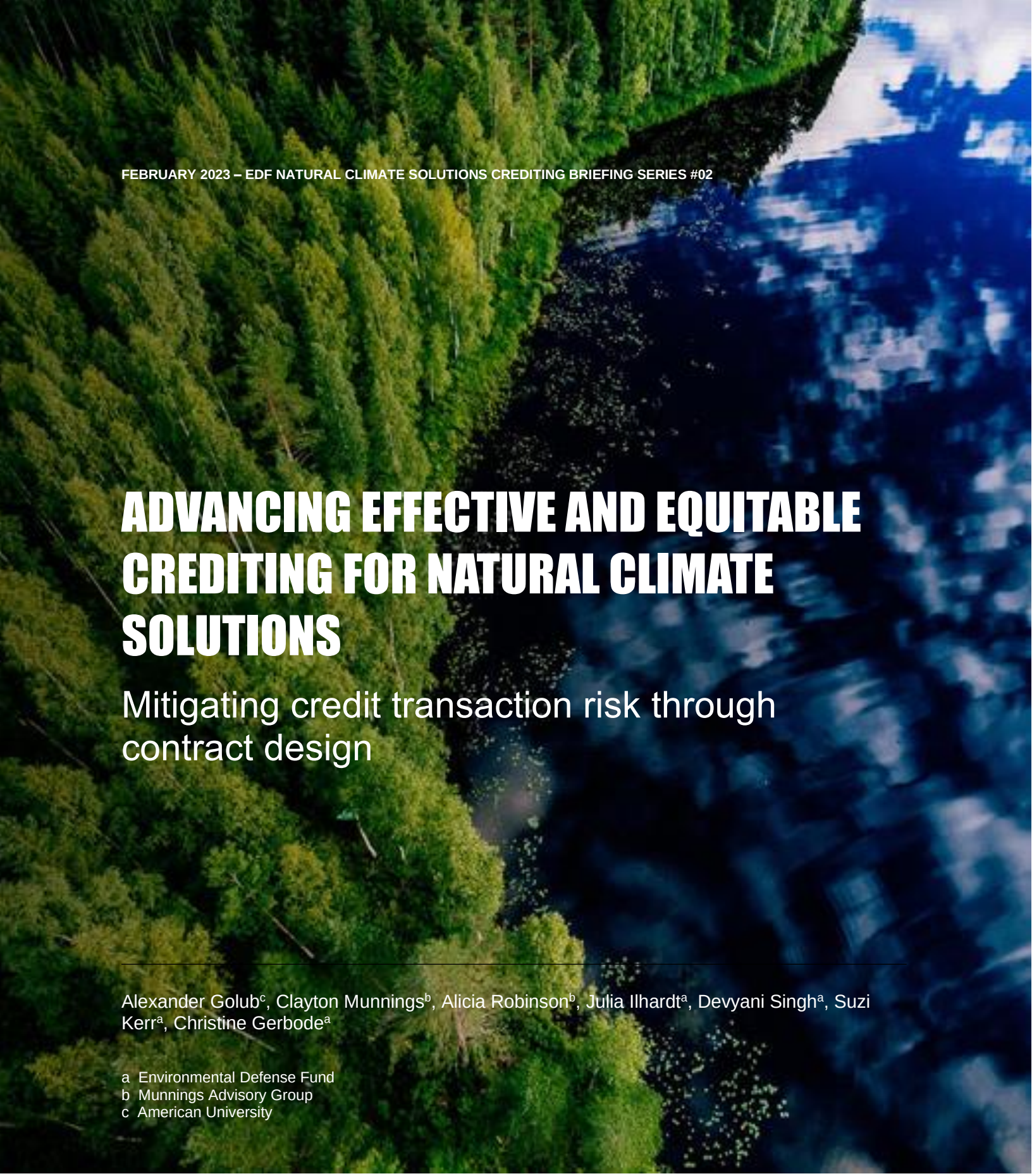

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ADVANCING EFFECTIVE AND EQUITABLE CREDITING FOR NATURAL CLIMATE SOLUTIONS

Mitigating credit transaction risk through contract design

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Environmental Defense Fund

About Environmental Defense Fund

Guided by science and economics, Environmental Defense Fund (EDF) tackles our most urgent environmental challenges with practical solutions. EDF is one of the world's largest environmental organizations, with more than 2.5 million members and a staff of 700 scientists, economists, policy experts, and other professionals around the world.

Sharing Our Discussion Papers

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EDF NCS Crediting Briefing Series

The Natural Climate Solutions (NCS) Crediting Briefing Series covers key issues involved in using NCS crediting as a climate change mitigation tool. The series of briefing notes tackle issues, considerations, and trade-offs related to generating, trading, and using NCS credits and will ultimately provide the content for a Handbook on NCS crediting. Topics in the series include achieving large-scale high-integrity crediting; ensuring financial and environmental equity as credits are created, traded, and used; and financing the mitigation activities that underlie the credits. This briefing note addresses the design of financial contracts to mitigate risk in NCS credit transactions.

