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Bellona input to the structured public consultation on Removal activities under the Article 6.4 mechanism, 1 August 2023

The Bellona Foundation is an independent non-profit NGO that aims to meet and fight the climate crisis, by identifying and implementing sustainable environmental solutions. Bellona welcomes the opportunity to provide input on removal activities under the Article 6.4 mechanism. We look forward to further opportunities for external stakeholders to engage with the work of the SBSTA and the Supervisory Board.

In considering all issues related to removals, there should be explicit recognition of the primary role of emissions reductions, the risks of mitigation deterrence from removals, and the likely constraints on removals. Even with concentrated efforts, removal activities will be small relative to needed emissions reductions over the next three or four decades. While the IPCC clearly spells out the fact that CDR will be unavoidable, it also stresses the need for significant emission cuts as a pre-requisite and that, in the short-term removals serve to accelerate net reductions in emissions (i.e. should be additional to emission reductions).

The four principles[1] proposed by Tanzer and Ramirez in their 2019 paper and adopted by the Advisory Council of the European Zero Emission Technology and Innovation Platform, clearly outline the need for removal activities to specify the atmospheric origin and permanent storage of the removed CO2, but also specifically mentions that all emissions associated with the removal process should be included in the emission balance and that the 'net' balance of a removal process should always be negative (i.e. remove more than is emitted) for it to qualify as a removal. These principles were also used in the State of CDR report.

Crucially for this document, the definition for 'removal activities' should include the fact that these must be 'net of all associated emissions', to ensure that any certificate or credit issued on the basis of CDR actually results in a net removal from the atmosphere.

Furthermore, carbon dioxide removed from the atmosphere will need to be monitored in perpetuity, as emissions to the atmosphere from reversals are harmful at any time, particularly given the long-lived nature of CO2 in the atmosphere. The monitoring period may nevertheless in practice end when there are adequate assurances that the CO2 has been physically and permanently isolated from the atmosphere, but liability should remain to address any unforeseen risk of reversal.

If the permanence of a removal activity is dependent on human intervention or management (e.g. the perpetual maintenance of a particular practice), the monitoring period should run at least as long as these activities—and the removals they provide—are required. If monitoring stops, the removed CO2 should be assumed to be re-emitted to the atmosphere and treated in the same way as a reversal.

Over-reliance on high-risk high-uncertainty removals could create a "carbon timebomb" where stored carbon could be rapidly re-emitted at an unexpected point in time (e.g., large scale forest

[1] 1. Carbon dioxide is physically removed from the atmosphere.
2. The removed carbon dioxide is stored out of the atmosphere in a manner intended to be permanent.
3. Upstream and downstream greenhouse gas emissions, associated with the removal and storage process, are comprehensively estimated and included in the emission balance.
4. The total quantity of atmospheric carbon dioxide removed and permanently stored is greater than the total quantity of greenhouse gases emitted to the atmosphere.

dieback) that we may or may not be equipped to deal with. Instead, liability mechanisms can ensure removal permanence via the obligation to perpetually monitor and manage high-risk carbon sinks and rectify any reversals should they occur, as explored further in our 2022 policy brief, Addressing Differences in Permanence of Carbon Dioxide Removal.

Finally, MRV for removals is an open field and one goal of policy design on removal monitoring must be to ensure transparency as well as knowledge sharing of successes and failures, so to speed the development and use of high-quality monitoring techniques. These schemes should be designed to consistently incentivise the use of ever-improving MRV.

2.1. Monitoring and reporting

5. **Should the activity proponent be required to periodically update its monitoring plan every five years and/or at the end of the crediting period?**

   Monitoring plans should be updated *at least* every five years due to the continuing evolution of MRV practices. Monitoring plans should therefore be required to take into account recent developments to improve the accuracy and efficiency of the monitoring, with particular attention to ensuring the validity of any models (e.g., for calculation of baselines or for remote sensing).

