported by governments, to take actions that are different from those they would have taken otherwise. They may be supported in this by, for example, project development companies or jurisdictions. In this section, we refer to all of these actors collectively as 'NCS credit sellers'.[84] NCS credit sellers create a source of revenue by generating and selling credits – effectively monetizing some of the carbon sequestration or emission reduction value that NCS activities provide.[85] Critically, however, this revenue generation is different from the deployment of finance. The deployment of finance refers to the use of debt or equity, and possibly grants – which can come from a variety of sources – to help meet the upfront investment and/or operational costs of NCS activities. Figure 5.1 illustrates this in a stylized way through a simple cost-revenue model. In the example, revenues from the sale of carbon credits (represented by the light green bars) arise as the activities mature, in this illustration from year 5 onwards. However, there is a still a need to meet the early upfront investment costs and (early) operating costs of the activity, as shown by the blue and orange bars. To meet these costs, some forms of finance will need to be deployed.

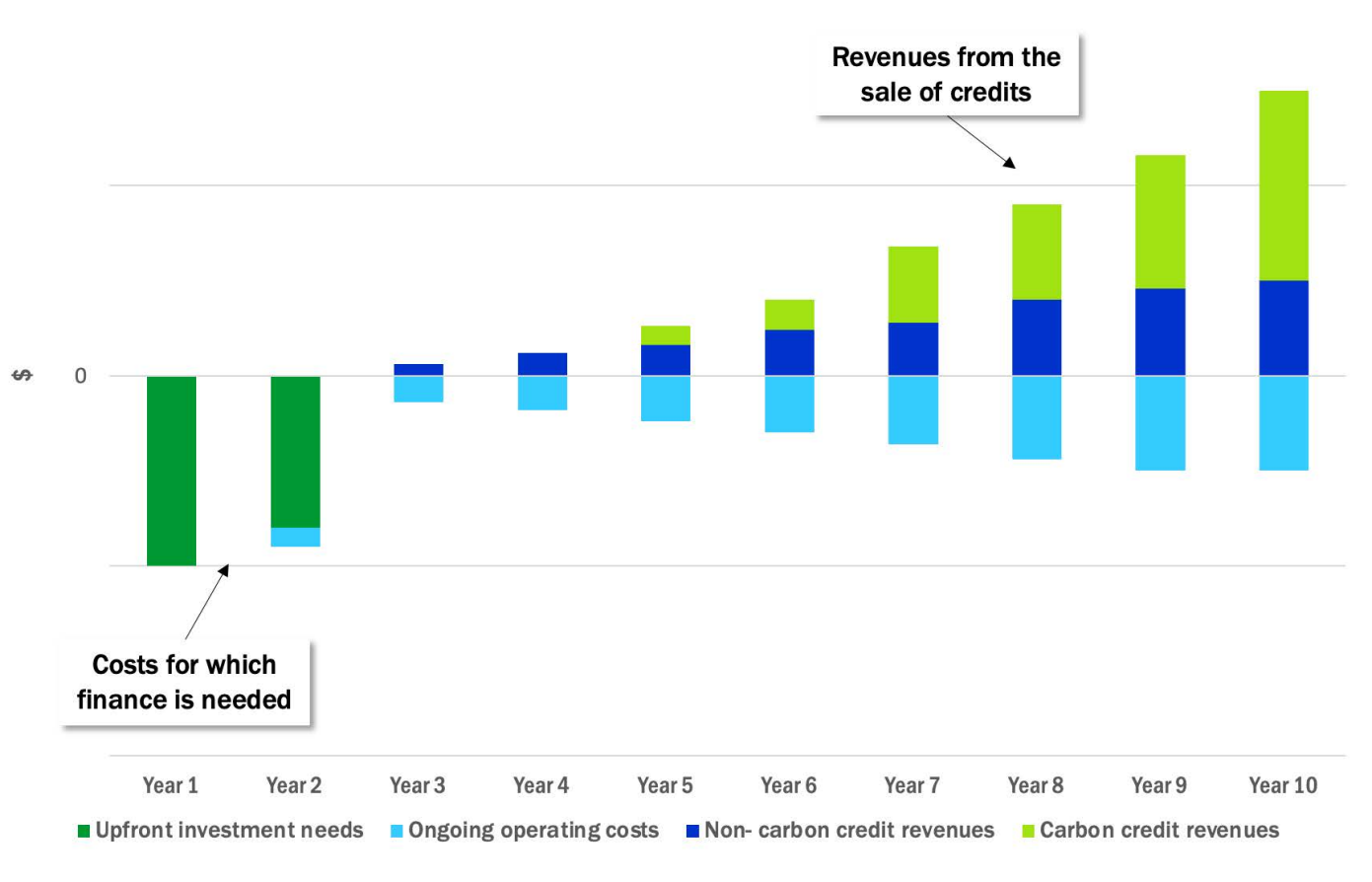


FIGURE 5.1

The revenues generated by the sale of NCS credits is distinct from the finance needed to cover the upfront costs of NCS activities

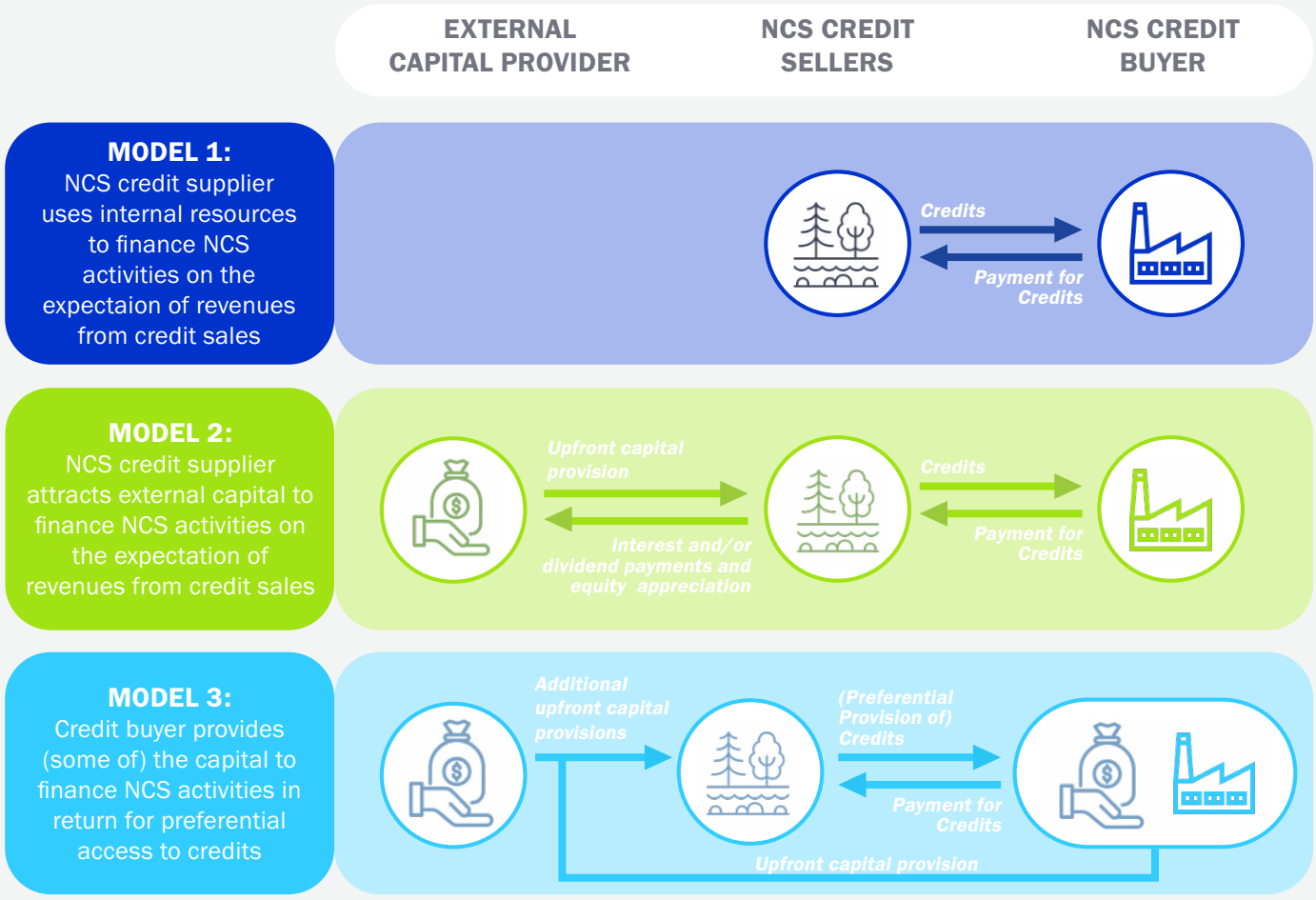
84 While this section considers NCS credit sellers as a single entity, the (contractual) relationships that can exist within different groups on the supply side of the market is discussed more fully in Section 2.