Contents

1. Introduction: Purpose and Context

Natural Climate Solutions (NCS) have the potential to provide one-third of the climate mitigation needed to limit global warming to well below 2 degrees (WEF, 2021; UNEP, 2021). In addition to their significant mitigation potential, many NCS are extremely cost-effective relative to other existing carbon dioxide (CO_2) removal solutions; NCS activities can also help to enable a long-term shift toward ecologically sustainable land-use (WEF, 2021). However, rapid and steep investments in NCS—from today's $133 billion per year to over $536 billion per year through 2050—are needed to deliver on their mitigation potential (UNEP, 2021).

To date, most NCS activities have been funded by limited public funds. Private-sector finance, and more specifically emissions trading markets, have a crucial role to play in scaling the growth of NCS projects globally (UNEP, 2021). But private actors seeking to engage in NCS credit transactions will encounter a variety of risks related to market dynamics and market perception. While such risks are not limited to NCS credits, risks within the NCS market do warrant special consideration, particularly given the potential for NCS projects to either positively or negatively impact Indigenous Peoples and Local Communities (IPLCs). The proper management of these risks will therefore directly impact the ability to scale the emerging NCS market effectively, and to ensure that NCS credits are generated under continuously improving high-integrity frameworks.

The design of carbon credit sales contracts—also known as **emission reduction purchase agreements (ERPAs)**—presents a major opportunity for managing these risks. The aim of this briefing note is to enable scaling of high-integrity NCS transactions through the sharing of insights on several key types of risks faced by buyers and sellers of NCS credits. This document also presents a range of opportunities for managing risks through thoughtfully structured contracts – though this brief does not claim to represent a comprehensive inventory of all such risks, nor all such potential solutions. Moreover, many of the risks discussed in this document are not unique to NCS transactions; some of these insights may therefore also serve as a helpful reference for de-risking emissions credit transactions more broadly. This briefing note considers the following types of risks that can be managed through contractual design:

i. **Generation Risk.** Generation risk refers to the risk that fewer NCS credits are generated than expected by a project or jurisdiction-scale NCS initiative[1].
ii. **Delivery Risk.** Delivery risk refers to the risk that, once generated, the contracted credits are not delivered to the buyer pursuant to the terms of the agreement.
iii. **Reversal Risk.** Reversal risks refers to the risk that intentional or unintentional actions lead to a release of the CO_2 reduced or removed by the NCS initiative.
iv. **Price Risk.** Price risk refers to the risk that future prices for carbon credits generated are different (higher or lower) than anticipated.
v. **Reputational Risk.** Reputational risk refers to the risk that the NCS initiative damages the reputation of the seller due to an adverse finding on the quality of the project.

The remainder of this document is structured as follows:

- **Section 2** of this briefing note discusses the landscape of actors and entities involved in contracts.
- **Section 3** then explores how several main classes of contractual structures create incentives for buyers and sellers.
- Specific tools and opportunities for managing each of the types of risk listed above are described in **Section 4**.

2. Actors: Roles and Objectives

Contractual design is impacted by actors beyond the buyer and seller. These actors are identified below along with a brief explanation of their role in carbon credit transactions.

i. **Buyers.** A buyer of credits could be a country, corporation, financial intermediary, investment fund, philanthropic actor, or individual. The buyer's role is to meet its payment obligations according to the terms of a contract. The buyer may also provide upfront financing to enable the seller to access sufficient resources to initiate the project. In for-profit cases, the buyer's objective is typically to maximize the financial return on transactions, or to meet a corporate climate target (whether voluntary or legally required). Maximized financial return could therefore take the form of minimized compliance costs (including hedging cost), or the form of appreciation of purchased

[1] This briefing note refers to 'projects' or 'project developers' as inclusive of NCS initiatives and development at jurisdictional scale. Issues related to scale will be explored within a separate note in the series.

credit value following an upfront investment. Additionally, some government and philanthropic buyers may seek to purchase credits or provide upfront financing as a way to support increased supply of NCS activities and strengthen markets that incentivize further climate action.

ii. **Sellers.** A seller of credits could be a national or subnational jurisdiction, a community, an individual landowner, or another proponent serving to coordinate the generation of credits by a group of these actors. Generation refers to the direct emissions reductions associated with the production of credits. The seller's role is to supply carbon credits produced in accordance with the rules and methodologies of a credit-issuing registry, and to meet any other requirements determined in the contract with the buyer. The seller's objectives likely include selling all credits generated at the highest possible price, ensuring that those investing time and resources in generating activities receive the maximum possible benefit or financial reward for doing so. Sellers may also value the local or global co-benefits associated with NCS, such as preserving livelihoods or improving forest governance. For the purposes of this brief, the seller is assumed to be the project developer, or the entity responsible for generating the credits, rather than an intermediary.

