Submission to the Structured Public Consultation on Removal Activities under the Article 6.4 Mechanism

Environmental Defense Fund (EDF) is grateful for the opportunity to provide input to the 6.4 Supervisory Body on removal activities under the Article 6.4 mechanism. This submission builds on previous EDF input, including joint submissions on nature-based removals and a submission on engineering-based removals, which are included below. EDF looks forward to continuing to support the operationalization of a mechanism that helps countries raise their ambition and directs finance toward sustainable development and climate solutions.

This submission builds on the following materials, among others:

1. EDF's submission with other NGOs on nature-based removal activities[1]
2. EDF's submission on engineered removal activities[2]
3. Tropical Forest Credit Integrity Guide, https://tfciguide.org/
4. Carbon Credit Quality Initiative, https://www.carboncreditquality.org/

Cross-cutting questions

1) Discuss the role of removals activities and this guidance in supporting the aim of balancing emissions with removals through mid-century.

Achieving the Paris Agreement's goal of balancing anthropogenic emissions and removals in the second half of the century requires both reductions and removals. In the near-term, priority must be given to *reducing* emissions by transforming energy systems and conserving critical ecosystems, such as tropical forests. The harmful effects of fossil fuel pollution on communities and the climate are indisputable. Further, emissions caused by deforestation and the loss of other ecosystems are significant and irrecoverable in relevant time frames.

However, the Intergovernmental Panel on Climate Change (IPCC) notes that "the deployment of carbon dioxide removal (CDR) to counterbalance hard-to-abate residual emissions is unavoidable if net zero CO_2 or GHG emissions are to be achieved."[3] With innovation and investment, CDR solutions have socio-technical potential to remove billions of tons of CO_2 from the atmosphere each year.[4]

Removals are not a justification for continued pollution but rather a complementary piece of a larger transition that requires deep emission cuts across all sectors. They will require attention in the near-term to be part of the solution in the future. To ensure an adequate supply of removals

[1] Recommendations to the Article 6.4 Supervisory Boy on Activities Involving Removals, submitted by EDF, Conservation International, The Nature Conservancy, Wetlands International, Rare, Ocean Conservancy, Ocean & Climate Platform, and National Wildlife Federation. https://www4.unfccc.int/sites/SubmissionsStaging/Documents/202303141631---Joint%20Submission%20on%20Removals_March%2015.pdf

[2] Input to SB005 Annotated Agenda and Related Annexes, submitted by EDF. https://blogs.edf.org/climate411/wp-content/blogs.dir/7/files//23.05.25_EDF_UN_CDR_Letter.pdf

[3] IPCC AR6 WGIII, Summary for Policymakers, 36. https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_SPM.pdf.

[4] "Negative emissions—Part 2: Costs, potentials and side effects" Sabine Fuss *et al* 2018 *Environ. Res. Lett.* 13 063002, DOI 10.1088/1748-9326/aabf9f.

credits to neutralize residual emissions, for example, policymakers must take care not to prematurely eliminate potential climate solutions as technologies move toward pilot scale and beyond. Similarly, they must not lose sight of the time lag between the initiation of forest restoration activities and the generation of significant volumes of emissions removals.

For this reason, the 6.4 Supervisory Body must finalize robust and future-proofed recommendations on removals. In addition, as the effectiveness, impacts, risks, and co-benefits of CDR will be highly variable depending on the method and context,[5] it is critical that the Article 6.4 mechanism Supervisory Body ensure high social and environmental integrity for any removals methodologies it approves. All CDR solutions require careful considerations around safe and effective deployment; monitoring, reporting, and verification; equity and justice; and innovation.

Questions on specific elements

A. Definitions:

Discuss the role and potential elements of definitions for this guidance, including removals.

The initial recommendations advanced by the Article 6.4 Supervisory Body echoed the Intergovernmental Panel on Climate Change (IPCC) definition of carbon dioxide removal,[6] maintaining a technology neutral approach while expanding the definition to encompass all greenhouse gasses (GHGs).[7,8] This includes activities that result in durable storage in geological, terrestrial, or ocean reservoirs, or in products. EDF sees the wisdom in relying on the IPCC's approach. All options to remove emissions from the atmosphere—all tools in the toolbox—should be considered eligible under the Article 6.4 mechanism to contribute to the achievement of the Paris Agreement, provided they meet the forthcoming requirements elaborated by the Article 6.4 Supervisory Body.

