Response to Call for input 2023 - Issues included in the annotated agenda and related annexes of the fifth meeting of the Article 6.4 Supervisory Body

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We appreciate the possibility to submit our views on annotated agenda and related annexes of the fifth meeting of the Article 6.4 Supervisory Body.

We have extremely serious concerns with the content of A6.4-SB005-AA-A09 - Information note: Removal activities under the Article 6.4 mechanism. Our concerns relate to the substance of the note but also to the process for how the UNFCCC secretariat is addressing public comments, as scientific errors in the analysis have not been corrected, despite earlier submissions from various stakeholders on these matters.

The Information Note provides a highly biased appraisal of the arguments for and against the approach of tonne-year crediting. The note provides a very large amount of scientifically incorrect information. For example, the note states:

"The question, in unambiguous terms, is this: Can N tCO_2 of removals stored for 10 years produce the benefit to counteract the impact of 1 tCO_2 emission? The answer evidently is yes. Only the number N needs to be determined on some scientific and economic basis. That is what tonne-year accounting does". P33, A6.4-SB005-AA-A09.

This exemplifies a fundamental misunderstanding of the incompatibility of tonne-year accounting with the temperature goals of the Paris Agreement. N tCO_2 removed and stored for 10 years followed by N tCO_2 of reversal emissions entails *zero* net change in cumulative emissions in the atmosphere, and zero impact on long-term temperature change. This *zero* net change in cumulative emissions cannot be used to offset or counterbalance a 1 tCO_2 emission, which contributes to cumulative emissions and temperature change.

The note claims 'The answer is evidently yes' whereas the true answer is the exact opposite. This is one example of the very many false and misleading statements provided in the information note. It is, however, illustrative of a basic failure to respond to the substantive objections raised by us and other commenters in prior submissions. In short, there *is* no "scientific and economic basis" for equating short periods of carbon storage with permanent mitigation when it comes to the Paris Agreement's temperature goals.

This raises further concerns about the scientific quality and impartiality of the support and advice that the Supervisory Body is receiving from the secretariat. It is highly important that the Supervisory Body receives high quality, balanced, and impartial analysis from the secretariat, and we strongly recommend that the Supervisory Body address this issue as soon as possible.

We have appended our previous submission on the Information Note (below).

Comments to the information note "Removal activities under the Article 6.4 mechanism" in document A6.4-SB004-AA-A04. https://unfccc.int/process-and-meetings/the-paris-agreement/article-64-mechanism/calls-for-input/sb004-annotated-documents

The approach of tonne-year accounting proposed in the note is highly problematic. It would lead to higher cumulative emissions in the atmosphere and thus undermine our ability to achieve the long-term goals of the Paris Agreement, whereas Article 6 has been set up to raise ambition. The approach also does not seem consistent with the decisions on Article 6.4 taken in Glasgow, which state that where reversals occur these should be "addressed in full".

We are also concerned that the UNFCCC secretariat, in its role of advising the Supervisory Body, is not drawing on the broader available literature and is not discussing other approaches to address non-permanence, but mostly elaborates on one particular approach which has not been used under the UNFCCC or by any larger carbon crediting program in the voluntary carbon market space.

We recommend that the Supervisory Body considers other appropriate approaches to address non-permanence, such as long-term monitoring and compensation for reversals or temporary crediting.

Why is tonne-year accounting not an appropriate solution to address non-permanence?

Tonne-year accounting is premised on the assumption that temporary carbon storage can be equated, in physical or economic terms, to the permanent reduction (or permanent removal and storage) of carbon emissions. The notion is that holding CO_2 out of the atmosphere – even for very short periods – can be counted as equivalent to some fraction of a permanent reduction or removal. This contention is not supportable if the primary goal of climate policy is to limit long-term global warming, as expressed under the UN Framework Convention on Climate Change and the Paris Agreement.