iii. **Brokers.** Brokers are intermediaries that match carbon credit supply with demand. Brokers that successfully match buyers and sellers obtain a brokerage fee, calculated as a percentage of the total sale price.

iv. **Exchanges.** Exchanges are private platforms that enable transactions in carbon credit contracts. Exchanges seek to use electronic trading platforms to enable transparent pricing, facilitate transactions through standardized contracts, and increase market liquidity.

v. **Registries.** Registries are the organizations responsible for establishing the methodologies and other requirements for generation and issuance of credits. They also track the transfer, use, and retirement of credits. They facilitate transparency across these processes, supporting credit integrity by preventing issues related to double counting.

vi. **Rating Agencies.** Rating agencies are private companies that rate methodologies and projects based on their quality. Their objective is to increase market access to information about credit quality through the sale of this information.

vii. **Academia and the Media.** Academics and the media study and report on issues pertaining to the quality and integrity of NCS initiatives. Their objective is to reveal new knowledge or information about NCS initiatives to improve the public's understanding and transparency of the market.

3. Overview of Contract Types

In the growing market for carbon credits, two primary types of contracts have emerged: over-the-counter (OTC) contracts and exchange-traded derivative contracts. Exchange-traded derivatives use standardized contracts, which by their nature are not customizable on a transaction-by-transaction basis, though they could incorporate some of the safeguards discussed below.. This paper focuses primarily on OTC contracts, which take place bilaterally between a buyer and seller, often facilitated by an intermediary broker or exchange. OTC contracts can either be structured as **spot, forward, or options** contracts. The type of contract depends on the goals of the sale – for example, whether a buyer is interested in purchasing credits for immediate accounting use, for future use, or for a range of other reasons. In turn, credit sellers may have different reasons for entering into each type of contract.

Spot contracts call for the delivery of credits at or very near the time of the agreement -- typically within three to five days of the contract execution. This type of contract requires that sellers have already generated the contracted credits, which are available for sale and delivery at the time of the transaction. Because credits sold through a spot transaction have already been generated, the buyer is insulated from some of the more significant risks that arise in contracts that involve future credit delivery, including generation, delivery, and price risk. For this same reason, spot transaction prices tend to be higher than forward transaction prices, because the buyer is offered greater certainty on the type and quantity of credits they will receive. Spot transactions therefore appeal to buyers with a lower risk tolerance and a higher willingness to pay. For sellers, spot contracts can generate revenue quickly but do not capture the true (intrinsic) value of NCS that could be monetized in the future if the seller maintained flexibility.

Forward contracts, on the other hand, call for the delivery of credits at a future point in time and are typically entered into before credits are generated. Forward transactions can be

particularly beneficial to the seller of credits because they guarantee a sale and a sale price before the credits are generated, although the future market price is unknown. They are also attractive to buyers seeking to obtain credits at a lower price, and to guarantee future supply. While payment for the credits can be made upon delivery of the credits to the buyer's account, it is relatively common—particularly in the NCS market—for buyers to provide upfront debt financing or an advance payment to the seller, in order to provide the resources necessary for the seller to undertake the activities that will generate credits. Such financing or prepayment arrangements entail significant risks for the buyer, however, as discussed in the later sections of this paper.

Table 1: Characteristics of Spot and Forward Transactions

	Buyer	Seller
Spot OTC	**Pros:** Credits available for immediate delivery to satisfy buyer needs.	**Pros:** Immediate source of revenue relative to forward trading.
	Cons: Higher price in exchange for greater certainty.	**Cons:** Seller assumes full responsibility to finance credit generation.
Forward OTC	**Pros:** Secures future supply of credits at a relatively lower price than in a spot transaction or on the secondary market.	**Pros:** Predictable future revenue source; enables seller to take on larger projects by borrowing.
	Cons: Buyer is exposed to performance risk, price risk, and counterparty risk (the risk that the seller defaults on the contract).	**Cons:** Lower credit price; financing arrangements may require seller to assume debt obligations; seller is exposed to counterparty risk.

Options contracts are a class of diverse contracting tools that can provide either buyers or sellers with the right, but not the obligation (hence, the 'option'), to enact a specified transaction in the future. For example, these contracts may set an agreed upon minimum or maximum price for credits; one party may opt to buy or sell up to an agreed upon number of credits at this price after some future date. Options are primarily viewed as price risk management tools for both buyers and sellers, though the type of option has important implications for the risks and incentives provided to each party. Two of the most important types of options in the NCS

crediting context are **put options** and **call options.** Options contracts typically require the party gaining the option to buy or sell the underlying assets at a negotiated strike price during the agreed timeframe. To gain this right, the buyer of an option contract pays a premium to the seller who is taking on the potential obligation to fulfill their role in the contract, if the option holder chooses to exercise it.

