Carbon Market Watch recommendations to Article 6 negotiators on removals

- May 2022

This note presents recommendations for consideration by Article 6 negotiators during the UNFCCC's 56th session of the subsidiary bodies (SB 56) and beyond. The recommendations concern removals and permanence in the context of the Article 6.2 and 6.4 mechanisms. It is expected that this first set of recommendations will be further elaborated depending on how negotiations advance.

Summary

- **Parties must clearly define "removals"** to ensure only "real" removal activities are eligible under 6.2 and 6.4. Removals are not defined in the 6.2 guidance or 6.4 rules.
- **Real removals do not include**: carbon captured at fossil fuel point sources; CCS with EOR/EGR (even if using DAC); temporary storage from CCU (e.g. synthetic fuels).
- **Activities that only store carbon temporarily - e.g. nature-based sequestration - do not qualify as permanent removals**. Monitoring and liability for reversals cannot be guaranteed for a minimum of 200-300 years (even for 100 years this is questionable).
- **Nature-based activities hence should not qualify as removals under Article 6.2 or 6.4** and should not be permitted to generate credits for offset/compensation claims.
- **Nature-based activities should be supported and can be encouraged under Article 6, but should not be considered equivalent to permanent removals or emissions reductions. Therefore, they should not be used for offsetting or to meet emission reduction targets such as NDCs**.
    - This could be operationalised by ensuring that these units are only issued as "Paris Agreement Support Units" (or an equivalent type of unit to be defined), whereby they support host Party mitigation but do not represent a permanent mitigation outcome.

The Article 6.4 Supervisory Body is tasked with making recommendations on "removals" as well as on related monitoring, reporting, reversals, leakage, and other safeguards: "[The CMA] Also requests the Supervisory Body to elaborate and further develop [...] recommendations [...]

on: [...] Activities involving removals, including appropriate monitoring, reporting, accounting for removals and crediting periods, addressing reversals, avoidance of leakage, and avoidance of other negative environmental and social impacts [...]" (Decision 3/CMA.3, cover, §6c).

However, neither the 6.2 guidance nor the 6.4 rules define the concept of "removals", meaning that Parties need to first establish a clear definition grounded in science.

Defining removals and excluding false solutions

Parties should unambiguously define "removals", with a view to this definition applying to 6.2 and 6.4 activities. Neither the 6.2 guidance nor the 6.4 rules define removals. Parties should provide a definition of removals that is grounded in science, hence ensuring that only "real removals" are permitted under 6.2 and 6.4. There are no "low quality removals" – a "low quality removal" is simply not a removal.

The terms 'negative emissions'/'removals' are used inconsistently in academic literature and media outlets, with a potential for adverse outcomes, underscoring the importance in getting the definition right.[1] In their review, Tanzer and Ramirez (2019) conclude that misinterpretation, misuse, and miscounting of 'negative emissions' could have "unintended, and possibly dangerous consequences, such as policy incentives that reward increasing atmospheric greenhouse gas concentrations under the guise of negative emissions."[2] They outline four minimum guiding principles framing whether a given process, technology, or project qualifies as a removal. These informative principles are summarised and briefly illustrated below (see footnote for more detail[3]).

Removals should be defined based on four key principles:

1. *Physical greenhouse gases (GHGs) are removed from the atmosphere*
    - If the process does not remove atmospheric GHGs, it is not a removal process: carbon capture and storage (CCS) from fossil fuel point sources (power plants, factories) hence does not qualify as a removal process.
2. *The removed GHGs are stored out of the atmosphere in a manner intended to be permanent*
    - To qualify as a removal, the process must ensure the removed GHGs remain out of the atmosphere on a "permanent" basis. Permanent storage would technically entail a timeline in geological terms (thousands of years), but practically – as removals are needed to at the very least bridge the time needed for humanity to

[1] Tanzer, S. and Ramirez A. (2019), "When are negative emissions negative emissions?", Energy and Environmental Science (12), 1210-1218, https://doi.org/10.1039/C8EE03338B
[2] Ibid.
[3] Ibid.; Carbon Market Watch (2021), "Respecting the laws of physics: Principles for carbon dioxide removal accounting", https://carbonmarketwatch.org/publications/respecting-the-laws-of-physics-principles-for-carbon-dioxide-removal-accounting/

have dealt with the climate crisis – at least 2-3 centuries can be considered "permanent storage".