85 In addition, some NCS activities may also generate non-carbon revenues e.g. revenues from sustainable harvesting of timber products.

While revenues from the sale of credits and the finance needed for NCS activities are separate, they are also closely linked.[86] Because NCS credit sellers can expect a future revenue stream from the sale of credits, they may choose to take the risk of making an investment (using their own capital) to implement an NCS activity. Alternatively, they may seek external capital for the same purpose from (for example) a public or private bank, a donor or philanthropy, or other investors. In either case, the extent to which the investment is financially successful depends critically on how many credits are later sold, and at what price. In some cases, an external finance provider may also provide upfront capital to an NCS credit seller, in exchange for preferential access to the credits that are generated – creating an even more direct link between finance and revenue. In this case, the credit buyer/finance provider might be looking to access the credits so that it can surrender them (see discussion on different types of end user in Section 2) or, more commonly, will then look to sell-on the credits it has secured as a means of realizing a return on its investment. Figure 5.2 illustrates some of the different relationships that can exist between NCS credit sellers, NCS credit buyers and external finance providers.

FIGURE 5.2

The revenues generated by the sale of NCS credits is distinct from the finance needed to cover the upfront costs of NCS activities



86 This discussion – as with the rest of the Handbook – focuses on cases where the credits derived from NCS activities are sold to a third party who then can claim the ERR that the credit represents. However, potential credit buyers – most obviously companies with voluntary climate commitments in the food and agriculture sector – might also choose to finance NCS activities within their supply chain, using carbon crediting methodologies to support the robust quantification of the emission reductions or removals delivered by activities that they finance. This is often referred to as insetting.

Those investing in NCS activities – whether credit sellers or external financiers – may expect to realize financial benefits beyond the sale of NCS credits. For example, regenerative agriculture techniques that generate credits based on increasing soil carbon storage can also help reduce agricultural input costs, or increase crop yields. This can improve a farm's profitability. In anticipation of this, the farmer will be more willing to invest her or his own financial resources into the activity, or seek external capital – for instance a loan from a bank – to realize these additional profits.

However, credit sales make these NCS activities more financially rewarding – and therefore more likely to attract the necessary finance. Credit sales can be important even when NCS activities appear to be financially attractive without the income they generate; the additional revenues can help overcome cultural or technical barriers to the NCS activity that are not easily captured in a purely financial assessment. Table 5.1 provides further examples of the financial benefits that NCS activities can provide and some of the remaining barriers that credit sales can help address.

TABLE 5.1

Financial benefits and remaining barriers from various NCS pathways

NCS Pathway / creditable activity	Mangrove restoration	Biochar / carbon-sequestering soil amendments in farmlands or regenerative agriculture techniques	Tropical forest conservation
(Potential) financial benefits of creditable NCS activity	Increased fish and species populations from increased nursery habitat for juveniles; products from other mangrove forest plants (e.g. nipa palm – food, molasses, sugar, vinegar, thatching)	Improved crop yields; reduced costs of pest management and/or other chemical inputs	Sustainable forestry/ small-scale forest product extractive industries (non-degrading)
Remaining barriers that credit revenues can help overcome	Opportunity cost of alternative land use like shrimp farming may outweigh near-term mangrove restoration benefits	Learning curves/ uncertainty related to adoption of new production technique that can dissuade farmers from adopting potentially beneficial practices	High opportunity cost of deforestation (vs. e.g., clearing for agricultural planting) may sway decision-making toward deforestation without credit sales

Despite the carbon revenue and other financial benefits of NCS activities, sellers of NCS credits may find it difficult to commit or raise the finance needed to cover the upfront costs of these NCS activities. As discussed further below, barriers can include, for instance, concerns about the future price of credits which might be influenced by both policies and the real and perceived quality of the credits; concerns that the activities may generate fewer credits than projected (potentially because of the delivery capacity of the partner, or negative perceptions of the investment climate – including risk of capital expropriation – in some of the locations where NCS opportunities are abundant); or the existing level of indebtedness of the credit supplier.

These barriers mean that ensuring that NCS credit prices are sufficiently high is only one piece in the puzzle to scaling up NCS activities. Additional public interventions will often be needed to ensure sufficient financial flows. These interventions could include providing capital available on cheaper (more concessional) terms than is available from private sources, or creating mechanisms that shift the burden of financial impact if certain risks cause NCS activities to be less successful than expected. It is important to address both the issue of proper credit valuation and sufficient financing for NCS crediting to reach its full potential.

5.3 Current NCS financing landscape

5.3.1 Scale of costs and needed investment for NCS credit generation

The implementation of NCS activities requires a number of different activities to be undertaken 'on the ground'.

Each of these has associated costs and, in most cases, these costs need to be incurred (well) in advance of when credits are available for sale. Table 5.2 provides some illustrative examples.

TABLE 5.2

Comparative pathways – NCS pathway implementation activities

	Tropical forests – conservation	Agricultural soils – soil organic matter improvements	Blue carbon –wetland restoration
Potential actions and costs related to implementing creditable NCS activity	Fire management; security costs to reduce illegal logging/ clearing/ competing land uses; landowner incentives to avoid legal deforestation	Sourcing cover crop seed; soil amendments; materials, labor, specialized equipment costs	Sourcing of native plant and aquatic species; planting labor; cost of earthmoving to restore hydrologic regime
Costs re: monitoring and compliance standard	Surveying, remote sensing, sampling		
Market, administrative, and transaction costs	Validation/verification/registration costs; costs of debt/ other upfront finance costs; developing safeguard systems and benefit-sharing plans with key stakeholders, including IPs and LCs		
Jurisdictional scaling costs	Monitoring and law enforcement; policy/program implementation costs; territory-scale administration		

The allocation of responsibility for these activities, and accessing financing for them, varies depending on whether NCS credit sellers adopt a project-based or jurisdictional approach to organizing NCS activities (as discussed in section 2):

1. Under a project-based approach, the activities will be undertaken by a combination of entities including potentially farmers, landowners, Indigenous Peoples and traditional local stewards, project development companies, or an organization specifically created for the purposes of undertaking the NCS activity and selling credits. They will source capital for these activities from their own reserves or possibly from external sources (see below). They will then receive the revenues from the sale of credits, which can be used to repay any external financing as needed.
2. The scale and potential of jurisdictional approaches requires a more complex approach, although many of the same actors identified above would still be involved. In this case, the jurisdiction will receive at least some of the revenue from the sale of credits. In anticipation of these revenues, it may directly implement or support programs to avoid or remove emissions. The jurisdiction may also create or provide policy signals that encourage others to engage in NCS activities. For example, it may provide concessional debt, allocate subsidies, provide supportive infrastructure or training programs, or implement regulations that facilitate private investment into NCS activities (or discourage competing activities, like deforestation or other land-use conversion). Jurisdictions may need to access additional capital in order to undertake these complex and costly activities. This capital may come from issuing bonds, borrowing from national or international financial institutions or seeking grants from development partners. Section 5.5 discusses this in more detail.

Between 2021 and 2050, one estimate (United Nations Environment Programme, 2022) suggests that around $11 trillion of investment may be required in a number of critical NCS pathways[87] in a scenario that limits global average temperature increases to 1.5 degrees while also halting biodiversity loss and achieving land degradation neutrality.[88] This includes protection and restoration of forests, seagrass, saltmarshes, peatlands and mangroves, as well as agroforestry. Annual investment needs in 2030 are estimated to be around $484bn, rising to $674bn by 2050. Within this subset of activities, the largest investment needs, around two thirds, are associated with reforestation and agroforestry. By contrast, the same report estimates that current annual investment flows into the same activities is around $154 billion which is only around 32% of the 2030 investment need and 23% of the 2050 need. This implies that annual investment flows need to at least treble by 2030 and quadruple by 2050.

5.3.2 Who are the key actors that do – and could – supply capital?

Much of the tracked data indicates that investments into NCS activities comes largely from the public sector. The same UNEP report suggests that about 83% of the investment into NCS activities comes from the public sector, with only 17% ($26bn) coming from the private sector (which in this analysis also includes investment by philanthropies and conservation NGOs). These investment flows relate to activities that expect to generate credits as well as those that do not, with the largest category of private sector investment being associated with commitments to sustainable supply chains. Analysis by the Climate Policy Initiative (CPI) reviewing mitigation investments in the agriculture, forestry and other land use sector (AFOLU) sector also suggests that NCS investments are very heavily dominated by public finance, although it notes the difficulty of tracking private investment flows (Climate Policy Initiative, 2021).

Several categories of key private sector actors have contributed little to global financing of NCS activities, either relative to their potential footprint of land-use related emissions, or to the scale of the resources available to them. Two types of actors, in particular, stand out.