Nature-based removals can play a particularly important role not only for their mitigation benefits, but also for their ability to enhance adaptation and resilience. It's also important to note that the vast majority of removal activities to date are biological in nature.[9] For these reasons, nature-based removal activities must not be overlooked or excluded as the 6.4 Supervisory Body develops its recommendations. EDF urges the 6.4 Supervisory Body to address the question of duration elsewhere in its recommendations, rather than in the definition of removals.

It is imperative, however, that the 6.4 Supervisory Body adopt strong safeguards to ensure that activities under the mechanism deliver verified mitigation benefits and avoid potential negative environmental and social impacts. When elaborating these safeguards, the 6.4 Supervisory Body might consider referring to existing guidance, like the Cancun Safeguards, which describe the safeguards that should be promoted and supported when undertaking REDD+ activities.

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[5] IPCC AR6 WGIII, Summary for Policymakers, 36.
[6] IPCC, Special Report: Global Warming of 1.5C, Glossary. https://www.ipcc.ch/sr15/chapter/glossary/.
[7] Recommendation: Activities involving removals under the Article 6.4 mechanism, 2. https://unfccc.int/sites/default/files/resource/a64-sb003-a03.pdf.
[8] As noted in the Information Note on Removal Activities under the Article 6.4 mechanism, there are currently no mature removal methods for non-CO_2 GHGs. https://unfccc.int/sites/default/files/resource/a64-sb004-aa-a04.pdf.
[9] IPCC AR6 WGIII, Summary for Policymakers, 40.

C. Accounting for removals:

1) **Discuss any further considerations to be given to the core elements for accounting for removals in A6.4-SB003-A03; where possible, identifying their applicable scope, i.e., relevance to all 6.4 mechanism activities, to removals activities, or to specific removal activity categories or types.**

Importance of aligned baselines and nesting for accounting integrity: Aligning baselines across scales, from projects to the jurisdictional (i.e., national, state, or provincial) level, is critical for upholding environmental integrity in crediting.[10]

Project-scale emissions reductions and removals must be accounted for within jurisdictional accounting and reporting (where jurisdictional programs exist). A jurisdictional program and/or projects nested into a jurisdictional program should set baselines in accordance with a jurisdiction-wide accounting methodology or, in the absence of one, an independently certified, jurisdictionally allocated baseline. Nesting-ready projects should also start the process to adopt an independently certified, jurisdictionally allocated baseline as soon as one is developed.

E. Addressing Reversals:

In order to minimize the risk of non-permanence of removals over multiple NDC implementation periods, and, where reversals occur, ensure that these are addressed in full.

2/CMA.3 stipulates that Article 6.4 activities shall "minimize the risk of non-permanence of emission reductions over multiple NDC implementation periods and, where reversals occur, ensure that these are addressed in full."[11] The International Civil Aviation Organization's emissions unit eligibility criteria similarly require that, if there is a risk of reversal, "mitigation measures are in place to monitor, mitigate, and compensate any material incidence of non-permanence."[12]

"Permanence" generally means that the atmospheric benefit claimed by the carbon crediting project or program is durable over time. A "reversal" occurs when GHG emissions reductions or removals credited by a mitigation activity are later reversed.[13] Reversals can occur, for example, due to a natural disaster, project mismanagement, or significant policy change/political turnover. The mitigation activity thus may result in only a temporary GHG benefit for the atmosphere. However, the risk of reversal does not mean that reversal is a foregone conclusion, or that activities with a risk of reversal should be ineligible for crediting under the Article 6.4 mechanism.

The recognition of the risk of reversal has led to the development of policy approaches that can (1) mitigate the risk of reversals and (2) compensate for reversals when they occur, which are detailed in responses to the questions below.[14] Most—but not all—crediting programs combine these two approaches to address the potential for reversals.

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[10] Tropical Forest Credit Integrity (TFCI) Guide. https://tfciguide.org/.
[11] UNFCCC, 2/CMA.3, 33. https://unfccc.int/documents/460950.
[12] ICAO, CORSIA Emissions Unit Eligibility, 3. https://www.icao.int/environmental-protection/CORSIA/Documents/ICAO_Document_09.pdf.
[13] Carbon Offset Guide, Permanence. https://www.offsetguide.org/high-quality-offsets/permanence/.
[14] CCQI, Methodology, 75. https://carboncreditquality.org/methodology.html.