3. *Upstream and downstream GHGs associated with the removal and storage process (e.g. biomass origin, energy use, land-use change) are comprehensively estimated and included in the emission balance*
    - The quantity of GHGs removed from the atmosphere as well as the GHGs associated with this process must be properly accounted for: e.g. direct air capture (DAC) is energy-intensive and if a DAC facility is connected to a largely fossil-powered grid, there may be significant process emissions to account for.
4. *The total quantity of atmospheric GHGs removed and permanently stored is greater than the total quantity of greenhouse gases emitted to the atmosphere*
    - Quite simply, if a process generates more GHGs than it is removing, then this process does not qualify as a removal. For example, Patrizio *et al.* (2021) find that in EU countries with power grids dominated by coal power a DACCS facility actually results in net-emissions, where more GHGs are emitted into the atmosphere, due to energy demand, than the facility actually draws back down.[4]

If these principles are not all satisfied, then the process should not be considered a removal and it should hence not qualify under Article 6. In addition, these four principles should be seen as minimum requirements (e.g. a process satisfying all 4 principles still must not do any significant harm). It is important to ensure that false "removals" - which are in fact not removals - are excluded beforehand, rather than identifying and seeking to rectify mistakes after they occur.

To provide some examples, the following non-exhaustive list includes activities that are not removals and have no place in Article 6:

- Point-source carbon capture and storage - i.e. CCS not from DAC - is NOT a removal.
- DACCS used for enhanced oil/gas recovery is NOT a removal, despite what major oil and gas companies have recently been claiming:
    - Occidental, for example, is marketing a planned DAC facility as a carbon removal process despite the sequestered carbon potentially being used to create fuels or for enhanced oil recovery (EOR).[5] They are also marketing future oil shipments as "net-zero oil", which is very misleading and raises concerns of shoddy emissions accounting.[6]

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[4] Patrizio, P., N. Sunny and N. Mac Dowell (2021), "Extended MONET-EU, NEGEM deliverable 7.2", https://www.negemproject.eu/wp-content/uploads/2021/11/D-7.2-extended-MONET-EU.pdf.

[5] Occidental (2022), "Occidental, SK Trading International sign first agreement for net-zero oil created from captured atmospheric carbon dioxide", Press Release, March 22nd 2022, https://www.oxy.com/news/news-releases/occidental-sk-trading-international-sign-first-agreement-for-net-zero-oil-created-from-captured-atmospheric-carbon-dioxide/

[6] Occidental's claim that future oil shipments will qualify as "net-zero oil" is on the basis of operating this planned DAC facility. This not only is misleading (many might call it greenwashing) but also raises concerns about shoddy

- CCU with temporary storage, e.g. in the form of synthetic fuels or products, is NOT a removal since the carbon will be re-released soon after its capture.

Monitoring and liability: why nature-based activities cannot guarantee permanent removals and should not generate offsets in Article 6

Nature-based sequestration and storage do not qualify as a removal process due to non-negligible impermanence risks that cannot be mitigated at the needed scale of at least 2-3 centuries.

If it were possible to ensure that robust monitoring and liability for reversals could be ensured on the long-term multi-century time frame needed (at least 200-300 years), then nature-based activities might qualify as removals. However, the challenges required to do so are such that it is neither practical nor credible to consider nature-based temporary removal activities as eligible to generate units used for offsetting claims, including in Article 6. These challenges are briefly explained below.

Monitoring reversals for centuries? Easier said than done

In order to verify issuance requests and detect reversals, robust MRV would be required during any nature-based activity's crediting period and well beyond it. MRV would be required on a timescale of at least 200-300 years to be consistent with permanence requirements (as detailed earlier). Clearly, this is easier said than done.

It is already highly challenging today, let alone for the next 2-3 centuries, to guarantee robust monitoring of stocks and flows of carbon in natural sinks, including to detect reversals. Take soil carbon sequestration: numerous studies underscore the difficulty of conducting accurate monitoring, demonstrate the variability of results, and question the suitability of soil carbon for crediting.[7]

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emissions accounting: Occidental and its partners may each claim removals related to "net-zero oil" in their climate targets, on top of the United States presumably also reflecting the DAC removals in its national emissions inventory. This could lead to double-/ triple-claiming.