- First, many larger agribusinesses, including multinational packing and trading operations, have a significant footprint in countries where NCS opportunities are most abundant. According to one report, each year, these agribusiness companies channel around $100 billion of fixed and working capital and trade finance flow into the production of beef, soy, palm oil, pulp and paper in tropical forest countries (Tropical Forest Alliance, 2016). Despite their clear willingness to allocate capital to economic activities in regions where NCS opportunities abound, these companies are only making modest investments in NCS activities, with the UNEP report above suggesting that investments in NCS activities related to 'sustainable supply chains' amount to around $7bn per year. This is despite the historical contribution of many of these companies to deforestation and the emerging evidence that some NCS investments will help maintain agricultural resilience to locked-in and expected changes in temperature and precipitation due to climate change.
- Second, large institutional investors, including sovereign wealth, pension and endowment funds, also have the potential to provide an enormous amount of capital to finance NCS activities. The OECD estimates that if institutional investors were able to shift just 3.7% of their assets to sustainable activities in developing countries, it would be enough to close the entire (not just NCS related) $3.7 trillion annual sustainable investment gap faced by developing countries (OECD, 2021). However, the best current evidence suggests that private equity impact investments – which might be partially capitalized by financing from institutional investors – provide only around $3bn of annual investment in NCS or similar activities (United Nations Environment Programme et al., 2021).

5.3.3 What factors hold back capital for NCS crediting activities?

Various risks and challenges can make it unattractive for investors to commit capital to NCS activities. There are two broad categories of barriers. The first category relates to risks and challenges associated with generating revenue from the delivery and sale of high-integrity credits. The second relates to risks and challenges associated with the characteristics of NCS activities and the geographic, political, and economic environments of the countries in which many crediting activities are located.

87 This analysis considers investment needs for some pathways that are not included in the definition of NCS used in this Handbook (see Introduction) including the use of cover crops and facilitating sustainable grazing intensity. However, these only account for around 5% of the estimated investment need.

88 The investment estimate for NCS in a 2 degree increase scenario is $9.5 trillion.

The nature of credit generation and the market environment for NCS credit sellers present four main challenges:

- **Price/demand factors.** A critical determinant of NCS credit prices is the level of future demand. Although many commentators expect that increasingly stringent carbon constraints or increased awareness among NCS credit buyers will lead to higher demand for NCS credits in the future, and hence higher prices (Singh and Tan, 2022), the actual future price of NCS credits remains highly uncertain. It remains unclear both whether voluntary market demand will grow and whether this will be boosted by demand from jurisdictions using NCS credits to directly meet their NDCs, or from compliance entities in these jurisdictions who are permitted to use NCS credits to meet their emission targets. Growth from these demand sources is likely to depend critically on whether users are comfortable about the quality of credits (see Section 2), and hence whether using credits is associated with significant reputational risk. This may play out differently for different types of NCS credits. Until there is more certainty about future NCS credit demand and prices, both sellers of NCS credits and external financiers may be reluctant to invest in NCS activities. Indeed, historically, the price of credits has been too low to make many NCS activities sufficiently profitable to be financially attractive.
- **Policy risk.** In addition to concerns about whether future policy decisions will create additional demand for NCS credits, those considering allocating capital to NCS activities may be concerned about the stability of demand associated with current policy settings. For example, the rules governing the acceptability of credits in different markets may change over time. This has already happened. For example, rule changes in the EU ETS in 2012 affected the eligibility of credits from a wide range of activities, registered in the Clean Development Mechanism (CDM). Similarly, the new rule in the California market requiring that at least 50% of allowed offsets must have direct environmental benefits within the geography of California will reduce demand for NCS credits sourced from further afield.[89] Rules governing the ability of private actors to sell credits could also change, especially if more countries adopt jurisdictional approaches to NCS with diverse approaches to nesting and grandfathering of existing projects and initiatives (see Section 2.3). These uncertainties in the future regulation of credit sales and markets could reduce the attractiveness of investment in NCS activities for both credit sellers and external financiers. This risk is greater the longer the period between when the initial investment is made and when the credits are expected to be realized and sold. As such, it may be a particularly acute risk for NCS activities such as afforestation and reforestation where new trees may take many years before they maximize their carbon sequestration potential.
- **Generation risk.**[90] Carbon credit transactions are inherently results based; monetization depends on the successful delivery and verification of the intended emission reductions or removals. There is a time lag between the initial investment in NCS activities and the creation of a monetizable credit; during this time, any number of complicating factors may cause the activity to generate fewer credits than anticipated. For example, tenure over the ecosystem in question may prove challenging to secure, or climatic factors such as drought may slow the expected rate of ecosystem restoration. In some cases, NCS sellers may lack the necessary skills or experience to successfully implement the NCS activities – in other words, there is significant counterparty risk. If any of these risks result in fewer emission reductions or removals than intended, then fewer credits will be generated. Furthermore, even if emissions reductions or removals are achieved and credits generated, host country policy settings may change making it more difficult for suppliers to sell credits, especially overseas.[91] Any of these factors could reduce or undermine the profitability of the investment. While many competing investment opportunities are also results-based, most external investors, in particular, are likely to have less experience in assessing and understanding of the extent of generation risk in NCS activities compared to these alternatives, given the evolving nature of the sector. This uncertainty may lead these external investors to assume that generation risk is high, when this may not be the case for all credit generating activities.

89 There is already evidence for this in the respective prices for eligible NCS credits (forest offsets) that provide in-state environmental benefits, as defined by the statute, and those that do not. Across all offset transactions in 2022, the weighted average price for the former was $19.91 compared to $16.87 for the latter. Data taken from https://ww2.arb.ca.gov/sites/default/files/2023-02/nc-2022_transfersummaryfinal.xlsx

90 This is sometimes also referred to as delivery risk. However, in the Handbook, we use the term delivery risk to refer to the possibility that contracted credits, once generated, are not delivered to the buyer pursuant to the terms of an agreement. See Section 5.4 below.

91 One motivation for these change in policy settings could be a concern that the sale of credits will make NDC attainment more challenging. See Section 4.5 above.

- **Reversal risk.** As discussed in detail in Section 2.3, the risk of reversals, including due to climate-related events such as wildfires, is an important risk faced by NCS activities. Even if credits are created according to strict standards, the emission reductions or removals associated with NCS activities may not be, or may not be perceived to be, permanent. This risk may reduce the demand for NCS credits, thereby depressing prices. In addition, regulations that place obligations on credit suppliers to maintain the environmental integrity of credits in the face of this risk – for example, requirements for credit replacement – may also make it unattractive for either NCS sellers and/or external finance providers to allocate capital to NCS activities.

In addition, a number of challenges less directly related to the specifics of arrangements for bringing credits to market can make NCS activities appear an unattractive investment proposition, especially for many external financiers.

1. **Country-specific risk.** Many economies with abundant NCS opportunities suffer from weak governance, a challenging enabling environment and a difficult macroeconomic context. These inhibit large flows of private sector capital into all sectors of these economies, of which NCS represents a small subset.[92]

2. **Pipeline.** Many potential external capital providers face fixed costs when considering investment opportunities in new sectors such as NCS. For example, they must develop the expertise to identify attractive opportunities in the area. For entry into a new investment space to be justified, the potential returns of the investment must be perceived to outweigh these fixed costs. Despite the recent growth in NCS activity, many potential investors consider the pipeline of future investible opportunities too small and uncertain to justify these upfront costs of engagement.

3. **Ticket size.** Many existing opportunities for investing in NCS activities are relatively small value transactions and the overall NCS credit market remains comparatively small in comparison to other asset classes. For example, reviewing survey data on conservation finance,[93] the Coalition for Private Investment in Conservation, found that 85% of transactions were under $5 million (Coalition for Private Investment in Conservation, 2021). Many potential investors find the transaction costs associated with conducting due diligence on transactions of this size to be prohibitive.

4. **Liquidity risks.** Many of the financing instruments associated with NCS crediting activities involve taking ownership (equity) stakes in unlisted companies/projects or providing long-term loans. This makes them illiquid instruments i.e. if the external investor needs to exit the investment, it could be difficult and time consuming to find a willing buyer. This may make investing in NCS activities unattractive to some investors, who in some cases may also face regulations that restrict investment in illiquid assets.

These risks will be more or less important for different types of external investors in different contexts. For example, larger investors with a global footprint across many sectors are likely to find the challenges associated with pipeline and ticket size particularly difficult to manage. This includes most institutional investors (OECD, 2021). These investors will also be particularly concerned by liquidity risks (Nelson and Pierpont, 2013). In contrast, many smaller, more boutique investor organizations, such as Blue Orchard, are now developing sectoral expertise in NCS activities. They are also willing to hold their investments for the long-term. Similarly, national financing institutions and investors may be better able to understand and manage country-specific risks than their international counterparts. This will be especially true if most of their assets and liabilities are denominated in the same local currency. This suggests that national public agricultural finance institutions, that often dominate land-use finance in developing countries, could have a key role to play in scaling up financing for NCS activities.