Long-term temperature change is driven by *cumulative CO_2 emissions* and is *insensitive to the timing* of those emissions (Allen et al. 2009; Archer et al. 2009; Ciais et al. 2014; Eby et al. 2009; Mackey et al. 2013; Matthews et al. 2009; Matthews and Caldeira 2008). This fact underpins the concept of a 'carbon budget', i.e., a fixed quantity of net additions to the atmospheric stock of CO_2 before a given temperature threshold is reached, e.g., 1.5 or 2 degrees.

Within carbon crediting mechanisms, therefore, the benchmark for crediting mitigation of CO_2 should be whether the mitigation contributes to staying within a targeted global carbon budget. There is no time limit on the carbon budget. If CO_2 mitigation is reversed – even far in the future – it no longer contributes to staying within the budget. There is no number of years of storage, "N," that would make the reversal emission count less than the physical amount that was emitted. Physical methods for tonne-year accounting (such as the "Lashof method") only reach this conclusion because they ignore – arbitrarily – any radiative forcing caused by a reversal that occurs more than 100 years after the original

mitigation was achieved. This convention is at odds with the science of temperature stabilization, which suggests – irrespective of timing – that once a tonne is emitted, cumulative emissions increase by one tonne, and the expected long-term temperature equilibrium increases accordingly. Moreover, the natural uptake of CO_2 by land and oceans is already incorporated in IPCC scenarios for limiting global warming to 1.5 or 2 degrees. To stay on track towards achieving these targets, any CO_2 reversal at a later stage must be fully compensated for.

Tonne-year accounting methods based on economic discounting (e.g., Parisa et al. 2022) are also incompatible with achieving long-term temperature targets. These methods apply an economic discount rate to calculate the reduction in the present value of damage costs achieved by delaying climate impacts, and then apply that reduction to calculate the implied value of a tonne-year of carbon storage. Unlike physical tonne-year accounting methods, these methods do not pretend that climate impacts do not occur. They simply assume that if those impacts occur far enough in the future, they do not matter.

Taken to their logical conclusion, these methods imply that global temperature increases exceeding 2C are acceptable as long as they only affect future generations. But the world community's concern with long-term temperature change is not expressed in these terms. The Paris Agreement does not say "…hold the increase to well below 2°C, but *only for the next 100 years*" or "*only until the present value costs appear negligible*."

These deficiencies in tonne-year accounting have been understood for quite some time (e.g., Korhonen et al. 2002). While it is undoubtedly true that the world needs to take urgent action to mitigate climate change, including actions that temporarily enhance carbon storage, it does not follow that in the context of carbon crediting mechanism, arbitrarily short periods of carbon storage should be accounted for as "equivalent" to permanent mitigation. Doing so risks shifting investments that would otherwise go to permanent mitigation into mitigation options that do not contribute to staying with a global carbon budget.

If temporary storage options are included in a trading system, this should be done using methods that either internalize the costs of maintaining storage indefinitely (e.g., through long term commitments and buffer reserve systems, which require compensation for reversals in the near term)[1], or that credit temporary storage with expiring credits (i.e., "temporary crediting," as was allowed for afforestation/reforestation projects under the Clean Development Mechanism.)

To be clear, temporary carbon storage can have distinct benefits, such as helping to slow the rate of global warming and lowering peak temperatures (Matthews, Zickfeld, Dickau, et al. 2022). Tonne-year crediting can, in principle, be used as an effective mechanism to incentivize investment in temporary carbon storage. As a recent study concludes, however, this is only true if tonne-years are "not … treated interchangeably with permanent storage or fossil fuel emissions, but rather [are] quantified as an independent contribution to lowering global peak temperature" (Matthews, Zickfeld, Koch, et al. 2022). This does not apply the Article 6.4 mechanism. The fundamental flaw of the proposed tonne-year

[1] Note that these approaches have drawbacks as well, in that they only require compensation for reversals over finite time horizons, and ignore reversal emissions thereafter. By requiring long-term storage commitments, however, they can at least provide market actors with an efficient price signal concerning reversible mitigation options, unlike tonne-year approaches, which impose no liability if reversals occur even within short periods

approaches is that it wrongfully presumes to *equate* short periods of carbon storage with permanent mitigation.

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