6. **Should monitoring reports be submitted within the first [2] [5] [X] years of activity implementation? After the first report, at least once every [2] [5] [X] years?**

   Credits should not be issued before a credible monitoring plan is in place; standards must be developed for each removal type to ensure that monitoring plans meet minimum criteria. The initial monitoring report should be submitted within one year of implementation to provide proof of validity of the monitoring plan. Monitoring reports that are inaccurate or incomplete should be grounds for revoking credits.

   The frequency of additional detailed monitoring reports may vary with the type of removal activity, with the primary variable being the fragility of the carbon sink. As a rule of thumb, annual monitoring reports. This is due to the urgency of the climate crisis and therefore the risk of adverse consequences if removals are reversed or if too many removals are accounted for. Additionally, as large-scale carbon removal is a nascent human activity, frequent monitoring reports can also help promote knowledge exchange, such as by identifying MRV practices of high and low quality, challenges to MRV, or flag unexpected consequences (e.g., social or environmental) of the removal activity.

   Removals to geologic sinks, such as subsurface storage of CO2 (e.g., as gaseous atmospheric CO2 or bio-oil) become less risky after the injection period closes and the sink is closed, and thus over time are likely to require reduced monitoring, at which point monitoring reports every 5 years may be acceptable if there also exists the tandem with real-time reversal notifications.

   Removals to biologic sinks, such as forests or soils, should always require annual reporting, as the carbon uptake rate (and reversal) of these sinks are dependent on local conditions and are likely to become more fragile with increasing climactic changes.

Questions for structured call for inputs on recommendations for activities involving removals

7. **Do the "reversal notification" reports referred to in SB 003 recommendations involve, e.g. digital notification of an observed event that could lead to a possible reversal of removals; submission of notification within [90] [120] [X] days of the observation; follow-up submission of a full monitoring report within [6 months] [1 year] [X timeframe]?**

   The reversal notification reports should be submitted as soon as possible, such as within 30 or 60 days. Substantive delay in dealing with potential reversals could lead to further reversal or reduced ability to rectify the reversal. A full monitoring report should be required in a similarly prompt timeframe, such as within 3 months. This monitoring report should also include an action plan on how to rectify any reversals that have occurred and reduce the risk of reversals occurring in a similar manner in the future. Subsequent corrective measures and lessons learned should be made available to the public.

8. **To ensure and demonstrate the continued existence of removals, are activity proponents required to undertake monitoring and address reversals:**

   (a) Only during active crediting period(s) or

   (b) Also [15] [X] years after the last active crediting period?

   (c) The longer of [9(a)] [9(b)] or a timeframe specified by the host Party (e.g. communicated in LoA or earlier)

   If a removal is reversed at any point during or after their crediting period, the re-emission of greenhouse gases to the atmosphere means that they lose their climate benefit, therefore removals must be monitored in perpetuity so that any reversal can be addressed. Rather, the question becomes: how long after the end of the crediting period should the liability to monitor and rectify reversals remain with the activity proponent?

   The desirability of monitoring and liability being transferred to the state entity depends on the risk profile of carbon storage. The EU CCS Directive provides a model for risk transferring for geologic storage after the close of the injection site "if and when all available evidence indicates that the stored CO2 will be completely and permanently contained." In addition to this, the handover of responsibility is to be accompanied by a financial contribution to cover the expected cost of monitoring for 30 years.

   For other forms of carbon storage, private insurance (e.g., for enhanced weathering, whose primary risk is that removals may occur slower than anticipated), or a [non-]governmental trust (e.g., for storage in biotic sinks that will require ongoing maintenance)

9. **Is simplified annual reporting required to ensure and demonstrate the continued existence of removals? In what cases and how long?**

   Simplified annual reporting is an option in cases where the stored atmospheric carbon is permanently bound, such as stored in geologic formations or bound into

minerals. Such forms of carbon storage have a low risk of reversal, so simplified reporting may be justified, such as after the closure of injection of CO2 in a geologic sink. In the future, improvement of remote sensing (e.g., via satellite or LIDAR) may allow for simplified annual reporting to be possible for removal options such as afforestation if the reporting is paired with active remote monitoring.