These risks may also vary depending on the scale at which crediting activities take place. For example, under a jurisdictional approach, one way that capital can flow to support crediting activities is for jurisdictions to issue bonds that are purchased by investors. The bond proceeds would then support the jurisdictional-scale activities necessary to generate credits. In this case, assuming that the bond is backed by the jurisdiction's balance sheet (tax base), the risk of lending from the investor's perspective will depend on the creditworthiness of the jurisdiction, not the risk of

92 Specifically, they increase the country risk premia used to determine the hurdle rate (minimum expected return) for projects and investments in that country.

93 This analysis is based on the IUCN's definition of conservation as being 'protection, care, management and maintenance of ecosystems, habitats, wildlife species and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence'. As such, it overlaps significantly, but not entirely, with those activities that might generate NCS credits.

the NCS activities. While the creditworthiness of the jurisdictions where NCS activities can take place vary significantly (and while there will be some jurisdictions with low credit ratings (or no credit rating at all) making such a financing model infeasible), there will also be some jurisdictions that are financially robust (i.e. that have strong credit ratings) which would allow for relatively cheap financing. In these cases, liquidity risks would also be reduced as bonds are easily traded. In this case, the jurisdiction will want to be confident it can generate additional revenues from NCS activities to repay this additional debt. Section 5.5 discusses this further.

5.4 NCS contracting structures

Various contractual arrangements can help to manage the risks of investing in NCS crediting activities. Purchase contracts, typically signed between an NCS credit buyer and the credit supplier (or representatives of each), specify how the price of credits will be determined, what actions the various parties should take to reduce various risks, and what may happen if the number of credits generated falls below initial expectations. Contracts may also specify what happens in the event of reversals.

This section is divided into four parts. First we identify key contract types and their implications for the allocation of price risk, as well as some of the other risks described above that can hold back financial flows into NCS activities. We then discuss how other elements of contract design can play a role in mitigating reversal risk. Finally, we look at how contracts might be used to help with (i) generation risk (as defined above) and (ii) delivery risk – the possibility that contracted credits, once generated, are not delivered to the buyer pursuant to the terms of an agreement. While the contractual provisions used to address these latter risks are primarily focused on providing comfort to buyers, this will be important when those credit buyer are also finance providers (see Model 3 in Figure 5.2) and are relying on the delivery and resale of credit to generate their return. They are also important for maintaining the longer-term credibility of NCS credit markets.

5.4.1 Contract types and their implications for price risk

This section considers three main types of contracts: spot contracts, forward (and future) contracts and options contracts (both put and call options). For each case, it explores how the contract allocates price risk between the credit seller and buyer. In turn, it explores the implication of this allocation for investment in the underlying NCS activities. In most cases, this depends on the impact of the contract type for the risks faced by the credit seller. However, some contract types may be commonly used in cases where credit buyers are also providing the investment into NCS activities (Model 3 in Figure 5.1) and so may also affect the ease of accessing finance through this model. Furthermore, while the different contract types are discussed in turn, a seller need not use same contracting structure for 100% of volumes generated from a particular NCS activity.

Spot contracts

A spot contract specifies an immediate or near-immediate transfer of credits between the buyer and seller, at an agreed upon price. This is sometimes referred to as trading credits 'for immediate delivery'. Spot contracts can be contrasted with derivatives contracts which, as explained below, are contracts for future delivery, and 'derive' their value from the value of the spot contract.

From the perspective of those investing in NCS activities, spot market transactions involve significant price risk. At the time that the NCS activity is initiated, investors do not know what the future spot price will be at the time of credit delivery; they also face uncertainty about the number of credits the activity will generate for sale. For both of these reasons, there is a risk that revenues from the sale of credit will be too low to provide a financial return on their investment. On the other hand, if spot market transactions take place at a higher price higher than anticipated, equity financiers in the NCS activity will receive an unexpected windfall. In addition, once credits have been generated, spot market transactions can allow the seller to realize revenues very quickly. This can be important if there is a short term need to make a repayment to an external finance provider i.e. to meet a loan repayment obligation.

From the buyer's perspective, spot market transactions provide immediate access to credits, at current market prices. This immediate access will be attractive if, for instance, a buyer is facing a specific annual target or regulatory requirement that they might otherwise miss. Because credits sold through a spot transaction have already been generated, the buyer is also not exposed to generation, delivery, or counterparty (e.g., insolvency) risk. Because these risks are largely eliminated, and so the buyer can have a high degree of confidence in the type and quantity of credits they will receive, spot transaction prices tend to be higher than forward transaction prices (see below). Buyers with a lower risk tolerance and a relatively high willingness to pay will therefore find them attractive. However, if the buyer does not plan to use (retire) the purchased credits until a later date, they may still be exposed to policy risks;

rule changes could alter the eligibility of their type of purchased credits within the relevant regulatory or emissions accounting framework.

Forward contracts

A forward contract is negotiated 'over the counter' and commits a buyer and a seller to transact credits at a specified price, before or on a specific future 'delivery date'. A typical forward contract specifies that a certain volume of credits will be delivered some number of years in the future , at an agreed upon price per credit This price may either be paid at the time of credit delivery, although sometimes a proportion of the credits may be paid for in advance, to support the seller to undertake the NCS activities. The negotiated price level may reflect the spot price when buyer and seller sign the contract or an expected price at the time of delivery; it may also specify a rule that determines the price depending on other conditions (for example, setting the price as a certain percentage of the market price closer to the delivery date). The negotiated price is based on each party's forward-looking analysis, expectations, preferences, willingness to accept, and other factors.

Forward contracts allocate price and delivery risks between buyers and sellers in ways that differ from spot market transactions. These differences have distinct potential advantages and disadvantages.

From the perspective of a seller, and/or those investing in NCS activities, a forward contract provides a more predictable future revenue stream. Credit sellers can have relative confidence in the price they will receive for the credits they generate.[94] This could make it easier for them to access capital (external investors to provide that capital), and thus scale up the activities needed to generate the credits. On the other hand, if spot market prices at the time of delivery are higher than the price agreed in the forward contract, the seller will have lost the opportunity to sell the credits at the higher spot price. The seller also faces counterparty risk: the risk that the expected buyer is unable to pay the agreed price for the credits at the point of credit delivery.

From the buyer's perspective, the price stability provided by a forward contract can be attractive, and it may also be a way to access credits cheaply; but the contract also exposes them to generation risk. Forward contracts provide price stability to the buyer as well as the seller. In addition, they may allow buyers to secure a relatively lower price in recognition that they are taking more generation risk: buyers may agree to transact a certain number of credits at a certain price at some point in the future, but if the NCS activities are less successful than planned, then there may be fewer (or no) credits available to acquire by the delivery date. If the forward contract has involved advance payment then this could leave the buyer suffering losses. Even if payment is only made at the point of credit delivery, the buyer may need to quickly access credits from an alternative source, potentially at a much higher price. In addition, forward contracts necessarily imply a longer period of time between when a contract is signed and when the end user retires the credits, increasing policy risk. These considerations have differing implications for different types of buyers:

- Sometimes the buyer in a forward contract is an end user (see Section 2). In these cases, the payment associated with the forward contract is most likely to happen at the point when credits are expected to be delivered. In this case, the buyer who needs to trade off the benefits of locking in a budget for a credit purchases and the possibility of securing a lower price for credits, with the possibility that they could be left without access to sufficient credits needed to meet a time-sensitive compliance target.[95]
- On other occasions, the buyer in a forward contract may also be providing some of the investment needed to initiate the NCS activities – either through providing upfront debt financing or through an advance payment to the seller. The forward contract sets out the terms on which they access the resulting credits, which they then on-sell, in order to realize a return on the capital provided.[96] Potentially, this sort of package can reduce the time and effort that the seller would otherwise have to expend in obtaining finance. It can also be an effective way to build a long-term trusted relationship between buyer and seller which can then make it easier for both parties to work together if, for example, generation risk means that fewer credits are created than expected. Nonetheless, if fewer credits than expected are generated, then this will reduce the returns the credit buyer/finance provider realizes, and potentially expose them to losses. They will need to consider

94 Assuming that the buyer is still around and able to pay for the credits at the time of delivery.

95 Typically, under a forward contract, settlement will only take place at the end of the contract. This means that the buyer will not need to pay the seller in the case that the credits do not materialise to the extent expected. Nonetheless, they may still face problems if they need to purchase other credits quickly.

96 This arrangement could be supported by an insurance contract which would transfer some of the credit generation risk otherwise faced by the buyer, with companies such as Kita, Oka and Forest Re offering products.

whether the expected returns from providing capital in this way are commensurate with the risks associated with providing that capital (in other words, what the risk-adjusted return of the investment is), taking into account the risk-adjusted returns available from alternative investment opportunities.