Put options provide a credit seller with the right, but not the obligation, to sell credits to a buyer at a pre-negotiated (strike) price. Put options – typically secured through the payment of a premium by the credit seller to the potential credit buyer – enable the seller to hedge against a drop in their credit prices. By reserving the option to sell credits at a minimum price, a seller may ensure a minimum return on their investment in NCS credit generating activities. Put options can thereby also incentivize more credit generation on the part of the seller, who will not have to worry about finding a buyer to be guaranteed a minimum return on the sale. In this example, the buyer (which may be a philanthropic actor seeking to support increased NCS supply) receives the credits, but also inherits the price risk that prompted the seller to exercise the option.

Conversely, **call options** provide a credit buyer with the right, but not the obligation, to buy credits at a pre-negotiated strike price before the option expiration date. To reserve the right to buy credits, the buyer also typically pays the seller an upfront nonrefundable premium. In exchange for this premium, which represents an upside for the seller, the seller has a binding obligation to sell credits if the buyer decides to exercise the option. The buyer does not incur any penalties for not exercising the option. Market price is an important determinant of whether buyers exercise a call option. For example, if a buyer anticipates that credit prices on the spot market will increase above the negotiated strike price, the buyer may choose to exercise their call option, thereby securing credits at a better price. If the buyer then re-sells those credits at the future higher price, the buyer keeps all the upside.

Factors beyond price, however, may also influence the buyer's decision to exercise the call option or the seller's decision to exercise the put option. For instance, even if the buyer anticipates that credit prices will increase, they may refrain from exercising their call option if their perception of the quality of their optioned credits has changed. On the other hand, if the buyer has an unprecedented and unanticipated need for credits to meet a compliance obligation, they may decide to exercise their call option now, even if they anticipate that prices will drop in the future. And although call options are an effective way of managing price risk, the buyer may

still face performance risk (in this case, the possibility that the seller has not generated or does not deliver the credits upon exercise of the call option). Similarly, a seller may choose to exercise a put option when the market price is still below the strike price given an immediate and unanticipated need for finance.

Table 2 summarizes the key characteristics of call and put options. It is worth noting that more complex transactions may include both call and put options to address buyer and seller risk appetite.

Table 2: Call and Put Option Transaction Characteristics

	Buyer Incentives	Seller Incentives
Call Option	**Pros:** Minimizes price risk, in exchange for a nonrefundable premium. Enables buyers to cover their supply needs at a better than market price.	**Pros:** Seller receives an upfront payment which may leverage collateral investment.
	Cons: Buyer exposed to performance risk.	**Cons:** Seller may lose some of the upside if the market price is significantly higher than the strike price.
Put Option	**Pros:** Potential to profit if the seller does not exercise the option. Incentivizes growth of market through supplier performance.	**Pros:** Provides demand security for credits and incentivizes performance.
	Cons: Exposure to unfavorable market dynamics and potential losses.	**Cons:** Does not provide an upfront payment.

4. Opportunities to Manage Risk

As noted above, OTC forward and options contracts are common in the NCS market and carry important risk considerations related to the time lag between contract execution and credit delivery. This section discusses these risks, and how they can be addressed in contractual design, in greater depth.

4.1 Generation Risk

Generation refers to the production of carbon credits – that is, the translation of NCS activities into a quantified volume of credits issued within a registry, based on the verified emissions impacts of these activities. In most instances, project developers must undertake a series of specific steps outlined in a protocol published by a carbon registry. These protocols entail a combination of project implementation, monitoring, and verification activities. To be issued credits for these activities, the project developer must submit documentation to the registry demonstrating that it has adhered to the prescribed steps, along with a third-party attestation of the project developer's results. Only once the registry has received these submissions will it issue credits to the project developer.

One of the main risks faced by most buyers is **generation risk**, a type of performance risk in which *the quantity of NCS credits contracted by the buyer is not ultimately generated by the seller within the agreed timeframe*. Generation risk is predicated on the seller undertaking the required activities to produce emission reductions but failing to achieve the intended results in terms of subsequent credit production. In this scenario, the buyer may be left empty-handed or with fewer credits than anticipated; depending on the buyer's needs for credits at the time of this failed delivery, the buyer might be forced to quickly try to procure the missing quantity of expected credits from a different source, potentially for a much higher price.

Buyers often conduct extensive due diligence on a seller's track record to identify signs of potential non-performance by credit generators. The risk that the seller does not perform can also be managed through one or more contractual provisions agreed to between the buyer and seller. These contractual design measures may seek both to reduce generation risk and to offer protections in the event that credits are not generated.

