June 19, 2023

Removal activities under the Article 6.4 mechanism

Dear Supervisory Board,

Thank you for the opportunity to submit structured comments regarding Removal activities under the Article 6.4 mechanism. Spark Climate Solutions ("Spark") is the leading non-governmental organization globally supporting and funding research and development for atmospheric methane removal technologies.[1] Given the current trajectory of climate change and its compounding impacts, we see a need to expand the portfolio of solutions. Our comments below focus primarily on the topic of the science and governance of methane removal, responding to the questions the Supervisory Body posed in its "Information note - Guidance and questions for further work on removals" (A6.4-SB005-A02).

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

Climate scientists around the world are starting to research atmospheric methane removal approaches to determine how methane in the atmosphere might be removed faster than via natural sinks alone, which would help lower peak temperatures and counteract some of the impact of potential large-scale releases of methane from natural systems. Atmospheric methane removal could be an important additional climate mitigation tool to augment other approaches and prevent climate harms. Atmospheric methane removal is not proposed and should not be used as a substitute for any available options for avoiding methane, or any other GHG or climate pollutant, emissions.

Atmospheric methane removal involves breaking down, or oxidizing, atmospheric methane to produce carbon dioxide, water, and other byproducts, or using biological processes that can produce biomass, mimicking natural atmospheric oxidation and soil methanotrophic processes. Since a methane molecule has a much larger warming impact than a carbon dioxide molecule (by an estimated 43x), and the methane would naturally oxidize to carbon dioxide anyway, this reaction results in a net decrease in near-term warming. More information on the typology of methane removal approaches being studied is available on Spark's "Approaches to Atmospheric Methane Removal" web page[2]. The U.S. National Academy of Sciences, Engineering, and Medicine (NASEM) is currently conducting a major study on atmospheric methane removal,[3] examining opportunities, risks, and co-benefits of different atmospheric methane removal approaches and making recommendations for new research that would improve understanding of these technologies and their implications.

Elevated methane emissions have already caused 0.5°C warming, and continue to rise. Growing evidence suggests that methane emissions from natural sources are already increasing as a result of current climate change.[4] Projected future increases of natural methane emissions are high, particularly from wetlands and abrupt permafrost thaw, and there is also

[1] https://www.sparkclimate.org
[2] https://www.sparkclimate.org/methane-removal/101/approaches
[3] https://www.nationalacademies.org/our-work/atmospheric-methane-removal-development-of-a-research-agenda
[4] https://www.nature.com/articles/d41586-022-00312-2

high uncertainty as to how natural methane emissions may evolve within various climate scenarios.[5] At present, these impacts are not all incorporated into IPCC models, and represent additional risks to the climate system.[6]

Given this, it is crucial that our ambitions for methane mitigation not be limited to “balancing emissions with removals, ” as the question suggests. We must also address rising natural emissions and atmospheric methane from past emissions via removals to the maximum extent possible. We should pursue anthropogenic methane emissions reductions and atmospheric methane removals to their utmost possible extent, on parallel tracks. Removal must be additional to emissions reduction and never used as a substitute for it.

As methane removal research progresses, new solutions might become well-understood and potentially deployable in the coming decade. The question will then quickly turn to appropriate incentivization and inclusion in UNFCCC protocols, such as Article 6.4. Given both the urgency to be prepared to deploy additional solutions that could play a part in mitigating both near-term and long-term warming, as well as the crucial need to proceed with robust governance and ensuring ongoing additionality of the field as it develops, the UNFCCC Parties and Secretariat are urged to recognize this field and greenhouse gas removal approaches more broadly, to start defining what appropriate inclusion could look like.

Methane removal differs from carbon dioxide removal in key ways and would require separate treatment in order to maximize total climate benefits in the near- and long-term. Some key considerations for evaluating and designing ways to incorporate methane removal include the following:

1. A one-time removal activity of methane will have an impact for decades, whereas a one-time permanent carbon dioxide removal will have an impact for centuries. Just as separate targets should be set for short-lived (e.g. methane) and long-lived (e.g. carbon dioxide) greenhouse gas reductions,[7] in the same way that temporary carbon removals cannot substitute for lowering carbon emissions, atmospheric methane removals should not be used as a substitute for one-time permanent carbon dioxide removals, or for avoiding carbon dioxide emissions. The impact of atmospheric methane removal is more similar to the impact of a temporary carbon dioxide removal.
2. Any inclusion of atmospheric methane removal as an additional greenhouse gas removal method must be treated in such a way that it does not lower ambitions for methane emissions avoidance. Net anthropogenic methane emissions must be kept as low as possible, and target net-negativity, especially in light of growing evidence that natural methane emissions are rising and projected to rise further.
3. Many of the atmospheric methane removal approaches[8] currently under investigation are likely to have quantification uncertainty since they are open-system changes, analogous in this sense to enhanced rock weathering in CDR. Any inclusion of these methods as they’re developed should acknowledge the value they provide, while also ensuring that they are not over-credited.