As NCS credits become increasingly traded on exchanges, futures contracts, although currently nascent, may become increasingly common alternative to forward contracts. Box 5.2 looks at the difference between forward and futures contracts for NCS credits, and the potential implications they may have for the ability of NCS credit suppliers to raise capital, in more detail.

BOX 5.2

COMPARING FORWARD AND FUTURES CONTRACTS

Futures are like forwards in that they represent an agreement to transact credits at a certain price in the future (when the contract expires). However, while forwards are traded over the counter, futures are exchange traded.

This brings a series of advantages and disadvantages, largely reflecting the differences between OTC and exchange-traded contracts initially discussed in Section 4.2. Some of the key advantages include:

- Greater price transparency. The enforced disclosure of information on exchange-traded contracts means that both buyers and sellers will have a significantly greater understanding of market perspectives on the appropriate price for the future delivery of credits. This makes it less likely that buyers (or sellers) can exploit information or power asymmetries that may be more prevalent in a forward transaction. If this results in sellers being able to secure better pricing terms, this should make it easier for them to raise capital.
- Liquidity. A particular benefit of futures contracts is that they can be traded with other market participants. By contrast, forward contracts are specific to the initial contracting parties. The ability to easily trade futures makes it easier for credit buyers to hedge the price risk associated with the purchase of credits, encouraging participation in the market. This increase in market liquidity should, in turn, benefit credit sellers who should be able to more easily find a willing counterpart on a fixed-price contract for their credits. In turn, this may make it easier for the credit supplier to raise capital.
- Reduced counterparty risk. One of the features of exchange-traded contracts is that the 'clearing house' of the exchange validates and finalizes the transaction ensuring that both buyers and sellers honor their contractual obligations. (This is achieved by the clearing house taking the opposite position in all trades i.e. being the buyer for every seller and the seller for every buyer.) This will increase the confidence of credit sellers, and their financiers, that they will receive payment for their credits.

However, the requirement of exchanges to trade standardized contracts reduces the flexibility for buyers and sellers to agree a bespoke contract that reflects their specific needs. For credit sellers, and their capital providers, this means that any unique attributes of the activities associated with credit generation would not be captured in the market price of the futures.

Call and put options

Options are contracts that can provide buyers or sellers with the right, but not the obligation (hence, the 'option') to enact a specified transaction. These types of contract may provide further opportunities to manage some of the risks associated with crediting activities. Two of the most important types of options in the context of NCS crediting are call options and put options (Lubowski et al., 2014). Each has different implications for credit sellers/external financiers and credit buyers.

Call options give the buyer the right, but not the obligation, to buy credits at a pre-negotiated 'strike' price, at any time before the end of the contract. To acquire this right, the buyer pays an upfront premium to the seller.

A call option has the potential to help credit sellers access financing for NCS activities. Because the potential buyer pays the seller for the option, the seller receives an upfront payment. This upfront payment can make the credit seller a more attractive (less risky) investment proposition in the eyes of potential external financiers. In addition, if spot market prices fall below the strike price, the seller may not be forced to sell credits at these low prices as buyer and seller may still transact at the strike price. On the other hand, once a credit seller has entered into a call option contract, she is likely to lose the ability to sell the optioned credits at a price above the strike price.

For the buyer of credits, a call option provides protection in the form of a price ceiling. If spot prices rise above the strike price, buyers can exercise their call option and purchase credits at a price lower than the spot market price. If, on the other hand, spot market prices do not exceed the strike price, then they can arrange to buy credits at spot market prices, forfeiting only the premium paid to the credit seller for the option. However, as with a forward contract, credit buyers still face generation risk, as the credit buyer relies on the seller to generate enough high-quality credits to meet their needs by the time they intend to purchase. They may also face delivery risk – which arises when a buyer and seller have agreed on a transaction but the seller reneges on the contract, usually to sell the credits elsewhere at a higher price (see further discussion in Section 5.4.4 below).[97]

Put options, on the other hand, give the seller the right, but not the obligation, to sell credits at the agreed 'strike' price at any time before the expiration of the contract. Put options can be helpful in attracting capital to NCS activities. By providing a floor below which the price of a seller's credits will not fall, put options increase confidence in future revenues; this could make investment in these NCS activities significantly more attractive. However, a put option does not generate upfront revenue for credit sellers. Indeed, it may represent an additional cost if the seller has to buy the option from the buyer.

For publicly motivated credit buyers, put options may be an attractive way to support NCS activities. As described above, put options could change the investment calculus for private investors (either credit suppliers or external finance providers) so that they are willing to provide more upfront financing for NCS activities. Put options therefore represent an opportunity for publicly motivated entities to support the development of credit supply. For these organizations, put option contracts may ultimately involve only limited financial resources, as they are likely to be required to purchase credits only if the spot market price is lower than the strike price at the time of delivery. However, if spot prices are lower than the strike price, significant funds may be required to meet the obligations under the put option contract. In the NCS crediting context, the most likely source of a put option would be a public finance provider or philanthropist. Box 5.3 describes how a trust fund managed by the World Bank has used an auction process to allocate put options for non-NCS carbon credits, while the example of the Lowering Emissions by Accelerating Forest finance (LEAF) coalition, discussed further below, is also exploring minimum guaranteed prices, specifically for jurisdictional NCS credits.

BOX 5.3

THE PILOT AUCTION FACILITY – USING PUT OPTIONS TO SUPPORT CARBON CREDITING

The World Bank's Pilot Auction Facility auctioned put options to support methane and nitrous oxide emission reductions. It focused on Clean Development Mechanism (CDM) projects where mitigation investments had already been made, but where the investments were no longer operating and delivering emission reductions, because of the significant decline in credit prices after 2012.

Under the scheme, auction participants submitted bids to claim ownership of a put option that gave its owner the right, but not the obligation, to sell their carbon credits to the Bank's trust fund.

A number of auction designs were explored. These included a design in which the put option premium (the price that had to be paid to purchase the option) was fixed and auction participants competed over the strike price that they were willing to accept, with the auction winner being the participant willing to accept the

97 For more information on the role of call options in NCS crediting, see Golub et al., 2018.

lowest strike price. In another auction design, the strike price was fixed and participants bid progressively higher put option premiums.

In all designs, the put option was tradable, meaning that the initial auction winner could resell the contract to someone else.

An evaluation of the Facility found that the 'PAF was well received by market participants and expert stakeholders, and donors were also satisfied with its design ... [and that] ... the concept has proved to be an effective mechanism to allocate scarce funding to reduce GHG emissions and mitigate climate change.'

However, an attempt to also use the mechanism to stimulate investment in new projects was less successful, suggesting that such an approach alone may not be sufficient to stimulate investment in projects with high fixed costs and/or long payback periods.

Sources: Ipsos MORI and SQ Consult, 2019; World Bank and Vivid Economics, 2018

TABLE 5.3

A summary of the main characteristics, advantages and disadvantages of these different contract types, from the perspective of buyers of credits and of sellers of credits (and their associated financiers)

	Description	Pros and cons for seller (and financiers)	Pros and cons for buyer (who may sometimes also provide finance for NCS activities)
Spot contract	Purchase of credits for immediate transfer (delivery); may be "over the counter" or through a centralized exchange	Potential for immediate access to revenues Spot market prices may be higher than previous anticipated	Immediate access to credits and very little delivery risk
		Spot price is unknown when capital is committed, implying significant price risk	Prices may be higher than in forward contract Still faces policy risk
Forward contract (and futures contracts)	Agreement to purchase in the future a certain volume of credits at a certain price	Significantly reduces price risk of seller, making it easier to access capital Forward contracts can be embedded in an arrangement that allows for long-term trusted relationship with buyer, that could make credit generation easier	Reduces price risk which, for buyers who are end users, makes budgeting for credit purchases easier Potential opportunity to access credits at what may be a relatively low price (which for buyers who are also finance providers, makes investing in NCS activities more attractive) Ability to build long-term relationship with seller, making it easier to influence credit generation (and associated NCS activities)
		Loss of opportunity to sell credits at high price in spot market Counterparty risk as expected buyer may not be able to honor their future contractual commitment	Loss of opportunity to buy credits at low price in spot market Exposure to performance risk if fewer credits generated than expected Duration between contract signing and credit retirement increases policy risk

	Description	Pros and cons for seller (and financiers)	Pros and cons for buyer (who may sometimes also provide finance for NCS activities)
Call option	A contract sold by credit supplier to the credit buyer which provides the buyer with the right, but not the obligation, to purchase future credits at an agreed strike price, in exchange for a premium payment	Provides an upfront premium payment which may make it easier to raise capital In some cases, buyer may be willing to pay strike price, even if the spot price is lower	Reduces price risk as buyer either exercises the option or pays a lower price for credits in the spot market (losing only the premium payment)
		Loss of upside if the spot market price of credits is significantly higher than the strike price	Exposure to performance risk if fewer credits generated than expected Some delivery risk
Put option	A contract provided or sold to credit supplier that provides the seller with the right, but not the obligation, to sell future credits at an agreed strike price; may be enacted with a public or philanthropic buyer	Places a floor on the price at which credits will be sold, making it easier to raise capital	Provides an opportunity for public funds and philanthropists to leverage private capital and support credit generation at potentially low cost
		Purchase of put option may be expensive	Could be expensive if credit sellers exercise their option to sell at the strike price

Note: In key aspects related to allocation of price risk, forward and futures contracts have the same implication. Box 5.2 explores the differences between forward and futures contracts in more detail.

