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Dear Supervisory Board:

Thank you very much for the opportunity to provide feedback on the Article 6.4 Supervisory Board (SB) Information note on Removal activities under the Article 6.4 mechanism Version 04.0. We appreciate the immense amount of work required to keep up-to-date with all the different pathways that we will need to employ in order to stay with the 1.5C target.

## Introduction

Planetary Technologies was founded in 2019. We are based in Halifax, Nova Scotia, Canada, and we operate throughout the world, with projects in the UK, Canada, and the United States. Our pathway can be used to great benefit at every company that has a population center near a coastline. This of course includes many countries in the global south and many island nations.

We are a carbon removal company whose vision is to protect and restore the ocean and climate for generations to come. We do this through Ocean Alkalinity Enhancement (OAE) to fight climate change through $CO_2$ removal and storage. Planetary adds a pure, mild antacid or “alkalinity” to the ocean through existing outfall pipes, such as from a wastewater treatment plant. Once in the ocean, this alkalinity neutralizes acidic CO2 by converting it into carbonate and bicarbonate, storing it in the ocean for up to 100,000 years. As ocean $CO_2$ is converted, the ocean absorbs $CO_2$ from the atmosphere to bring the air and ocean back into equilibrium. Our goal is to work collaboratively with all of our stakeholders as we develop cost effective and sustainable tools to remove and store carbon dioxide at gigatonne scale.

The Planetary process is inspired by nature’s own rebalancing process, where the rain brings the $CO_2$ to the alkaline rock, which goes through the same process described above. Our process is essentially the same, except we bring the alkalinity to the $CO_2$, and our process works in months rather than the millenia required by the geologic carbon cycle. Just like replanting a forest is man’s way of speeding the land-based sequestration of $CO_2$, our process is the way we can speed ocean-based $CO_2$ capture and storage.

## Terminology

Words have power and so care must be taken, especially when something new is described.

As you can tell by our description above, we believe that our process is quite natural. It is the same process that has been in place on the earth for millions of years. We simply speed it up.

Labeling our process as “engineered” or even labeling any process as “engineered” makes it seem “unnatural” which is frequently associated with being less desirable.

We urge the SB to move toward standards-based definitions for removals, including notions of permanence/durability, additionality, leakage, etc., - as well as co-benefits - and move away from choosing any specific pathway. Further, we urge the SB to refrain from grouping pathways into different classes as much as possible as with any taxonomy there will be pathways that could be in multiple groups, and the name of each of the classes can be misleading or could cause biases.

## Co-benefits especially reduction of ocean acidification

In addition to helping to reach the Climate Action Sustainable Development goal (Goal 13), ocean alkalinity enhancement directly impacts Goal 14, “Conserve and sustainably use the oceans, seas, and marine resources for sustainable development.”

OAE locally reduces ocean acidification and can even improve outcomes for shellfish. See Albright, et. al. 2016, *Reversal of ocean acidification enhances net coral reef calcification* and Mongin et. al. 2021, *Reversing ocean acidification along the Great Barrier Reef using alkalinity injection* where the addition of alkalinity was shown to have a positive effect on coral.

In addition to the co-benefit of ocean de-acidification, the production of pure alkalinity at scale will use a new process that is being developed by Planetary. This process utilizes waste material from mines with ultramafic rock (such as nickel or asbestos mines). The process purifies the mine tailings, removing and disposing of any harmful substances, transforming the previously unusable tailings into productive land. Additionally, the processing of the tailings will create significant investment in the region and increase local employment.

## MRV

Measurement, reporting, and verification (MRV) in open systems is challenging but not impossible. Because research in the area of MRV for ocean alkalinity enhancement is nascent, Planetary has publicly published a protocol for MRV and has gathered comments from scientists and oceanographers from around the world. Version 2 of Planetary’s MRV is available freely under the creative common license online here in GitHub[1]. We are currently updating it and will publish Version 3 before the end of 2023 for additional comments. We intend to continue to make it freely available.

[1] See: https://github.com/Planetary-Technologies/MRV

We have submitted the Planetary MRV protocol to a verifier and plan to have it ICROA certified by the end of 2023.

## Potential for scale

Because of the urgency of the climate crisis, and because the carbon removal field is still relatively nascent, we urge the SB to encourage development of multiple approaches. We are not on track to reach our current climate goals, and our goals are not yet ambitious enough for us to stay within the 1.5 threshold.

Innovation in the carbon removal space is happening broadly and quickly. Discouraging work along any set of pathways may definitely cut off an invention or discovery that could make a sizeable difference to reaching our climate goals, which require significant scale.

Please note that the potential for scale for ocean alkalinity enhancement is one of the very largest of all pathways. According to the State of Carbon Dioxide Removal 2023, the potential for ocean alkalinisation pathways is 100Gt annually (more than double DACCS)[2].

Additionally, according to a recent paper (Yang, et. al, 2023[3]), “We conservatively estimate that 44. 4 × 10**9 ton of CO2 (~ 3.3 times of current annual CO2 sink in the ocean) could be removed from the atmosphere…”

We have set a goal for Planetary to reach gigatonne scale - removing a billion tonnes of CO2 from the atmosphere every year with a similarly large set of co-benefits, by 2045.

## Permanence

Ocean alkalinity enhancement is believed to have durability of approximately 100,000 years. The mean seawater residence time of alkaline dissolved carbon (bicarbonate and carbonate ions (charged-balanced by cations other than H+) is about 100,000 yrs, based on the annual input of alkaline carbon from rivers (0.3 GtC/yr), the alkaline pool of dissolved alkaline carbon resident in the ocean (about 34,000 GtC), and assuming steady state (Middelburg et al. 2020).

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[2] See the full report here, https://www.stateofcdr.org/resources, page 18. https://static1.squarespace.com/static/633458017a1ae214f3772c76/t/63e3d4602156db24bc18c91c/1675875445298/SoCDR-1st-edition.pdf

[3] Seawater alkalinity enhancement with magnesium hydroxide and its implication for carbon dioxide removal, see here: https://www.sciencedirect.com/science/article/abs/pii/S0304420323000476?via%3Dihub

We hope that our response here can be helpful to the Supervisory Body. We are happy to engage in discussions if you have any questions. We look forward to working in partnership with you as we all move forward to address all the challenges brought about by climate change.

Sincerely,

Mike Kelland
CEO
Planetary Technologies, Inc.