1) **Discuss the applicability and implementation aspects of these approaches, including as stand-alone measures or in combination, and any interactions with other elements of this guidance:**

    a) **Non-permanence risk buffer (pooled or activity-specific);**
    b) **Insurance/guarantees for replacement of ERs where reversals occur (commercial, sovereign, other);**
    c) **Other measures for addressing reversals in full.**

There are a number of approaches to compensate for reversals if they occur.

1. Effectively and efficiently detecting reversals is a critical first step to ensuring high-integrity carbon credits. Challenges with reversal detection vary depending on the type and scale of the intervention.

   At all scales, the monitoring techniques and technologies that suppliers can use to quantify and verify reversals vary widely across ecosystems and NCS pathways. As NCS pathways have diverse impacts on GHGs stored in soil, water, and biomass, they require different monitoring approaches. There are three main approaches: direct monitoring, modeling, and remote sensing, all of which have associated uncertainties.

   Direct monitoring involves physical visits to NCS activity sites, to record direct measurements and changes in carbon stocks (via scaling rules) or other proxies. Modeling involves utilizing a few measurements and scaling to larger areas via empirical rules, such as for soil carbon. Remote sensing 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, and scaling to carbon via ground truth points, empirical relationships developed elsewhere, or other methods. Remote sensing is often able to efficiently collect data over large, inaccessible, and even remote landscapes.

2. Require compensation for all types of reversals by either the carbon crediting program or the mitigation activity developer through the cancellation of other carbon market units. This can be achieved through landowner liability, pooled or non-pooled buffer reserves, and/or insurance.[15] In addition, credits held in a buffer reserve at the end of a program's monitoring period should be canceled.[16]

   Voluntary standards have converged around the use of appropriately sized buffer pools to address the risk of reversals. Buffer pools require suppliers to assess their reversal risks (e.g., their vulnerability to specific natural disasters or economic failure) and contribute 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. To be most efficient, the percentages of credits

[15] CCQI, Methodology, 75. https://carboncreditquality.org/methodology.html.
[16] CCQI, Methodology, 78. https://carboncreditquality.org/methodology.html.

allocated to the buffer should match the actuarial risk of reversal for all activities covered by the buffer. The allocation should take into account how reversals are detected, quantified, and reported.

3. Encourage the use of financial instruments for risk management, with a view to potentially mandating the use of these instruments at a later stage. This refers to the idea of making insurance or some other backstop (like a bond) mandatory for project managers under contractual design. To discourage risky practices, insurance companies frequently set management requirements for insured projects. In theory, project managers could purchase insurance to cover the risk of reversals, though very few insurers currently provide this service.

4. Generate temporary credits, which Parties have previously employed with limited success. Temporary credits expire after a certain period and need to be replaced, regardless of whether a reversal occurred. In principle, this is a conservative approach to address the risk of reversals as long as procedures remain in place to ensure the replacement of credits. These credits do, however, carry buyer liability and are therefore less attractive for compliance by sovereigns.

   In the case of the Clean Development Mechanism (CDM), which was developed under the Kyoto Protocol, the temporary crediting approach encountered numerous challenges and demonstrated limited effectiveness, putting forestry projects at a de facto disadvantage compared to projects in other sectors.[17] The need to replace temporary credits, as well as their limited fungibility, discouraged investors, depressed credit prices, disincentivized projects with long-term sequestration goals and, overall, reduced both demand for and supply of forestry credits.[18] Going forward, the obligation to replace temporary CERs with other units will be dependent on a smooth transition from the CDM to the Article 6.4 mechanism.

5. Discount removals to result in fewer removals credited. In principle, discounting could address reversal risks if the non-credited emission removals are equal to or larger than future reversals. However, because discounting does not maintain incentives to avoid or compensate for reversals after the crediting period ends, this approach may not be as effective as other approaches.[19]

2) Discuss the appropriate timeframe(s) for applying the approaches, including any interactions with other elements of this guidance and the applicable scope, i.e., relevance to all 6.4 mechanism activities, to removals activities, or to specific removal activity categories or types.