5.4.2 Contracts design to manage reversal risk

Reversal risk can also be partially managed through contract design. As discussed above, NCS activities may be (or may be perceived to be) particularly susceptible to reversal risk. As discussed in Section 2, this can threaten the integrity of the NCS credits if it occurs. However, it is also a factor that can make it more difficult to raise finance for NCS activities, including finance provider by buyers, as a reversal event will significantly reduce the value of the NCS credits that have been generated up until that point. Some of the measures to address reversal risk can be taken by a registry, such as stipulating a requirement for buffer pools (see Section 2.3.6). However, additional contractual features can also optimize the management of this risk, with different provisions being more or less relevant depending on whether the reversal is unintentional (the result of natural events) or intentional (caused by human action)

- One option is the contractual creation of a private buffer pool that is filled with a percentage of the credits issued to the seller. Sellers can use this private buffer pool in the event that either an intentional or unintentional reversal is not fully covered by the registry-managed buffer pool.
- Another is to require the seller (or buyer) to purchase a series of call options which, in the event of a reversal, they are contractually obliged to activate. An insurance requirement could play a similar role but, taking into account moral hazard concerns, may be more relevant for unintentional reversals.
- Another approach, where available, is for the credit buyer and seller to agree as part of their contract that the seller will register a conservation easement on the land where the NCS activities take place. A conservation easement legally prevents non-conservation activities from occurring on the land, and, depending on the jurisdiction, runs in perpetuity unless otherwise specified. Conservation easements

are therefore a way for a credit supplier to make a credible commitment against intentional reversals, even if the land changes ownership. They can also reduce the registry-mandated buffer pool contribution because the assessed risk of reversal is reduced by this legal prohibition on non-conservation activities.

- A contract could specify the safeguards that need to be put in place to ensure that the NCS activity does not cause unintentional harm to communities or ecosystems, or undermine the rule of law in the society where the NCS activity takes place. This would be included in a contract in recognition that a failure to realize these objectives could threaten the long-term sustainability of the NCS activity. These contractual provisions may include a requirement to commit to fair and equitable benefit sharing arrangements with Indigenous Peoples and local communities (IPs and LCs) and/or explicit requirements to comply with existing frameworks and practices such as the Cancun Safeguards (see Section 2.3.7 above).

5.4.3 Contract design to manage generation risk

A number of contractual provisions can help buyers manage generation risk i.e. the possibility that the quantity of NCS credits contracted by the buyer will not ultimately be generated by the seller within the agreed timeframe. As noted above, this will be particularly important from a financing perspective in those cases where the credit buyer is also the capital provider for the underlying NCS activity. It is also important from the wider perspective of maintaining and enhancing the long-term credibility of the market.

- *Incorporating access to early warning signals into the contract.* This would allow the buyer to know early on if the project is not on track to deliver the expected emission reductions and to take timely protective actions. This can be secured through a contractually-defined right for the buyer to audit the implementation of the project. The auditing might take the form of site visits to verify that the activities are taking place according to expected schedules, or requirements that the seller provide the buyer with access to other project-related documentation upon request. The details of these steps are typically negotiated between the buyer and seller, based on the specifics of the activities.
- *Structuring financing or pre-payment to incentivize generation and limit risk.* In cases where the buyer has agreed to provide financing or a prepayment to enable the seller to undertake the project, the structure of that financing can also be designed to incentivize credit generation. For example, a contract could provide that the seller will not receive payment for further stages of project implementation until it has demonstrated the achievement of a prior milestone. An alternative version of this model would involve the seller receiving further financing according to the number of credits generated and sold using the financing previously provided.
- *Contractual commitments to make commercially reasonable efforts to follow all applicable registry rules as closely as possible.* In theory, if the seller has complied with the registry's requirements for producing a credit, then the risk that expected credits will not be produced should diminish. This type of provision may also provide comfort to a seller because if they can demonstrate that they have met all registry requirements, then they are unlikely to be penalized for failing to meet their contractual obligations. However, these types of clauses can introduce additional cost and complexity due to ambiguity regarding what constitutes commercially reasonable efforts.
- *Requiring the seller to post collateral.* The appropriate amount and type of collateral would be negotiated between the parties, but could include, for example, rights to some volume of credits being generated by the seller through other activities. A similar effect would be achieved by requiring the seller to purchase call options on credits from other sellers which they would be obliged to exercise in the event that their own activities failed to generate the expected number of credits.

When there is a long-term relationship between buyer and seller – which may be most likely in those cases where the buyer has provided financing to the seller or has pre-paid for some of the credits – formal contracts can be supported by informal relationships of trust. For example, buyers may agree to provide resources and expertise to help remedy a situation in which fewer credits are generated than expected. Similarly, in these relationships sellers may be willing to put more effort into generating high-integrity credits in order to maintain the relationship into the future.

5.4.4 Contract design to manage delivery risk

Contract design can help reduce the likelihood of delivery risk by making it less attractive for the seller to seek out a higher price in the market at the time of credit issuance.

- The most common disincentive for non-delivery is a contractual provision requiring the seller to pay the

buyer an amount equal to any credits not delivered at the prevailing market price for comparable credits. Alternatively, the seller could be required to procure comparable credits for the buyer as an alternative to the cash payment. In either case, the seller must compensate the original buyer for approximately the same amount that the seller gains by selling the credits to a third party at the spot market price. The seller therefore gains nothing by selling their credits to a third party.

- A second approach is to ensure that the credits are issued by the registry directly to the buyer. There are two requirements for this to be a viable option. First, the relevant registry must allow credits to be transferred directly to the buyer. This requires a departure from the default rule that credits are issued exclusively to the credit seller. Second, the buyer must have an account with the registry in order to receive credits. Assuming these two requirements can be met, this option almost entirely eliminates delivery risk by preventing the seller from repurposing the credits before they reach the buyer.

5.5 Role for public and philanthropic international actors in scaling up (jurisdictional) NCS financing

To achieve the scale of NCS finance needed to support ambitious global mitigation goals, the international community will need to significantly increase the flow of finance to NCS crediting activities. Greater use of the contracting structures described in Section 5.4 can help to address some of the risks associated with investing in NCS crediting activities. However, these solutions alone are unlikely to overcome the financing barriers that prevent NCS crediting from reaching its full potential. Regardless of contracting structures, credit prices will likely remain too low to make NCS activities attractive. In addition, contracting structures alone will not address all of the risks and challenges identified in Section 5.3, including those related to country/policy risk, transaction size and pipeline, and investment liquidity. This requires a broader range of financing approaches and actors.

There are particular opportunities and challenges associated with unlocking financial flows for jurisdictional crediting. Section 2 highlights some of the potential benefits associated with jurisdictional crediting from a credit scale and integrity perspective.[98] In the longer term, this model also offers opportunities from a financing perspective. This is because the scale offered by jurisdictional crediting makes its potentially suitable for bond financing, a financial instrument that is less feasible for smaller scale transactions due to transaction costs. Bonds that are very familiar to institutional investors and favored because they can be easily bought and sold on capital markets.[99] Box 5.4 explains how jurisdictional crediting and bond finance could be combined. However, realizing this potential is challenging. Financing programs that have an impact on government budgets on the order of billions of dollars – but which, despite high upside, may return little or no credit value – are inherently risky. With a debt-finance model, if the jurisdictional program does not deliver sufficient results, the bulk of credit revenues may not materialize, while the debt incurred in the attempt will still have to be repaid. In other words, while the scale of finance required for jurisdictional crediting may, in the longer term, make it easier to access large pools of capital that have been largely absent from project-based crediting, in the short-medium tern, raising finance at the jurisdictional scale may be more difficult.

BOX 5.4

THE POTENTIAL ATTRACTIVENESS OF JURISDICTIONAL CREDITING IN RAISING FINANCE FROM INSTITUTIONAL INVESTORS

A country anticipates that it can implement an innovative set of policies to achieve a sharp decline in deforestation, generating around 250 million jurisdictional REDD+ credits and sell these at a price of at least $30 per credit. It expects the implementation cost to be around $12 billion. With these parameters, it could issue a bond with a coupon rate (interest rate) of 6.75% to cover the implementation costs, with the credit sales, at a price of $30 per credit offsetting almost all of the borrowing costs. It would then realize additional revenues should credit prices rise above $30, and also realize further cashflow/tax revenue benefits from the other ecosystem services delivered by the NCS activities, for example, increased soil productivity. These additional revenues could be invested by the country to further develop its economy (or pay down other debt).