10. Are measures required to address the residual risk of reversals beyond the monitoring timeframe? If so, for how long, and what are the options for, e.g. the mechanism(s), responsible entity(ies), oversight?

See answers to question 8 and 9.

2.2. Addressing reversals

2.2.1. General

11. What type of risk rating is used to calculate an activity's buffer contributions?

(a) The results of an individual activity's risk assessment;

(b) A standard rate determined by the 6.4SB;

(c) Either measure could be appropriate, depending on the circumstances (in this case, what factors should determine the use of an activity-specific or standard risk rating)?

All types of removal systems are sensitive to risk based on how and where they are implemented, and risk rating should be assessed on an individual project level. Projects that have greater risks of reversal, e.g., due to human interaction or sensitivities of storage to the environment, have a greater need for their risk profile to be individually assessed. While standard rates are administratively less burdensome, they also risk moral hazard, where projects are designed in more risky ways such that the standard rate underestimates the risk estimate. However, risk calculation can reasonably include standardized formulas and ranges based on the identified risk profile of the individual project for a given removal activity type. Some of the considerations for different types of removals include:

Geologic storage of atmospheric CO_2: characterization of the storage site; susceptibility of the region to tectonic instability; track record of the operator of the storage site.

Storage of CO_2 in standing biomass: diversity of the biomass; suitability of biomass to the regional climate (including under projections of climate change) and the corresponding need for human intervention to maintain storage; the risk of disease, fire, drought in the region (including under projections of climate change); fire management practices; local social stability; track record of the operator;

Enhanced weathering: [projected] changes in climatic conditions; erosion conditions; stability of land use practices in the region (e.g., risk that the land

will be backfilled or repurposed); risk of modelling vs real world inaccuracies; track record of the operator;

12. What are the options for circumstances/triggers and/or periodic milestones for reviewing and possibly updating activity baselines, risk assessments (so, risk ratings), and monitoring plans, including in relation to:

(a) Verified reversals of removals; and

Risk assessments and monitoring plans should always be reviewed and updated after any extreme weather event, such as fire activity, drought, typhoon, &c (regardless of whether that event could reasonably be expected for the region, e.g., due to climate change), or outbreak of disease. Economic and sociopolitical shocks should also be taken into consideration (e.g., price shocks or political instability in a region) as these may disrupt governance and increase risk of human-led reversal.

Activities that are deemed to be at a higher risk should be required to update their baselines and risk assessment more often.

(b) The stages of activity cycle implementation?

Milestones that should trigger updating baselines, beyond updates occurring on a regular basis (e.g., every 1-3 years) include any change in ownership or management; change in methodology; change in the magnitude of production/sale of credits. Periodic reviews and updates are necessary to allow for calibration of appropriate MRV, baselines, and risk assessments as data availability and models will improve as removal activities scale.

Furthermore, changes in relevant legislation (e.g., monitoring requirements, mandated practices that change what should be considered “baseline activities”) are also triggers that should cause a review and updating baselines and risk assessments and monitoring plans.

13. On what basis could requirements provide for the use of simplified / standardized elements or mandate the use of more frequent, full, or activity-specific elements and what are the requirements that may be relevant?