[7] For example, on the difficulties of assessing and monitoring soil carbon stocks, on broader questions of the suitability of soil carbon sequestration for crediting activities, and on impacts of climate change on soil carbon sequestration potential, see: Carbonplan (2021), "Depth matters for soil carbon accounting", https://carbonplan.org/research/soil-depth-sampling; Carbonplan (2021), "Lessons learned from a systematic review of 14 protocols for soil carbon offsets", https://carbonplan.org/research/soil-protocols-explainer; Berthelin et al. (2022), "Soil carbon sequestration for climate change mitigation: Mineralization kinetics of organic inputs as an overlooked limitation", European Journal of Soil Science, 73(1), e13221, https://doi.org/10.1111/ejss.13221; Soong et al. (2021), "Five years of whole-soil warming led to loss of subsoil carbon stocks and increased CO2 efflux", Science Advances, 7(21), https://www.science.org/doi/full/10.1126/sciadv.abd1343.

Supposing, for the sake of argumentation, that robust monitoring can be conducted today and consistently for the next 2-3 centuries for a given nature-based project, it still remains unrealistic to guarantee (or claim) this will actually happen. MRV is expensive, requiring significant technical and human capacity. Mandating a country, supervisory body, or project developer to pay for MRV costs for several centuries is not only unfeasible and unenforceable but also unfair in some cases: e.g. will a farmer's future generations or will future owners of a forestry plot be expected to pay for MRV costs for up to 200 years, and what if they cannot or if they chose (perhaps understandably) not to?

Liability for reversals - an unanswered question

Supposing, again for the sake of argumentation, that solutions are found for conducting robust multi-century MRV and covering the associated financial costs, it is still not evident who would be liable to address reversals when they occur.

Liability cannot be easily resolved since reversals can occur generations later and the associated responsibility becomes very ambiguous. If a reversal occurs 80 years after the end of a soil carbon project's crediting period, will the farmer's great-grandchild, or the host Party, or the buyer, be held liable to address this reversal? None of these options appear evident, feasible, or perhaps even fair.

In some cases, it has been proposed to allocate liability through a legal contract to the project developer. However, even this approach is uncertain when considered over more than one or two centuries. It is not clear how and where such a contract could be enforced. If a reversal occurs in a project registered under Article 6.4, who will have to take whom to court, and in which country if no compensation occurs? Would the standard sue the developer? How would this function in jurisdictions with weaker governance or limited institutional capacity? Or would the buying company (assuming they still track the reversal for the credit they bought decades ago) sue the standard, or perhaps the developer even? Ultimately, the atmosphere will be the biggest loser, while other actors will likely have forgotten about the compensation obligation, or will not be willing to take legal action.

Buffer pools[8] have been proposed in some crediting systems as a method to address reversals, but these problematically do not guarantee permanence beyond the monitoring period (which

[8] For nature-based projects that inherently face reversal risks, voluntary carbon market standards (and certain compliance systems) require a portion of issued credits to be set aside in a common buffer pool, in case reversals occur for any project in the same category, e.g. reversals due to fires, insects, disease. When a reversal occurs in a project area, an equivalent number of credits from the common buffer pool is cancelled. Usually a project's remaining buffer pool credits are cancelled at the end of the monitoring period (which coincides with the end of the crediting period for most standards currently) - as a way to theoretically eliminate any remaining reversal risks - but this does not eliminate all risks and there is no provision to guarantee permanence beyond the end of the monitoring/crediting period.

often coincides with the crediting period). After the end of the monitoring period, reversals on a former project area essentially occur without liability. Rather than attribute liability for reversals, it is assumed that the cancellation of a project's remaining buffer credits at the end of the monitoring period will be sufficient to account for any potential future reversals.

The assumptions underpinning buffer pools are shaky for several reasons:

- Buffer pools already appear inadequate in the face of near-term reversal risks.
    - Nature-based crediting projects are increasingly facing significant reversals due to raging forest fires, including during the recent summers of 2020 and 2021.[9]
    - In California's offset programme, the buffer pool credits reserved for wildfire and pathogen risks may soon be completely eliminated by future reversals: a recent study found that by the end of the 2021 wildfire season, after only a decade of the buffer pool's operation, wildfire reversals had already eliminated an estimated 95% of buffer pool contributions set aside to protect against all fire-related risks over a period of 100 years.[10]
- On top of this, reversal risks are bound to be only further exacerbated in an increasingly hot and volatile climate.[11] Climate change is expected to lower the resilience of natural carbon stocks by increasing the risks of forest fires, pests, droughts and floods.
- For buffer pools to actually work, the accuracy and conservativeness of reversal risks assessments must be extremely robust, yet this is not usually the case.
    - Reversal risk rates are sometimes set seemingly arbitrarily, without associated calculations or compelling rationale: e.g. California's offset programme attributes a standard 4% fire risk rate, which can be downgraded to 2% if fire management practices are in place, but this rate does not appear to have been based on rigorous scientific study.[12] As detailed earlier, this programme's buffer pool already appears at high risk in the near-future.
- If a standardised reversal risk rate for a given project type is underestimated for a crediting period (let alone for 2-3 centuries), then it is unlikely that the buffer pool will have enough credits to cover future reversals, thereby failing its objective.
    - For example, if a sufficient number of projects actually experience reversals that exceed their initially attributed reversal risk rate, or if several large-scale

[9] CMW (2020), "Up in smoke – California fires once again highlight dangers of forest offsets", https://carbonmarketwatch.org/2020/10/22/up-in-smoke-california-fires-once-again-highlight-dangers-of-forest-offsets/; Carbonplan (2020), "Carbon offsets burning", https://carbonplan.org/research/offset-project-fire; Financial Times (03.08.21), "US forest fires threaten carbon offsets as company-linked trees burn", https://www.ft.com/content/3f89c759-eb9a-4dfb-b768-d4af1ec5aa23;

[10] Carbonpulse (2022) "Wildfires, diseases show insufficiency of California offset buffer pool - researchers", https://carbon-pulse.com/158340; Badgley et al. (April 29 2022), "California's forest carbon offsets buffer pool is severely undercapitalized", bioRxiv, https://doi.org/10.1101/2022.04.27.488938 (pre-print).

[11] Carbonplan (2020), "Risks to forest carbon in a changing climate", https://carbonplan.org/research/forest-risks-explainer

[12] Grist (2021), "California is banking on forests to reduce emissions. What happens when they go up in smoke?", https://grist.org/wildfires/california-forests-carbon-offsets-reduce-emissions/

projects experience considerable reversals, then the buffer pool could be wiped out, in which case there is no longer any liability for additional reversals.

- Finally, buffer pools have only been in existence for little over a decade. Their effectiveness in supposedly securing permanence on a 100-year time frame, let alone for 200-300 years, is far from guaranteed.

These challenges point to the fact that it is not feasible to ensure robust monitoring and liability for reversals can be guaranteed on a minimum 2-3 century timeframe. As a result, nature-based temporary removal activities should not be eligible to generate offset units under Article 6.

With this in mind and given that there is no definition yet for removals in Article 6, Parties should take the opportunity to provide a clear definition based on the 4 principles previously detailed.

It is important to note that nature-based activities need not be excluded from Article 6. Such activities should still be supported, and can be encouraged under Article 6, but only if they are eligible to generate units that cannot be used for offsetting purposes, as proposed below.

A "contribution" unit to support nature-based temporary removals via Art 6

Activities that store carbon temporarily, such as nature-based sequestration, do not qualify as permanent removals and hence should not be eligible as *offset* units under 6.2 or 6.4. These activities should not be used for offsetting or to meet emission reduction targets such as NDCs.

To be sure, nature-based activities are important to support and could even be encouraged under Article 6, but only if they solely generate units that cannot be used for offsetting. This could be operationalised by ensuring that nature-based temporary removal activities can only issue **"Paris Agreement Support Units"** (or a similar alternative to what had been discussed during negotiations at COP 26), where the underlying temporarily removed emissions support host Party mitigation but is not considered equivalent to a permanent mitigation outcome, such as an emission reduction.

This approach would formalise an avenue through which much-needed climate finance could be channelled in support of nature-based activities to Host Parties, project developers and local communities, all without buyers making associated offset claims. The buyer would be entitled to claim they have supported an activity, but they would not be entitled to a claim to, or ownership of, the underlying temporarily removed emissions. This approach has the advantage of being more transparent and accurate about the actual impact of buying such units. It also should be attractive to prospective buyers since it mitigates the credibility risk they often expose themselves to when making offset claims.

While it might appear to be similar, this approach would constitute a major improvement over the existing REDD+ results-based payment scheme, as it would combine the "climate finance contribution" approach with improved rules on additionality, baselines, and MRV.

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