98 On the other hand, it also identifies the capacity requirements that are an essential prerequisite for jurisdictional crediting.
99 OECD data suggests that between 34% and 68% of the assets held by institutional investors are bonds. It also reports that institutional investors face fewer regulatory restrictions in holding sovereign bonds (those issued by sovereign governments) than corporate bonds (those issued by companies) (OECD, 2021).

A variety of actors are interested in exploring ways to scale up finance flows for NCS crediting activities, including at the jurisdictional level. These include donors, development finance institutions, philanthropists, and impact investors (private investors willing to accept lower returns or more risk in return for expected impact). The challenge is to develop financing packages for NCS activities, either at the project or jurisdictional scale, that align incentives and allocate risk to those willing to bear it (at low cost). The discussion below looks at four key elements that can be considered in developing these packages, with a particular focus on how to support packages that can help facilitate jurisdictional crediting. Indeed, the first three elements specifically relate to jurisdictional crediting, aiming to make it easier to realize the potential for financing at scale that this crediting approach offers. The fourth, blended finance, could be relevant at either the jurisdictional or project scale. It could also be used by jurisdictions and their partners to support specific NCS projects or activities within a jurisdiction so that the jurisdiction as a whole is better positioned to exceed a crediting baseline. The appropriate package, and the number and roles of different actors, will need to be developed on a case-by-case basis, and will change over time; many packages are likely to combine elements of some or all of the approaches described.

5.5.1 Enhancing the readiness of jurisdictions for jurisdictional crediting

There are a number of ways in which partners and jurisdictions can work together to improve the jurisdiction's ability to respond to the opportunity provided by jurisdictional crediting, thereby making it easier to attract financing. Implicitly or explicitly, this support focuses on providing resources to jurisdictions so that they are more likely to be able to exceed an appropriately ambitious crediting baseline. One option is results-based climate finance, where donor or philanthropic grants are provided if jurisdictions demonstrate emission reductions or removals that move them closer to a baseline and/or successful implementation of the necessary architecture for jurisdictional crediting, such as MRV systems. Many of the activities of the Lowering Emissions by Accelerating Forest Finance (LEAF) coalition, a group of corporate and sovereign buyers seeking to incentivize the generation and sale of high-integrity JREDD+ credits, fit into this category: it is exploring options to support readiness and implementation of these jurisdictional solutions through a combination of grants and advance payments which do not entail fees or interest, nor do they attract penalties if credits are not generated. Alternatively, or in addition, development finance institutions could further refocus their lending programs to help countries set up and deliver the institutions and policies needed for jurisdictional crediting.

Nesting can also enhance readiness for jurisdictional crediting, making it easier to attract financing. Section 2.4 sets out the benefits that can result from ensuring the ability to nest project-based credits within a jurisdictional crediting envelope. By advancing with project-level financing options in the short term, yet laying the groundwork for future compatibility with a jurisdictional crediting system, jurisdictions can begin to access financing for projects that move them closer to at-scale readiness; the success of such smaller initiatives may reduce the size (and therefore risk) of the additional investment needed to achieve scale. International actors have an important role to play in supporting the efforts of pioneering jurisdictions to navigate the complex design features of an effectively nested crediting system – particularly in the context of rapidly rising global standards of quality and administrative transparency. These complexities are likely to be reduced if credits from the nested projects are sold without corresponding adjustments (see Section 4.5).

5.5.2 Enhancing the readiness of investors for financing jurisdictional crediting

There may be opportunities to increase investor comfort with the concept of investing in jurisdictional NCS crediting. As well as enhancing the readiness of jurisdictions for jurisdictional crediting, there is also a need for investors to become more familiar with the proposition of investing in jurisdictional NCS activities. One option could be for jurisdictions to work with international partners to develop and pilot new financing mechanisms and instruments that test the market's appetite for larger-scale financing of NCS at the jurisdictional level, without (initially) exposing investors to all of the risks associated with NCS crediting.[100] An example of this might be the issuance of a sovereign or sub-sovereign bond with the proceeds hypothecated to pro-forest programs. This could possibly be in a sustainability-linked structure, with coupon payments linked to the achievement of deforestation targets (Wang et al., 2023). In this structure, investors would gain a better understanding of the proposition of investing in jurisdictional NCS activities, without facing

100 There is an analogy with financing of renewable power generation where many governments chose to provide additional confidence to investors by providing fixed price contracts (feed-in tariffs) for the power they generated but where there has been a gradual transition towards investors also accepting price risk (merchant risk).

the price risk associated with NCS crediting (and potentially with the sustainability-linked structure providing a financial hedge against the jurisdiction's performance in addressing deforestation).

5.5.3 Diversifying the risk associated with jurisdictional crediting

Diversifying the expected revenue streams from jurisdictional programs can also make them easier to finance. As discussed above, one of the key challenges in accessing finance for jurisdictional programs is the high downside risk – jurisdictions may invest significant time, money and political capital and then fail to realize significant revenues from credit sales. One way to reduce this risk is to embed NCS crediting activities within a wider rural and agricultural reform program that offers the prospect of multiple revenue streams. For example, NCS agroforestry activities could be embedded in a program focused on developing high-value coffee and other agricultural exports.

In some cases, development partners can provide financial support that both increases readiness for jurisdictional crediting and helps them situate crediting activities within a wider portfolio of activities. The World Bank approval in 2019 of a $250 million "Fiscal Adjustment and Environmental Sustainability" loan to the Brazilian state of Mato Grosso (World Bank, 2022c) which supported development of the state's ambitious sustainable rural development and climate smart agriculture program (known as Produce, Conserve, Include (PCI) might be seen in this context. Depending on the jurisdiction, these loans may be available on concessional terms.

5.5.4 Blended finance to change the risk/reward balance of crediting

Blended finance involves using concessional capital from public or philanthropic sources to reduce the risks faced by private investors investing in activities that support sustainable development such as NCS crediting activities. Blended finance models align capital sourced from different providers in a manner that allows multiple parties (i.e., public and private actors) to invest jointly in the same opportunity in a way that still satisfies each actor's own expectations of the necessary balance between financial return and social and environmental impact. It is typically used in transactions where the private sector would be willing to invest if the risk, real or perceived, were lower.

At present, NCS activities only represent a small fraction of the blended finance universe, with room for significant growth. A 2021 report identifies a total of 31 'vehicles' that (i) focus wholly or primarily on investing in ecosystem conservation or restoration in a way that captures economic value, and (ii) incorporate a blended finance approach of catalytically using public funds to attract private capital (Earth Security, 2021). The sectoral focus of these vehicles spans sustainable forest management, agroforestry and agriculture, as well as the sustainable management of coastal and marine ecosystems. The authors estimate that these vehicles represent only 5% of the total universe of blended finance transactions . There is no evidence available on the extent to which these blended finance vehicles are explicitly supporting the development of NCS activities that are expected to generate credits, while the use of blended finance within a jurisdictional crediting model is inherently modest, on account of the limited use of this crediting approach at present.

Different blended finance vehicles will be relevant in different contexts, with fund structures with different capital stacks being particularly common. The 31 vehicles referred to in the paragraph above include investment funds, financing facilities and investment products. An investment fund model with different 'capital stacks' is one framework seen as offering substantial promise; Box 5.4 below describes this model in more detail, using the example of an equity fund. Such a fund might either invest in a series of NCS crediting projects across a range of jurisdictions or it could be set up by a jurisdiction as part of their efforts to exceed a jurisdictional crediting baseline.

Another blended finance structure of relevance for NCS debt investments are partial credit guarantee mechanisms. Under this structure, a DFI agrees that, in the event of nonpayment by a borrower, it will still cover the guaranteed portion of the principal and interest payments due to investors. For example, a DFI might partially guarantee a bond issued by a jurisdiction in order to finance its NCS crediting activities. Alternatively, within a country, a national or international financial institution could provide a concessional partial guarantee to one or more private banks, in relation to the loans that the bank makes to those undertaking NCS activities expected to generate credits. This could apply both when the lending is for project scale crediting as well as when it is part of the policy package developed by a jurisdiction to generate credits relative to a jurisdictional scale baseline. In all cases, the guarantee could be offered with a fee structure that is deliberately lower than a commercial guarantee provider would charge.

BOX 5.5

A POTENTIAL BLENDED FINANCE STRUCTURE INVOLVING DIFFERENT CAPITAL STACKS

In this blended finance model, investors provide equity capital to a fund that then invests in specific NCS activities. However, the risks faced by the fund's investors are different, meaning that, if the fund's investments perform worse than expected, different investors are affected differently.