Ideally, emission reductions or removals should last indefinitely to keep global emissions within a carbon budget compatible with limiting global warming to 1.5°C. In practice, however, no risk can be insured against in perpetuity, including reversal risks. An important question regarding the

[17] World Bank, BioCarbon Fund Experience: Insights from Afforestation and Reforestation Clean Development Mechanism Projects (2011). https://openknowledge.worldbank.org/handle/10986/27108.
[18] World Bank (2011), BioCarbon Fund Experience: Insights from Afforestation and Reforestation Clean Development Mechanism Projects. https://openknowledge.worldbank.org/handle/10986/27108.
[19] CCQI, Methodology, 84. https://carboncreditquality.org/methodology.html.

compensation of reversals is for how long the occurrence of any reversals must be monitored and, if occurring, compensated for. Carbon crediting programs specify different minimum time periods when any reversals must be monitored, reported and compensated for. The minimum period for which reversals must be monitored and reported varies considerably among carbon crediting programs—between 1 and 100 years from the start of the crediting period. A longer period of time provides a higher assurance that future reversals are addressed.[20]

3) What risks of non-permanence need to be minimized, and how can these risks be identified, assessed, and minimized?

Non-permanence relates to reversals of carbon from a reservoir. It occurs when a mitigation activity enhances or preserves carbon stocks in carbon reservoirs but, at a later point in time, some or all of the additional increments in stock caused by the mitigation activity are released to the atmosphere. Such reversals can occur due to natural processes, such as wildfires, or anthropogenic drivers, such as land conversion. Non-permanence risk varies significantly between different types of mitigation activities and may also depend on the specific design of a mitigation activity.[21]

Non-permanence risks apply to several types of potential carbon crediting projects. A permanent reduction can only be guaranteed in the context where a reversal is physically impossible. In principle, any mitigation measure associated with carbon reservoirs has a reversal risk, including fossil fuel or land-based carbon reservoirs. By contrast, greenhouse gas reductions that are not associated with the preservation or enhancement of carbon reservoirs are always permanent.

Not all activities have the same non-permanence risk. Non-permanence risk depends on various factors: whether and how the activities address the anthropogenic drivers for the depletion of the carbon reservoir, including whether the carbon remains stored even if the mitigation measures are terminated; the susceptibility of the reservoir to natural disturbances; and, in some instances, the size of the reservoir.[22]

There are various measures that can be taken to mitigate the risk of reversals:

1. Require mitigation activity owners to conduct (and regularly update) a risk assessment, following a pre-defined methodology that includes a climate impact assessment. The outcome of the assessment may be used in several ways. Activities with high risk may be deemed ineligible for crediting. And the determined level of reversal risk may also inform the amount of credits contributed to the buffer pool or the discount rate applied to emission removals.[23]

2. Assist project stakeholders to have legal title or other rights to the land, increasing their ability to secure relevant carbon reservoirs over time.

[20] CCQI, Methodology, 77. https://carboncreditquality.org/methodology.html.
[21] CCQI, Methodology, 74. https://carboncreditquality.org/methodology.html.
[22] CCQI, Methodology, 73. https://carboncreditquality.org/methodology.html.
[23] CCQI, Methodology, 85. https://carboncreditquality.org/methodology.html.

3. Require the use of legal covenants, agreements, or policies that restrict, prevent, or discourage land management practices that would result in net reversals by project owners, policymakers, or other parties.[24] Options include conservation easements or trusteeships, which can be achieved through contract design.

4. Prioritize benefit sharing and stakeholder consultations. Inequitable benefit sharing agreements and insufficient stakeholder consultations can increase the risk of later reversal, demonstrating inattention to the legitimate interests of potential stakeholders. Mitigation activities should be required to ensure full and effective participation of stakeholders as active partners, compliance with the Cancun Safeguards, and a level of compensation that is fair and sufficient to minimize risk.

5. Employ conservative baselines for removals, which would result in fewer credited removals. Removal activities have little statistical history to draw upon, so baselines should conservatively account for the possibility of future reversals.[25]

6. Prioritize jurisdictional approaches, smoothing out the statistical risk of reversals across a geography. 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, the larger geographic scale of jurisdictional crediting means that the impact of natural disasters or the circumstances of a single landowner will not be material.