(a) Activity type or category;

Removal activities involve often involve a combination of system components, and so a modularized requirements are a possibility. For example
- removals involving standing biomass (e.g., reforestation, bioCCS) can have the same standards for caretaking and sustainability of the forest;
- removals that require substantial electricity demand (e.g., DACCS, grinding of rock for enhanced weathering) can have the same standards for additional and renewable energy generation;
- removals that require transport of CO2 (e.g., bioCCS, DACCS) can have the same requirements for pipeline transport safety and minimized landscape disruption.
- removals that requires limited human intervention to maintain storage (e.g., enhanced weathering, mineralization) can have more passive monitoring requirements, focused on preventing disruption rather than upkeep of storage

(b) Risk rating level (e.g. above versus below a given %-based threshold);

Given the uncertain nature of risk rating, we do not recommend the use of a numeric risk threshold as a primary means to determine whether MRV requirements can be simplified, particularly in light of the susceptibility of many risks to climate change (e.g., increased heat could affect risks such as the stability of biomass, the rate of enhanced weathering, and transport conditions of CO2 pipelines)

(c) Risk assessment contents (e.g. nature, number, variety of risk factors);

Projects with a large number and variety of risk factors should be subject to additional scrutiny, and, in particular, assess whether it should be certified as a removal at all.

This applies not merely for physical risk (e.g., choosing an unstable geologic site for CO2 storage or a drought-prone area for a forest) but also risk of being unable to accurately quantify and monitor stored carbon (e.g., carbon stored in soil or carbonate precipitation rate of enhanced weathering) and governance risk (e.g., track record of the responsible entity; capability of the liable party; strength of local institutions).

(d) Monitoring plan (e.g. complexity, frequency, responsible entity).

A robust monitoring plan with verified implementation, a responsible entity with a proven track record, and a clearly identified and capable liable party could be a reason to allow the use of simplified reporting, although audits should be used regularly to ensure that high standards are maintained and allow the continued use of the simplified reporting.

Complexity is not necessarily a salient quality for a monitoring plan, which need be no more (but no less) complex as is needed to accurately assess and maintain the quantity and stability of the stored atmospheric carbon.

14. Should procedures take the same or different approaches to instances of reversals that are (a) intentional/planned versus (b) unintentional / unplanned?

(a) An intentional reversal implies that an activity is not a removal and—if not replaced with carbon storage equivalent or greater net quantity and quality—should be considered a violation of contract and strictly penalized on top of requiring the rectification of the reversal, e.g., by another party.

However, in some cases, it may make sense to allow for certified removals to transfer locations, e.g., if a particular area of forested land becomes ecologically unstable or interferes with economically or socially just activities. In this scenario, the removal certification could be transferred to another carbon sink, assuming that the carbon in that sink is of equal or greater quality and stability; of similar or more recent vintage; and that the quantity of net removal does not diminish even

with the additional activities of establishing the new sink.

(b) All removals have risk of unplanned/unintentional reversal with profiles that vary primarily by the characteristics of the carbon storage sink. The mechanism and quantity of insurance needed to protect against these risks will therefore vary, but in all cases any reversals must be rectified by additional removals of equal or greater quality and net quantity.

It must be noted that not all risks are insurable—some may be too high or too uncertain. If an unintentional reversal risk is uninsurable, the removal activity should not be certified.

(a) How/would other tools to address reversals involving direct credit replacement (including use of insurance / guarantees) be used in combination with a buffer pool?

The design of any insurance mechanism must be designed around replacement of removals, rather than financial compensation—that is the cost of providing an equivalent amount of removal today, rather than the cost of the original removals in the past. Insurance could be used, for example, as a backup to a well-designed buffer pool (that accounts for climate change risks), e.g., requiring that the buffer pool operator take out reversal replacement insurance from a third-party actor, so as to spread liability. In cases where the risk is quantifiable and stable, governments can potentially act as the insurance provider (e.g., as in national mortgage insurance schemes).

One important aspect of any buffer pool or insurance scheme is that it needs to account for the difference between gross carbon storage and net carbon removals. E.g., a stand of trees storing 1200 tonnes of carbon may result in only 1000 tonnes of net removal, due to emissions from cultivation, decomposition, monitoring, &c. However, if that stand burns down, and those 1200 tonnes of carbon are re-released into the atmosphere, the correct amount that must be replaced is 1200 tonnes of *net* removal, which, assuming similar associated emissions would require 1440 tonnes of gross removals.