One approach to limit generation risk involves incorporating access to early warning signals into the contract, allowing the buyer to learn early on if the project is not on track to produce the expected emission reductions. Early signs of non-performance can enable the buyer to take steps to protect themself in a timely manner. These early warning signals can be grounded in a contractually defined right for the buyer to audit the project's implementation. This auditing might take the form of site visits to verify that the activities are taking place on expected schedules, or requirements for the seller to provide the buyer with access to other project-

related documentation upon request. The specifics of these steps are typically negotiated between the buyer and seller, based on the specifics of the generating project.

If the buyer has agreed to provide financing or a prepayment to enable the seller to undertake the project, the structure of this finance can also be designed to incentivize intermediate implementation milestones. For example, a contract could stipulate that the seller only receives the payment for further stages of project implementation upon demonstrating that the previous tranche of disbursed funds was invested into implementing a preceding milestone of the project. These milestones could be specific steps or requirements imposed by the credit registry's rules, which might offer an objective standard of achievements that both parties need fulfilled. For example, a number of steps of project development may require registry sign-off or approval; such an approval could serve as the trigger to release the next stage of funding.

An alternative contracting approach to reducing generation risk is for the seller to commit explicitly to making commercially reasonable efforts to follow all applicable registry rules as closely as possible. If the seller has adhered to the registry requirements for producing a credit, then there is (in theory) little risk that the expected credits will not be produced. This provision operates as a protection for both buyers and sellers:

- If the seller can demonstrate that they have met all the registry requirements, in the majority of cases the seller will not be penalized for a failure to generate.
- If sufficient credits are not produced, and the seller did not follow the stipulated rules and processes, then the buyer will have no obligations to the seller.

For the buyer, this type of provision could provide a useful alternative to performing audits, which may be impractical and cumbersome depending on the location, complexity, and resources available to the parties. But unlike audit rights, this type of clause does not provide the buyer with access to early warning signals. These types of clauses can introduce additional costs and complexities because there is ambiguity in what constitutes commercially reasonable efforts. In the case of a serious disagreement, the parties may need a court to settle any disputes.

In the event that expected volumes of credits are not generated despite any attempts to mitigate generation risk, contractual design elements to limit the impacts of this outcome include collateral agreements and call options. **Collateral agreements** require that one party puts forth something of value, to be transferred to the other party in the event that their other obligations are not met. The appropriate size and type of collateral is negotiated between the

parties, but could, for example, include rights to some volume of credits being generated by the seller through a different project. Similarly, in a long-term forward contract arrangement, the buyer could negotiate a call option providing the right to purchase any surplus credits generated by the seller in the future in order to compensate for missing credits during the timeframe of the original agreement.

4.2 Delivery Risk

Delivery risk is another type of performance risk that arises after credits have been generated, *involving a situation where the seller fails to transfer the generated credits to the buyer*. The key factor motivating this risk is potential price appreciation of the credits between the initial date of contracting and the delivery date. This creates an incentive for the seller to identify a third-party purchaser willing to pay the higher price and to sell the contracted credits to this third party instead of the original buyer. Contractual design can help reduce the likelihood of this scenario by making it less attractive for the seller to seek out a higher price on the market at the time of credit issuance.

Delivery risk differs from generation risk in that delivery risk typically involves an intentional contractual breach, whereas generation risk is less likely to involve willful violations by the seller. As a result, contractual design features that address delivery risk tend to be both preventative and punitive, rather than protective (as is more often the case when addressing generation risk).

The most common approach to limit delivery risk 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. The seller could also be required to procure comparable credits for the buyer as an alternative to the monetary payment. Either way, the seller would have to compensate the original buyer roughly the same amount that the seller gains by selling the credits to a third party at the appreciated price. Under these conditions, the seller would therefore not gain anything economically by selling its credits to a third party, and the incentive to breach the original agreement is gone.

A second approach to preventing delivery risk involves ensuring that the credits are issued directly to the buyer by the registry. Two preconditions are required for this to be a viable option. First, the applicable registry must allow credits to be transferred directly to the buyer,

which would represent a deviation from the default rule that credits are issued exclusively to the seller (project developer). Second, the buyer must have an account with the registry in order to receive credits. Assuming these two preconditions can be met, this option eliminates delivery risk almost entirely by preventing the seller from repurposing the credits before they reach the buyer.

As discussed in the generation risk subsection, call options and collateral clauses can be used to minimize harm to the buyer in the event that contractually guaranteed credits are not delivered. However, these options are less frequently employed to prevent delivery risk than to prevent generation risk, as in the former case they may create the opportunity for profitable arbitrage by the seller, which undermines their preventative goal.