   Further, credits originating from jurisdictional REDD+ programs (including projects nested into these programs) may be less prone to risks of reversals because jurisdictional program interventions are likely to be designed to address the landscape-scale drivers of deforestation and other ecosystem destruction holistically (e.g., at the national or large subnational scale).[26]

   The example of the largest-scale emissions reductions achieved by a single country shows that at-scale reductions can resist even aggressive efforts to reverse policy and increase emissions.[27] To avoid reversals and leakage of deforestation from one area within one jurisdiction to another, jurisdictional programs should also provide legal, accounting, and monitoring frameworks that can withstand political turnover.

4) In respect of risk assessment, how should the following elements be considered in the implementation of the approaches in (a) and any other relevant elements in this guidance?

[24] CCQI, Methodology, 85. https://carboncreditquality.org/methodology.html.
[25] CCQI, Methodology, 75. https://carboncreditquality.org/methodology.html.
[26] Schwartzman, S. et al. (2021), Environmental integrity of emissions reductions depends on scale and systemic changes, not sector of origin. *Environmental Research Letters* (16).
[27] Schwartzman, S. et al. (2021).

a) Level of non-permanence risk assessment, e.g., activity- or mechanism-level

While the significance of non-permanence risks depends on the activity type, the appropriate approaches to addressing those risks, including those outlined under question 3, will largely be established by the carbon crediting mechanism/standard. As noted above, all mitigation measures associated with carbon reservoirs have a reversal risk, regardless of sector. However, the risk of reversal does not mean that reversal is a foregone conclusion, or that activities with a risk of reversal should be ineligible for crediting under the Article 6.4 mechanism.

c) Entity or entities responsible for risk assessment(s) (e.g., activity proponent, 6.4SB, actuary)

Verification and validation (V&V) bodies have a role to play in risk assessment. V&V bodies, often referred to as auditors, are accredited, independent, third-party entities that assess whether a project or program, and the carbon credits it issues, conform to the requirements of the standard to which it is certified (e.g., reversal risk assessments, leakage, and uncertainty deductions). Independent verification and validation by credible auditors are cornerstones of environmental integrity.

Without independent verification and validation by credible auditors with expertise in the methodology against which they are assessing, a project or program cannot be determined to have met any of the requirements for issuance of high-quality credits. Credible methodologies require projects or programs to which they issue credits to pass an independent V&V assessment.

The performance and consistency of auditors is vital to the integrity of a crediting methodology, and transparency is essential to understanding the efficacy of the auditing process.

d) How should the following elements be considered in the implementation of the approaches in (1) above and any other relevant elements in this guidance?

- **a. Methods for determining the level of buffer pool contributions**
- **b. Composition of buffer pool, including in relation to ER vintages and contributing activity types or categories**
- **c. Intentional and unintentional reversals**
- **d. Treatment of uncancelled buffer ERs, including after the end of the last crediting period of the contributing activity**
- **e. Specifications for ERs that cancelled for compensate for reversals, including in relation to ER vintages and contributing activity types or categories**
- **f. Replenishment in case buffer cancellations exceed contributions; slide language on re-raising baseline level of storge before new crediting**

Regarding methods for determining the level of buffer pool contributions, the Supervisory Body might consider referring to existing high-quality standards such as the ART TREES standard, which includes robust buffer pool methodologies to address the risk of reversals. Under ART TREES, Participants are required to contribute a volume of credits commensurate to the level of reversal risk to a combined buffer pool. TREES establishes a starting level of reversal risk for

participants of 25%, which participants can lower if they can demonstrate that mitigating factors, such as policies and decrees for REDD+ implementation, are in place. If a reversal occurs, it is reported and a volume of credits from the buffer pool equivalent to the reversed volume is retired to permanently remove the credits from circulation and negate the reversal.

F. Avoidance of Leakage:

Discuss any further considerations to be given to the core elements for leakage avoidance in A6.4-SB003-A03; where possible, identifying the applicable scope, i.e., relevance to all 6.4 mechanism activities, to removals activities, or to specific removal activity categories or types.

Leakage refers to the risk that mitigation actions displace production, and directly or indirectly increase emissions elsewhere. For example, a project developer of a peatland conservation project needs to ensure that the degradation drivers (e.g., palm oil production) do not simply move into peatland areas outside the project perimeter. Similarly, reforestation of productive agricultural land can lead to deforestation if agricultural production shifts elsewhere. Leakage considerations are, among others, behind the drive to move from projects to jurisdictional programs and to find transformational solutions for structural degradation problems. They may be addressed through conservative estimation, rather than calculations based on empirical data, or calculated and accounted for in the crediting process.

