UNFCCC Article 6.4 Call for Input 2023

Captura Corporation Response

UNFCCC Article 6.4 Call For Input 2023 - Issues included in the annotated agenda and related annexes of the fifth meeting of the Article 6.4 Supervisory Body

May 24, 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 engineering-based removals within the Article 6.4 Mechanism.

We are grateful for the opportunity to respond to your call for input on the Information note: Removal activities under the Article 6.4 mechanism (Version 4.0) and offer the following comments in response.

Comments on section 3.2 Eligibility of activity types under the Article 6.4 mechanism:

We were surprised by the conclusions drawn in section 3.2 regarding the pros and cons of different types of carbon removal activities eligible under the A6.4 mechanism. The note broadly categorizes eligible carbon removal solutions into engineering-based and land-based approaches and states that 'these activities… do not serve any of the objectives of the Article 6.4 mechanism'.

Captura firmly believes that a comprehensive approach to addressing climate change necessitates the deployment of various forms of carbon removal, as different solutions each bring a unique set of benefits and limitations. Rather than categorizing solutions, Captura supports a method-neutral approach to methodology, with solutions assessed based on a universal set of criteria, such as those outlined by the Oxford Offsetting Principles. This approach would allow the mechanism to support the most feasible solutions available on the market, including those that are currently in earlier stages of development.

We provide the following comments in response to the below cons listed in *Table 3.*:

1. **'Engineering-based removal activities are technologically and economically unproven, especially at scale'**
   As a new industry that is advancing rapidly, carbon removal solutions are in varying stages of development, with some ready for deployment now and others requiring further innovation. It is important to recognize that any new technological sector goes through a period of scale-up and refinement. The history of renewable energy, exemplified by the growth of wind and solar power, provides a compelling precedent. Similarly, the field of engineered carbon removal solutions is undergoing rapid development, and the challenges associated with scalability and cost-effectiveness are being actively addressed by scientists, innovators, and policymakers.

2. **Engineering-based activities 'do not contribute to sustainable development'**
   Contrary to the above assertion, we contend that several technological carbon removal solutions can be responsibly deployed to contribute to sustainable development. For example, Captura's Direct Ocean Capture solution can be implemented in many ocean-based locations around the world, including the developing South, creating jobs in often marginalized coastal communities that have borne the brunt of climate change.

It can be deployed either onshore or offshore and can make use of existing ocean-based infrastructure such as desalination plants and oil and gas platforms that have been retired through the energy transition. Offshore deployments provide a new market for offshore renewable power, providing carbon removal without requiring the land-based renewable power needed for wider decarbonization.

Captura's solution does not compete for land or freshwater and requires no rare earth elements or minerals – a constraint that affects a broad range of technologies in the clean energy ecosystem. Additionally, if deployed in localized bays and inlets, Captura's technology has the potential to help address ocean acidification, which is causing devastating impacts to marine life and ecosystems.

Climate change is having a significant impact on the ocean, which in turn is affecting sustainable development activities associated with the ocean, such as seafood farming, fishing and tourism activities. Captura's solution can help mitigate localized impacts of climate change on the ocean and support ocean-dependent communities.

We also wish to highlight that *Table 3.* omits several critical cons associated with land-based activities, as acknowledged in section 6.7, many of which are permanent challenges faced by these approaches. These include negative impacts on biodiversity and competition for land, both of which can adversely affect biodiversity conservation, food production, and local livelihoods. It is imperative to consider the full spectrum of potential risks and trade-offs associated with different carbon removal methods to ensure environmental integrity.

Comments on omissions:

Captura notes that Section 7 considers five specific engineering-based removal activities but does not include Direct Ocean Capture. The note states that 'ocean-related activities have no known method of monitoring, while there is considerable uncertainty about their environmental and social impacts'. While this is true for some ocean-based removal solutions, others, including Captura's method, effectively avoid these challenges. We offer the below information on Captura's Direct Ocean Capture solution to help inform future documents.

Captura's Direct Ocean Capture technology removes carbon dioxide from the surface layer of the ocean using proprietary electrodialysis technology and commercially available water/gas handling equipment. It is a closed system that creates no side products, uses no external chemicals, and adds nothing to the ocean. Using only seawater and renewable energy as inputs, the system removes carbon dioxide from seawater, delivering a stream of captured carbon dioxide gas that can be utilized or safely and securely stored using mature sequestration methods, such as geologic sequestration.

The decarbonized seawater is returned to the ocean, enabling the drawdown of an equivalent quantity of carbon dioxide from the atmosphere as part of the natural equilibrium between the shallow ocean and the atmosphere. The seawater is returned to the ocean in its native state, with the exception of the removed carbon dioxide and a slightly higher pH, which could help address ocean acidification if deployed in localized bays and inlets.

Monitoring Captura's Direct Ocean Capture solution:

As with the output of Direct Air Capture facilities, the quantity of carbon dioxide removed from seawater in Captura plants can be precisely measured as a gas stream at the plant output. Captura plans to combine its technology with mature sequestration technologies, such as geologic sequestration, for which there are existing standards for monitoring and verification.

The additional atmospheric drawdown is explained by Henry's Law – the concentration of a gas in a liquid is directly proportional to its partial pressure above the liquid surface – and backed by scientific literature (National Academy of Sciences, Chapter 7). Monitoring for atmospheric drawdown can be accomplished through existing ocean models and known ocean characteristics, which allow for a localized model of the speed and extent of drawdown at the location of the plant.

Environmental and social impacts of Captura's Direct Ocean Capture solution:
Captura's demonstrated Direct Ocean Capture solution was designed to minimize ecosystem and societal impacts through the following characteristics:

- The technology requires no change to existing ocean current characteristics
- It does not add anything new to the ocean and no chemicals are used or harmful by-products generated
- It results in no change to ocean alkalinity, beyond a small, temporary increase in pH at the outflow, which is within the bounds of existing desalination plant characteristics and is quickly dispersed. Additionally, the technology has applications in localized de-acidification – when the system is operated within an enclosed area, such as bays and coral reefs, it can work to help address ocean acidification in small areas of the ocean. These deployments could benefit ocean-dependent communities, like oyster farmers, who have recently seen declines in seafood yields resulting from the damaging effects of ocean acidification on shelled marine organisms
- Our ocean-based system has no land-use requirements, avoiding competition with farmland
- Water is drawn from the ocean or desalination plants that generate waste brine, avoiding freshwater use conflicts
- Remote and isolated offshore system locations minimize disturbance to communities
- Ocean deployments, above sequestration sites, avoid the need for land-based pipelines
- The technology can be deployed anywhere there is access to ocean, which covers 70% of the Earth's surface

Captura is currently undergoing a rigorous piloting program, including ongoing ocean field trials to validate these assumptions and measure the characteristics of plant output.

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 CO_2 that can be sequestered or utilized to make low-carbon products, such as sustainable aviation fuel.

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.