4.3 Reversal Risk

Reversal risk refers to *the potential release or re-release of CO_2 after credits have been issued for reducing or removing that CO_2 from the atmosphere*.[2] Reversal risk is one of the most important risks faced in NCS initiative development, as reversals can have major implications for global mitigation accounting as well as for credit buyers' ability to meet voluntary and legal emissions reductions goals. The risk is particularly present for NCS, which by nature are vulnerable to adverse weather and climate impacts as well as changes to land and water use, all of which could be impacted or exacerbated by ongoing climate change. By contrast, the risk of reversal is considered to be lower in some non-NCS mitigation crediting contexts – for example, crediting for activities that involve the irreversible destruction of industrial gases with high warming potential, or direct geologic sequestration of carbon. In some cases, reversals may be necessary or favorable given shifts in the costs of mitigation options or changing demands on land, and temporary storage can still provide important climate and social benefits.

Unlike other risks discussed in this brief, some degree of reversal risk management is mandated by most if not all carbon registries. Reversal risk is discussed in terms of unintentional reversals and intentional reversals:

- **Unintentional** reversals are caused by natural events, such as forest fires and droughts.

[2] A forthcoming discussion paper on permanence will discuss the management of reversals in greater detail, including additional potential solutions.

- **Intentional** reversals are caused by human actions, such as tree harvesting or reversion to less climate-friendly farming practices.

The most common tool for managing the risk of reversals is known as a **buffer pool.** Buffer pools act like insurance accounts, in that all participating projects contribute a percentage of their credits generated to the buffer pool, and credits are retired from the buffer pool whenever a reversal occurs. The buffer pool contribution of each project is determined based on the risk associated with that project. The use of the buffer pool for reversal events depends on the registry rules and the type of reversal (intentional and unintentional). Some registries do not allow the use of a buffer pool to address intentional reversals; instead, registries may require the project developer to retire a volume of credits equal to those lost in the reversal from another source (i.e., requiring the developer to bear the full cost of replacing the lost credits). While buffer pools are standard practice at the project level and included in existing jurisdictional approaches, their effectiveness is still uncertain, and doubt remains surrounding their ability to compensate for large scale reversals in the face of extreme climate events.

Although the reversal risk is managed to some extent by the registry, additional contractual features can be deployed to optimize management of this risk. These approaches may be suitable in contracts where there is more than one party involved in the project development (for example, a joint venture or a buyer providing upfront financing.) One such approach is the contractual creation of a *private* buffer pool, populated only with a certain percentage of credits issued to the seller. Sellers would utilize this private buffer pool in the event that an intentional or unintentional reversal is not entirely covered by the registry-managed buffer pool.

Depending on the type of NCS activity, and on the legal context of the location where credits are being generated, another option to address reversal risk is to legally register the land on which the project is taking place as a conservation easement. A **conservation easement** legally prevents non-conservation activities from occurring on the land; depending on the jurisdiction, this obligation runs in perpetuity unless otherwise specified. Conservation easements are therefore a way to prevent intentional reversals even if the land changes ownership. They can also reduce the registry-mandated buffer pool contribution for the supplier, because the presumed risk of reversal is lowered by the legal prohibition of non-conservation activities on the land.

Risk of intentional reversal can also arise from unintended negative impacts on local communities or inequitable benefit-sharing arrangements among stakeholders involved in the NCS activities used to generate credits. Negative impacts to a stakeholder's community, environment, or livelihood, as well as clearly inequitable arrangements, may undermine a party's ability or motivation to fully meet any ongoing land use or management obligations underpinning NCS credit integrity. Avoiding negative impacts or unethical arrangements requires that buyers and sellers of credits take action to understand and consider the relevant local contexts that may shape near or long-term outcomes for credited NCS activities, whether ecological, economic, or cultural. Such **safeguards**—actions or practices that support the protection of human or environmental welfare and rights—aim to reduce the risk that an NCS initiative might cause unintentional harm to communities or ecosystems, or undermine the rule of law in the society where the NCS activity occurs. These proactive measures may include requiring sellers to commit to meaningful stakeholder engagement processes—as well as fair and equitable benefit sharing arrangements—with IPLCs (and any other stakeholders) involved in enabling the emission reductions. Equitable benefit sharing may include monetary or non-monetary compensation, depending on the goals and needs of the communities in question. For example, negotiated benefits might include goods that support implementation of NCS activities (such as seeds or agricultural equipment), as well as broader community development initiatives, such as technical training and capacity building, health services, or education programs (Forest Carbon Partnership Facility).

Specific safeguards applicable to a given credit-generating effort may be articulated through domestic legislation, international crediting standards, or other legal and voluntary frameworks related to financing NCS activities. The most well-known environmental and social safeguard framework in the NCS context is the UNFCCC's 2010 Cancun Safeguards, which specifically apply to REDD+ projects. These safeguards, many of which take the form of broad principles, seek to bolster respect for and meaningful consideration of the agency, knowledge and rights of IPLCs, whose lives and livelihoods may be greatly interdependent with forest ecosystems. Accordingly, the Cancun Safeguards include stipulations to ensure the "full and effective participation" of these stakeholders (1/CP.16, Appendix I), though specific practices to achieve this may vary across local contexts. Financial safeguards, meanwhile, often focus on adherence to international anti-corruption laws, such as the US Foreign Corrupt Practices Act and the UK Bribery Act.