Scale can be an important determinant of the environmental impact of credits, regardless of sector. Larger-scale programs are better positioned than individual projects that are not nested into jurisdictional-scale crediting to mitigate risks of leakage and non-additionality, as well as reversals.

G. Avoidance of other negative environmental, social impacts

Discuss considerations to be given to core elements for avoidance of other negative environmental, social impacts; where possible, identifying the applicable scope, i.e., relevance to all 6.4 mechanism activities, to removals activities, or to specific removal activity categories or types.

CDR activities, whether natural or technological, can have negative environmental and social impacts, and like all clean energy and decarbonization technologies, come with tradeoffs. It is imperative that the 6.4 Supervisory Body develop strong safeguards for removals activities. In doing so, it can draw from existing COP decisions on REDD+ (e.g., the Cancun Safeguards), as well as multiple international REDD+ programs, bilateral and multilateral agreements, and other experiences. The Cancun Safeguards constitute precedent under the United Nations Framework Convention on Climate Change (UNFCCC), and the Article 6.4 mechanism safeguards must not fall below this standard.

Regarding NCS removals, to minimize negative environmental impacts, the eligible removal activities should be required to demonstrate appropriateness and diversity of species selection to ensure efforts focus on restoration to natural ecosystems. Environmental integrity must also be upheld in order to ensure efforts positively contribute to restoration of biodiversity and/or adaptation, resilience, and food security.

Four aspects are particularly important to consider with regard to social safeguards:

1) Full and effective participation stakeholders as active partners

Effective solutions in this area are not one-size-fits all, and 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 Indigenous Peoples and Local Communities (IPLCs) who manage the landscapes that may be the focus of NCS activities. In addition to prioritizing the holistic management of forests and Indigenous territories, any proposed methodologies should not only ensure 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.[28]

In addition, ex ante consultation should always be accompanied by ex post mechanisms to report and address grievances. Stakeholders need to be aware of and have easy access to the grievance mechanism—this is a key factor for ensuring the integrity and credibility of mitigation activities.

2) Equitable benefit sharing

Since crediting is fundamentally an effort to provide incentives to suppliers for the implementation of NCS activities, the ethical and effective distribution of these incentives is a core element of high-integrity crediting.

Practical considerations that suppliers should take into account when designing equitable processes and outcomes include, but are not limited to:

- Direct allocation of funds and/or other benefits to IPLCs, and especially women, whenever possible.
- Where direct allocation of funds is not 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 IPLCs play in forest protection, and compensation levels that fairly value these contributions.
- Fair and effective dispute resolution mechanisms that are perceived as fair and impartial.

3) Social and environmental impact assessment

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

[28] Ilhardt and Barata, Leveraging Carbon Markets for Equitable Climate Outcomes, https://www.edf.org/sites/default/files/documents/Equity_and_Carbon_Markets_Brief.pdf.

the future, as new best practices and potential pitfalls are identified and shared. Meaningful impact assessments rely on investing in and understanding local environmental and social contexts, particularly of groups whose livelihoods and cultures are deeply intertwined with the landscapes where NCS activities take place.

Activities may have wide-ranging impacts that must be taken into account. For example, as it scales, direct air capture will require significant land, energy, and other resources. If deployed at the level most modeling indicates is required, one estimate characterizes direct air capture as responsible for a quarter of global energy demand by 2100,[29] and another suggests it could account for 9-14% of electricity in 2075.[30] The type of energy used to power direct air capture matters too—the environmental calculus is very different if these plants are powered by natural gas than if they are powered by renewable energy.

Any activities credited under the Article 6.4 mechanism must adequately monitor, report, and verify the emissions, calculated on a lifecycle basis, associated with the project and adequately mitigate the environmental impacts (including impacts on biodiversity, land use, and air and water quality) associated with the activity.

4) 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.

[29] Giulia Realmonte et al. (2019), "An Inter-Model Assessment of the Role of Direct Air Capture in Deep Mitigation Pathways," *Nature Communications* 10, no. 1. https://doi.org/10.1038/s41467-019-10842-5.
[30] Ryan Hanna et al. (2021), "Emergency Deployment of Direct Air Capture as a Response to the Climate Crisis," *Nature Communications* 12, no. 1. https://doi.org/10.1038/s41467-020-20437-0.