For example, a fund might expect to be able to generate a 10% net financial return, including the potential revenues from the sale of NCS credits, whereas potential private investors into that fund might consider a return of 30% to be required, given the risks. Without public intervention, the fund would not be able to reach financial close and the investments, and their associated socio-economic and emission benefits, would not be realized.

However, this could change if there were a public investor willing to invest equity into the investment fund on the basis of a lower expected return, say 5%, and to take a 'first loss' position. This first loss position would mean that in the event that the fund suffers losses – for example, because the revenues from the sale of NCS credits do not materialize – then these losses are born by the first loss capital provider, up to the amount that they invest. This can be achieved by distributing investment returns from the fund to the private investors until they realize an agreed target rate of return and only then distributing proceeds to the public investors.

In this case, if a public financier invested 40% of the fund's equity at a target return of 5%, the private investors, taking into account the first loss position, might be willing to target a 12% return on the 60% of equity they commit to the fund. This would lead to a total return requirement of 9.2% ((40%*5%)+(60%*12%)), lower than the 10% that the fund expects to realize, allowing the fund to proceed.

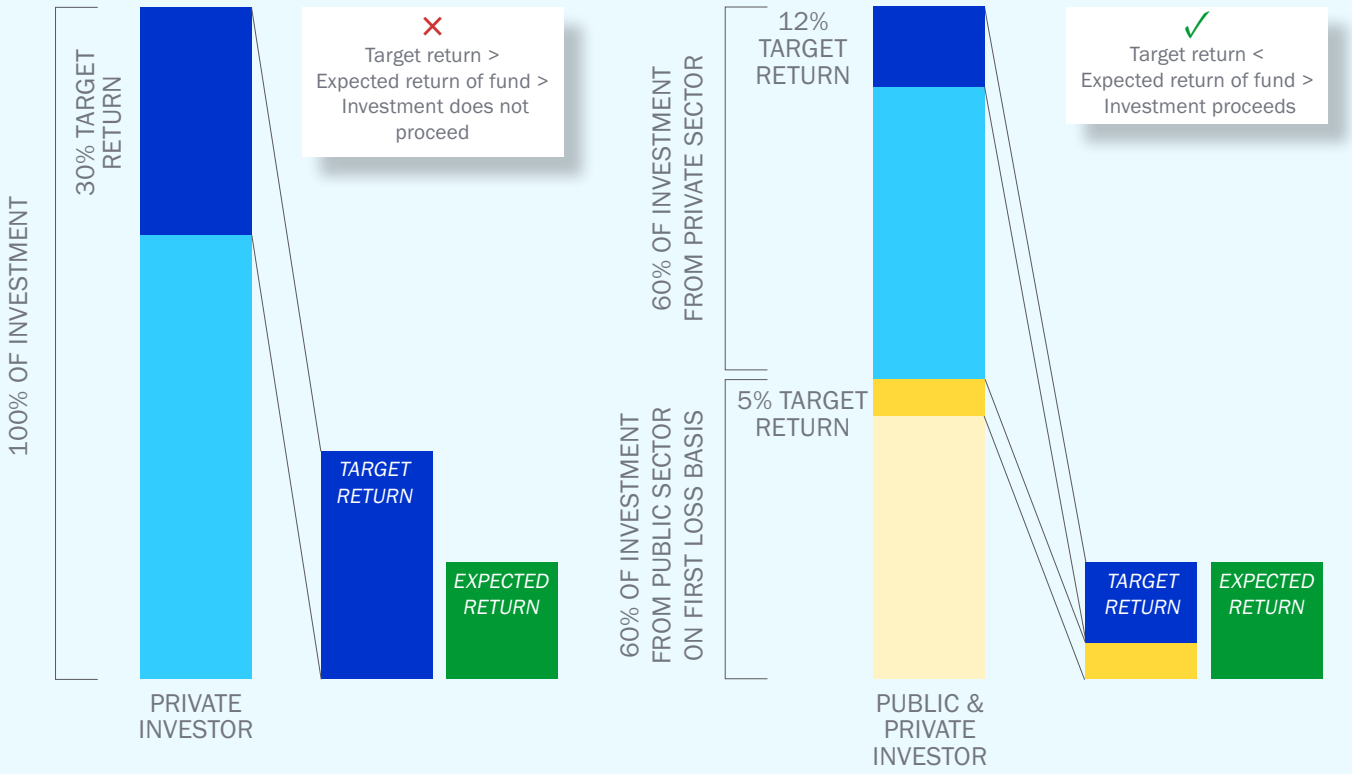


FIGURE 5.3

Blended finance with different capital stacks can make investment in NCS crediting activities more attractive

Blended finance can be controversial, as it is best suited to situations where the private sector actor involved is 'almost, but not quite' willing or able to invest. In these cases, blended finance could help ensure that the NCS crediting activity proceeds – often with an expectation that the de-risked project will provide a 'demonstration effect', proving the investment concept so that others will be more willing to invest in future NCS crediting activities. In contrast, blended finance is not necessary in cases where private investors are already willing to invest (that is, where activities are already considered to be 'bankable'.) Its use in these less risky cases may mean that the public or philanthropic capital achieves no additional results – as the investment by the private sector would have happened regardless – and that the concessional terms of the blended finance could actually crowd out willing private sector investors and/or provide windfall returns to those private investors who are able to invest. At the other end of the spectrum, it may be very difficult and expensive to use blended finance in cases where private investors are very reluctant to invest. Some stakeholders argue that the number of available 'sweet-spot' transactions (that is, transactions that do not fall into these endmember categories of too much or too little risk) may be small (Kenny, 2022).

Blended finance approaches have also sometimes been criticized for lacking transparency. This can lead to concerns that these solutions may not provide good value for money for the public/philanthropic actors providing capital. These concerns have been identified for all applications of blended finance, not specifically those related to NCS crediting activities (OECD, 2018).

To address these sorts of concerns, blended finance solution providers and private finance providers can follow principles to guide the strategic use of blended finance for investing in NCS crediting activities. The principles described below draw heavily from the recommendations made in One Planet Lab's report on Blended Finance for Scaling up Climate and Nature Investments (Lankes, 2021), though in recent years a wide range of actors are considering innovative means to establish impactful and effective blended finance opportunities.

- **Integrate any blended finance approach with complementary solutions.** Any efforts to develop blended finance solutions should be combined with efforts to improve the broader enabling environment for NCS, and to support project and/or program development activities beyond those dependent solely on the blended finance flows. This points to the potential attractiveness of blended finance as one element within a broader package that a jurisdiction introduces as part of its efforts to exceed a jurisdictional crediting baseline. If these complementary solutions are supported by actors with a financial and/or reputational stake in the success of the NCS effort, they will be strongly incentivized to make them effective.
- **Ensure that blended finance models transparently meet acceptable benchmarks for effectiveness and efficiency.** This should be underpinned by robust governance arrangements for the blended finance solution to ensure the necessary transparency.
- **Use aggregation to achieve scale.** The challenges some investors face in relation to small ticket-size transactions were identified in Section 5.3 above. To overcome these issues, those developing blended finance solutions should focus on designs that provide a single investment "input" opportunity for investors, but which can allocate that capital across multiple NCS activities or actors. Vehicles that can raise capital from bond markets, both local and international, are also more likely to achieve scale. These efforts should be complemented by streamlining project preparation and development activities (by, for example, simplifying the procedures to access this support), making it easier to replicate successful models. Once again, this points to the potential for blended finance solutions, supported by relevant partners, as one key element of a jurisdiction's strategy to exceed its crediting baseline.
- **Choose instruments tailored to target the source of the problems at hand.** Different blended finance solutions should be targeted to overcome the specific barriers holding back investment in a specific opportunity. This requires recognizing that the role for, and design of, blended finance will differ between cases – for example, solutions needed for supporting novel approaches to NCS activities in jurisdictions with very challenging enabling environments may be quite different from solutions needed in those cases where blended finance is supporting the scale up of more established approaches in countries with more supportive enabling environments. In the former case, blended finance might take the form of early-stage concessional risk capital that can be allocated to close individual transactions. In the latter case, the focus might shift to achieving scale by supporting across many transactions; for example, this could involve blended finance taking the form of risk mitigation instruments such as guarantees that support the mobilization of larger pools of capital towards NCS activities.

- **Invest in data to support markets, and more operational guidance for blended finance practitioners.** Currently there is a lack of data on the impact of blended finance or systematic guidance on what works best in different contexts. As more of these solutions enter into practice over the coming years, actors willing to assess the application and outcomes of these instruments (as well as to aggregate, systematize, and amplify such knowledge) will be essential to advancing effective use of these evolving financial tools.

Carefully designed financing packages involving blended finance to allocated risks and returns have an important role in helping to scale financial flows into NCS credit generating activities. However, the long-term, scale and sustainability will depend on the market being sufficiently mature that it attracts conventional capital sources into NCS credit generating activities, with investors convinced that the investment proposition reflects their risk-return preferences.

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