One approach to incorporating safeguards into contracts is to include explicit requirements to comply with any number of existing frameworks and practices such as those mentioned above; for example, a buyer could condition the purchase of credits on affirmative attestations of compliance with these practices by the seller. Buyers may be limited in their ability to monitor the implementation of these safeguards by the seller and may lack the resources or experience to verify that all provisions have been carried out as agreed (or to the satisfaction of all stakeholders). However, if a violation is discovered to have occurred, such a conditional contract would provide grounds for the buyer to back out of their obligation to purchase these credits. The buyer's ability to terminate in the event of noncompliance would create a strong incentive for the seller to respect the stipulated safeguards.

While important work has been done to raise standards for social safeguards and benefit sharing in the REDD+ sector in recent years, the lack of comprehensive and universally accepted best practices for safeguards in NCS activities remains a key challenge for their incorporation into contracts. Some existing safeguard frameworks and credit registry requirements are nonspecific, as appropriate practices for benefit sharing and engagement of IPLCs may vary dramatically from location to location. Seeking feedback on proposed contract inclusions from other actors, such as local civil society organizations already engaged with local communities and ecosystems, may help ensure that any efforts to contractually mandate safeguards are appropriate and comprehensive. Such actors might also be enlisted to provide support to ensure safeguards are meaningfully implemented – for example, by facilitating IPLC consultation, translation, and adequate legal representation, as part of ensuring free and prior informed consent (FPIC).[3]

4.4 Price Risk

Price risk is an inherent feature of most commodity contracts. In carbon markets, however, price risk is arguably higher than in other markets, given the potential for emerging climate-related compliance obligations to drive significant new demand for credits on a deeply uncertain timeline. Prices within carbon markets are also impacted by factors including (but not limited to) the homogeneity of credits, low price transparency, evolving definitions of quality, and challenges in quantifying and valuing co-benefits. The result of these complex market dynamics is high price variance and unpredictability.

[3] A right articulated in the 2007 United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP).

As framing for discussing price risk management through contractual design, this section first discusses several key market developments that influence price discovery and related information-sharing among potential buyers and sellers. Historically, brokers acting as intermediaries between buyers and sellers have been the primary source of price information, and they are still important data repositories today. Recently, however, the market has seen a surge in growth of carbon exchanges such as Xpansiv, AirCarbon Exchange, IncubEx, and Carbon Trade Exchange. These carbon trading platforms publish contract prices on a live basis, and therefore represent an important data source for parties assessing how to price a transaction. While the exchanges are growing, they are still relatively nascent and do not currently reflect the full universe of carbon contracts. Thus, prices available on exchange platforms are indicative, but not necessarily determinative, of the intrinsic value of a given credit. Prices for NCS-based credits are also strongly influenced by perceptions of a credit's co-benefits and overall quality. Several credit rating agencies, such as BeZero, Calyx, and Sylvera, have undertaken rating projects to assess these aspects of credits; these ratings can also be useful to inform current and projected pricing of different carbon credit categories.

Standard purchasing contracts may pre-determine the price of a carbon credit, in which case the price risk is low. For example, a corporate purchaser may agree to buy 10,000 forestry credits at $10 per credit, for delivery on a specified date. In this scenario, the price is fixed, typically based on prevailing market prices at the time of contracting. The downside of this arrangement is that both buyer and seller are locked into a price that may be higher or lower at the actual time of delivery. Thus, parties will often agree to determine the price of the credit at the time of delivery, typically by using broker-derived quotes and/or exchange prices as the price-determining metric. Parties may further balance price risk by establishing a fixed price for a certain quantity of credits with a floating price for a different quantity of credits. This approach enables parties to have some certainty on price through a fixed rate and to share in the upside or downside of price fluctuations.

Call options and put options are also effective tools for managing price risk and distributing risk between buyers and sellers. Options can either be standalone contracts or can be incorporated into forward contracts as a contingency for performance risk in a long-term offtake agreement. For example, if a seller has delivery obligations to a buyer for five years, but in the first year only generates a percentage of the credits, the buyer can exercise an option to purchase additional

credits from the seller in years two through five to make up for under-generation in the first year.