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2.2.2. Reversal risk tools—General: Buffer pools, direct credit replacement, insurance / guarantees

15. Regarding reversal risk buffer pools, direct credit replacement, and insurance / guarantees:

(a) What is the current practice with these reversal risk tools, including the extent and nature of their use (respectively and in combination), transaction costs and how these are financed, and potential roles of the Host Party in multi-decadal compensation requirements;

There are few reversal risk tools in place, but two examples are:
- California's forest offset buffer pool for their cap-and-trade system. However, the buffer pool is substantively undercapitalized relative to the risk of wildfire that is actually seen (https://www.frontiersin.org/articles/10.3389/ffgc.2022.930426/full)

- the EU's CO2 Storage Directive allows for the transfer of liability for reversals from geologic CO2 storage to the competent authority, provided all available evidence indicates that the stored CO2 will be completely and permanently contained, and a

financial contribution sufficient to cover 30 years of monitoring after the closure of the storage site.

(b) The circumstances under which the use of a given tool may be required or supplemental—for example, for intentional versus unintentional reversals, or during versus beyond the last active crediting period—and rationales.

We reiterate that intentional reversals must not be allowed to take advantage of any risk-sharing scheme, such as buffer pools or insurance, but rather should be seen as a violation of contract and be sufficiently penalized, including the full rectification of the reversal.

2.2.3. Reversal risk tools: Specific

16. What are options for robust buffer pool design, including conditions and procedures for its use, ER composition, replenishment, and administration.

Buffer pools can be made more robust by using a diverse set of removals in their composition, as well as diversifying their locations and ensuring that—particularly for land-based removals—they adhere to high standards of integration with their local ecosystems.

Buffer pools should be continuously replenished to ensure that they are not quickly used up. As previously mentioned, it is important that buffer pools are calibrated to account for reversal risks that are changing due to climate change (both for the original removal and the buffer pool itself). Historical data alone cannot be relied on.

In some cases, buffer pools alone are unlikely to provide sufficient insurance against reversal risks.

17. The need for additional procedures and guidance for the 6.4SB, PPs, insurers/ guarantors to implement options for direct ER replacement, including for insurance or guarantees.

There is a need to ensure that insurers are able to handle system level risks, such as mass forest dieback, which could potentially overwhelm an insurance market. This would likely require government intervention to be an insurer of last resort in some cases where the risk is still acceptable. Regardless, governments would need to ensure the existence of legal infrastructure necessary for credible long-term private law contracts.

2.2.4. Treatment of uncancelled/unused buffer ERs

18. Are uncancelled ERs in the buffer pool returned to the activity proponent to incentivize performance and/or automatically cancelled, and is this done periodically throughout activity cycle or only after the end of the activity lifecycle or the host Party NDC timeframe?

No. Uncancelled ERs should be held as insurance for future unintentional reversals, as well as insurance against losses of non-certified carbon stores (e.g., through disease or forest fires in old growth forest or by extended drought). These remaining

buffer pools may be necessary to handle the reversals that other buffer pools have not been able to redress by themselves.

19. **Whether the options for treatment and timing are mutually exclusive or could be applied in combination (e.g. returning some but not all ERs to proponent).**

    See answer to question 18.

20. **Possible basis for periodically returning ERs to proponents (e.g. metrics for activity performance, activity cycle milestones).**

    See answer to question 18.

21. **Procedures for the SB's periodic review and ongoing management of buffer contributions (e.g. buffer composition, stress-testing the sufficiency of risk coverage).**

More specific answers to the above questions can be found in our 2022 briefing: Addressing differences in permanence of Carbon Dioxide Removal.

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Dr. Samantha Eleonor Tanzer	CDR Research and Technology Manager	tanzer@bellona.org
Mark Preston Aragonès	Policy Manager Carbon Accounting	mark@bellona.org