The following comments pertain to the “cons” column of Table 1, “Proposed changes in the definition of removal activities” in the Information Note on Removal Activities of May 17, 2023, (A6.4-SB005-AA-A09):

[5] https://climatetippingpoints.info/2019/05/13/fact-check-is-an-arctic-methane-bomb-about-to-go-off/
[6] https://iopscience.iop.org/article/10.1088/1748-9326/ac1814
[7] https://www.nature.com/articles/s41612-021-00226-2
[8] https://www.sparkclimate.org/methane-removal/101/approaches

1. “Removal of other GHGs is not currently anticipated at relevant scales.”
   Some methods of atmospheric methane removal being researched may be scalable to 10+ Tg CH_4 / yr. For a sense of scale, as ongoing activities, these methods might have similar asymptotic climate impact as a one-time removal or avoided emissions of 37 GT of CO_2. Some of these same approaches are expected to have low infrastructure needs, and potentially could scale quickly. The science is still early and evolving, however given the potential to develop and scale these methods, there is value in anticipating and preparing for the possibility, so as not to miss or delay opportunities for further climate mitigation. Creating the frameworks around which potential new solutions could engage could also stimulate further research activity in the field.
2. “It is unclear if the removal of other GHGs has a comparable mitigation effect to the removal of CO_2.”
   When comparing one-time removals of each gas, removing methane, which is a short-lived climate pollutant, does ***not*** have a directly comparable mitigation effect to removing CO_2. A one-time removal activity of methane will have an impact for decades, whereas a one-time permanent carbon dioxide removal will have an impact for centuries. This lack of comparability does not imply lack of value. Both types of removal have value, but their values aren’t fungible. One-time methane removals should never be used as a carbon credit for a carbon dioxide emission.
3. “The IPCC recommends that, for now as well as in the foreseeable future, the effects of non-CO_2 GHGs should be balanced through additional removal of CO_2 based on 100-year global warming potential equivalence.”
   The scale that CDR will be able to reach on relevant timescales is uncertain, and the potential to scale removal approaches to address non-CO_2 GHGs is not guaranteed. Future availability and scalability of atmospheric methane removal approaches is also uncertain. However, non-CO_2 removals, including methane removals, can be complementary with CDR; developing one need not limit the other. Adding more solutions to the removals portfolio could contribute to reaching the maximum potential for climate mitigation.

   In addition, making cross-GHG decisions based on GWP100 can lead to tradeoffs in near-term and long-term mitigation, as covered in the final section of this letter.

Discuss the role and potential elements of definitions for this guidance, including “Removals”.

Atmospheric methane removal involves breaking methane down via processes that mimic natural methane oxidation in the atmosphere and methanotrophs in soil. To include methane removal approaches, the definition of “removals” would need to expand to include processes that “destroy” or “convert” greenhouse gasses, not just “remove… and store” them. Carbon removal requires sequestration, but since atmospheric methane removal breaks methane down, storing or sequestering is not a consideration. A broader, more inclusive definition of removals could be:

> *For the purpose of this guidance, “removals” are processes or outcome of processes via anthropogenic activities to reduce atmospheric levels from greenhouse gasses (GHGs) already emitted, inclusive of any activities necessary in order to ensure that the “removed” greenhouse gas is kept from re-entering the atmosphere and reversing the*

removal, for example via durable storage in geological, terrestrial, or ocean reservoirs, or in products.

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.

What types of emissions are included in 3.3.15 “activity emissions and leakage emissions” is not made clear.

To understand the full climate impact of any changes, activity and leakage emissions tracking should include all indirect greenhouse gasses and climate pollutants[9] (hydrogen and black carbon, for example), in addition to direct greenhouse gas emissions. Any increase in the emissions of a climate pollutant due to a removal process should be accounted for in all relevant per-gas inventories.

Different climate pollutants act on different timescales. GWP100 as a climate metric does not capture these dynamics, and can mask that a process causes near-term warming over the next crucial few decades while calling it “net-zero”. This would, for example, be the case for a process that emits 10 MT CO_2e of methane and removes 10 MT CO_2e of carbon dioxide, due to methane’s stronger influence in the decade after emission. In all reporting, the activity and leakage emissions should be reported per pollutant, in units of mass, and the time-horizon of any CO_2e calculations should always be explicitly listed.[10]

Some methods of greenhouse gas removal may have net-negative impacts on multiple greenhouse gasses.[11] This should be accounted for in order to value multiple climate benefits of such approaches.

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We hope these comments are useful and will help the Supervisory Body, the Secretariat and the COP and Meeting of the Parties to the Paris Agreement consider whether and how methane removal should be included in removal activities under Article 6.4 at this stage.

Sincerely,

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[9] Any anthropogenic emissions that affect the concentrations of climate forcers in the atmosphere. As one example, hydrogen emissions result in an increased atmospheric lifetime of methane, among other climate effects (https://acp.copernicus.org/articles/22/9349/2022/acp-22-9349-2022.pdf).
[10] https://www.frontiersin.org/articles/10.3389/fclim.2023.1163557/full
[11] https://agu.confex.com/agu/fm22/meetingapp.cgi/Paper/1130606