UNFCCC Article 6.4 Call for Input 2023

Captura Corporation Response

UNFCCC Article 6.4 Call For Input 2023 - Structured public consultation: Removal activities under the Article 6.4 mechanism

June 19, 2023

Introduction

Captura is a Direct Ocean Capture company that has developed an electrochemical process to remove carbon dioxide directly from seawater. We wish to express our appreciation for the efforts of the UNFCCC to build a global framework for carbon crediting, and we welcome your work to consider the role of removal activities within the Article 6.4 Mechanism.

We are grateful for the opportunity to respond to your structured public consultation: Removal activities under the Article 6.4 mechanism and offer the following comments.

Questions on specific elements

A. Definitions: Discuss the role and potential elements of definitions for this guidance, including "Removals".

The IPCC defines removals as "Anthropogenic activities removing carbon dioxide (CO_2) from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products"[1]. We encourage the Supervisory Body to consider including CO_2 captured from the ocean in its definition of removal activities, i.e. "Anthropogenic activities removing carbon dioxide (CO_2) from the atmosphere *or ocean* and durably storing it in geological, terrestrial, or ocean reservoirs, or in products".

The ocean plays an important role in regulating Earth's climate by absorbing 30% of anthropogenic CO_2 from the atmosphere and thereby slowing the rate of atmospheric warming[2,3]. Without this, "atmospheric CO_2 would be approximately 450ppmv today, a level of CO_2 that would have led to even greater climate change than witnessed today"[4].

However, this CO_2 uptake by the ocean has not been without consequence and has led to a decrease in seawater pH and carbonate ion concentration, in a phenomenon referred to as ocean acidification[5]. Ocean acidification directly impacts marine calcifying organisms that use dissolved calcium and carbonate ions to build their shells and external skeletons. It is causing detrimental ecosystem changes that are, in turn, affecting ocean-dependent sustainable development activities, such as seafood farming.

An equilibrium broadly exists between the atmosphere and shallow ocean with regards to CO_2 levels. "Air-sea gas exchange equilibrates surface water CO_2 to atmospheric levels with a timescale of approximately one year"[6]. Marine carbon dioxide removal (mCDR) methods, such as Captura's Direct Ocean Capture (DOC), can leverage this natural equilibrium to enable the removal of CO_2 from the atmosphere, while also helping to mitigate local ocean acidification.

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[1] IPCC AR6 WGIII Report p1,796
[2] Khatiwala et al. "Global ocean storage of anthropogenic carbon", Biogeosciences 2013
[3] Friedlingstein et al. "Global Carbon Budget 2020", Earth Syst. Sci. Data 2020
[4] Doney et al. "Ocean Acidification: The Other CO2 Problem", Annual Review of Marine Science 2009 1:1, 169-192
[5] Orr et al. "Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms", Nature 2005
[6] Doney et al. "Ocean Acidification: The Other CO2 Problem", Annual Review of Marine Science 2009 1:1, 169-192

Using only seawater and renewable energy as inputs, Captura's DOC method uses an electrochemical pH-swing based process to remove CO_2 directly from seawater, delivering a pure, measurable stream of CO_2 that can subsequently be sequestered through mature and verifiable approaches, such as geologic storage. If deployed in ocean locations with optimal drawdown characteristics, CO_2-depleted, or decarbonized, seawater is returned to the ocean with the capacity to absorb the same quantity of CO_2 from the atmosphere that was originally removed. Captura's DOC process creates no byproducts and does not add any chemicals or other material to the ocean. It indirectly provides atmospheric carbon removal as the released decarbonized seawater fully equilibrates with the atmosphere.

As CO_2 is 150 times more concentrated volumetrically in the ocean than the atmosphere[7], Captura's DOC has the potential to indirectly remove significant quantities of CO_2 from the atmosphere in an energy efficient way. If deployed in semi-contained bays or inlets, it can also counteract ocean acidification on a local level, supporting the UNFCCC's broader sustainable development goals. We therefore encourage the Supervisory Body to consider including removal of CO_2 from the ocean in its definition of removal activities under the Article 6.4 Mechanism.

We extend our gratitude once again for the opportunity to contribute to this essential dialogue. We remain committed to supporting your endeavors and stand ready to offer any further assistance that may be required. Please do not hesitate to reach out to us if you require any additional information or clarification.

Contact:
Tara Bojdak
Director of Communication
Captura Corporation
tara.bojdak@capturacorp.com

About Captura:
Captura is a Direct Ocean Capture company headquartered in Pasadena, California. Founded in 2021 utilizing technology developed in Caltech's laboratories, Captura offers safe, scalable, and low-cost atmospheric carbon removal by leveraging the world's largest natural atmospheric CO_2 absorber – the ocean. With minimal to no impacts on the environment and using only renewable electricity and seawater as inputs, Captura's Direct Ocean Capture technology generates a stream of pure, measurable CO_2 that can be sequestered or utilized.

Captura's technology is currently undergoing a rigorous piloting program consisting of systems of increasing capacity. The company's first operational pilot system that is capable of capturing 1 ton of CO2 per year has been undergoing ocean trials at Newport Beach, California since August, 2022. Captura has also built its next-generation system which has 100x the capacity of the first. The new, larger system has been successfully operating end-to-end in the company's lab in Pasadena and Captura plans to move it to AltaSea at the Port of Los Angeles in the summer of 2023 to begin ocean field trials. In parallel, Captura's engineers and scientists are developing proprietary optimized membranes to increase electrical efficiency and further reduce removal costs.

Captura's solution has been validated and supported by the Musk Foundation's Carbon Removal XPRIZE, the Department of Energy, and Frontier Climate. For more information, visit www.capturacorp.com.

[7] Willauer et al. "Feasibility of CO2 Extraction from Seawater and Simultaneous Hydrogen Gas Generation Using a Novel and Robust Electrolytic Cation Exchange Module Based on Continuous Electrodeionization Technology", Ind. Eng. Chem. Res. 2014