4.5 Reputational Risk

Participants in carbon markets currently face a significant level and unique type of reputational risk. Increases in corporate and international climate commitments have led the demand for carbon credits to skyrocket in recent years. However, this new spotlight has brought with it an increased scrutiny of carbon credits, particularly the integrity of credits within mitigation accounting frameworks at global and local levels. While there are a number of recent and ongoing efforts to define credit quality in detail, key themes that feature prominently in discussion of credit integrity include:

- additionality (the activities underpinning the credits would not have occurred in the absence of the credit sales and related finance)
- permanence (the carbon is reduced or removed for long enough to be scientifically equivalent to a permanent reduction or removal)
- conservativeness (the carbon credits issued for sale are equal to, or fewer than, the volume of reductions achieved by the NCS initiative)
- equity (the activities and projects on which the credits are based are not harming local people or ecosystems)

Critiques of carbon credit integrity are frequently centered on concerns that the claimed CO_2e (carbon dioxide equivalent) reduction or removal would have happened even in the absence of the carbon finance, and that more credits were issued than tons of CO_2e were reduced or removed. In the NCS space, avoided deforestation projects have been particularly vulnerable to these critiques, as there are significant challenges inherent to forecasting where deforestation would have happened in the absence of a given crediting project.

Potential approaches to manage these types of reputational risk depend in part on the timing of the transaction relative to credit generation and issuance. For example, purchase agreements entered into with the seller prior to the start of an NCS initiative might contractually require the seller to carry out the project in a manner that maximizes the quality of the credit. This **quality maximization** might entail evaluating the existing methodology's approach to additionality, permanence, and conservativeness, and identifying modifications to project design and

implementation that could improve upon quality while still adhering to the methodology's requirements. This exercise requires significant technical expertise and increases the cost of project implementation. However, a higher quality credit would also justify a higher credit price, and is arguably the best prophylactic against future reputational risk.

Contracts can also stipulate how negative reputational events should be managed once a project is underway. For example, if a media article or academic paper identifies over-crediting in an active NCS initiative, parties involved in that project can agree to address that over-crediting by reducing the credits available for sale. If the project suffers a reputational event before delivery of credits to a buyer, the contract may allow the buyer to exercise the right to terminate the contract. For long-term offtake agreements, which are not uncommon for NCS projects, this termination right could, in theory, terminate all future obligations of the buyer to the seller. Because this is not an ideal outcome for either of the parties, however, it is typically only exercised if all other measures have been exhausted.

As credit rating agencies begin to expand their coverage of projects, parties can also begin to condition contracted transactions on credit ratings. For example, projects could be required to receive a minimum rating as a condition for the purchase. In practice, however, this would require ratings to be issued at a faster speed than they are today and would require the rating to be issued at the project level.

Reputational risks exist beyond those related to the integrity of mitigation accounting—for example, those associated with the discovery of potentially negative financial, environmental, and social impacts of activities from which credits are generated. Some of these risks can be avoided or mitigated through an explicit contractual requirement to adhere to specific safeguards, as discussed in the context of reversal risk above.

Increasingly, advocacy groups assessing the integrity and quality of NCS-based carbon credits are stressing the need for buyers to seek credits generated with protections that go above and beyond traditionally invoked safeguard standards like those mentioned in Section 4.3. In particular, such recommendations are moving toward more proactive advancement of the rights and interests of IPLCs, including a growing focus on ensuring that projects complement and advance local climate resilience and adaptation, and support other UN Sustainable Development

Goals (SDGs)[4]. Seeking contractual assurances of safeguards that go beyond any bare minimum required by credit registries may help insulate both buyers and sellers against future reputational risks (and for sellers, related price risk), as global expectations for safeguard adherence continue to rise.

5. Concluding Thoughts

While public sector funding has enabled most of the NCS growth to date, private sector investments, specifically through the carbon markets, are crucial to scaling NCS through 2050. NCS have a crucial role to play in narrowing the emissions gap – but will be unable to fulfill this role in the absence of significant additional investment, including from the private sector.

Investments in NCS, like investments in most sectors, are not without risk. But thoughtful design of incentives can help both buyers and sellers mitigate these risks, opening the door for the huge volumes of NCS investment needed to meet global climate goals.

Other risk reduction mechanisms can complement those deployed directly within contract design. For example, to secure collateral investment in NCS, institutions can guarantee permanence or reduce reversal risk through buffers and other instruments. Emerging insurance products may be useful for mitigating the impacts of delivery and generation risk, as well as risks related to credits of insufficient quality. And many actors beyond the direct parties to a transaction can support the effective and ethical scaling of this growing market— from civil society organizations that can provide technical and legal support to IPLC stakeholders, to market intermediaries that help clarify the appropriate use of NCS credits and related claims. Such topics will be covered in further detail in subsequent briefs in this series, as well as in the forthcoming NCS Crediting Handbook.

[4] See for example the January 2023 update to the Tropical Forest Credit Integrity Guide, a collaborative consensus document issued jointly by 8 major NGOs focused on environmental integrity (including EDF).

5. References

Note: references include those which were relied on for information and discussions even if not explicitly mentioned in paper

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