United Nations Climate Change Convention
Article 6.4 Supervisory Body
Via electronic mail: **Supervisory-Body@unfccc.int**
June 19, 2023

Re: Structured Public Consultation - Removal Activities

U.S Biochar Coalition Response to UNFCCC Article 6 Call for Comments

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The U.S. Biochar Coalition appreciates the chance to provide our input regarding the integration of carbon removals in the implementation of Article 6.4. Specifically, we would like to express our insights on the Information Note titled "Removal activities under the Article 6.4 mechanism" (A6.4-SB005-AA-A09 version 0.40), which aims to provide valuable information for the upcoming meeting discussions.

U.S. Biochar Coalition Mission
The U.S. Biochar Coalition is a trade association unifying the voice of the biochar industry to catalyze development of the market, policy, and economic conditions necessary to expedite industry growth in the United States. Our mission is to :

- Advocate for legislative, policy, & regulatory action to build and open markets for the production and use of biochar in the U.S.;
- Raise federal policy, legislative & regulatory awareness of the benefits of biochar systems and products to break down barriers to growth;
- Deconstruct silos between the biochar business community & end use market sectors to cross pollinate opportunities for growth;
- Unite biochar industry leaders, create opportunities for collaboration, build a platform for action.

Creating a Unified Voice to Achieve a Planet Critical Mission
The Coalition's platform is specifically designed and uniquely suited to elevate awareness among policy makers, public, and end markets of the biochar carbon dioxide removal ("CDR") industry's capacity to achieve the U.S.'s permanent carbon removal, economic development, climate resilience, and energy independence goals at speed and scale no other form of engineered CDR can offer. Long overlooked, lacking a unified industry voice and lobbying presence, the biochar industry currently produces a mere 1% of its projected production capacity in the U.S. and globally.

U.S. Biochar Coalition
200 Massachusetts Ave NW, Suite 320,
Washington, DC 20001 USA
www.usbiocharcoalition.org
amymccraekessler@usbiocharcoalition.org

The Role of Biochar

Biochar is "the solid material obtained from the thermochemical conversion of biomass in an oxygen-limited environment."[1] In addition to biochar's many agronomic, environmental, electrochemical, and structural benefits, it is a carbon dioxide removal ("CDR") taskmaster. One ton of high temperature[2] biochar placed into a durable sequestration permanently removes three tons of CO2 from the atmosphere, fixing the CO2 stored in biomass and taking it out of the carbon cycle for millennia.

Too Important to Ignore: Claiming Biochar CDR's Seat at the Table

There is no more powerful full spectrum climate solution available to us than biochar. The U.S. Biochar Coalition is galvanizing the collective power of businesses, investors, and civil society to influence and accelerate policy change, secure action for industry growth, and build the political infrastructure and collaborative industry relationships we'll need to scale biochar across multiple markets not only in the U.S. but globally. Accordingly, we ask that the Supervisory Body consider the following:

The Role of Removal and Engineering-Based Removal

The world is on course for a 2.7C in global temperature rise. The IPCC AR6 report made it clear that CO2 emissions reductions are no longer enough to course correct for 1.5C: massive scale up of CDR is now essential. Current CDR capacity stands at 0.026% of our target. By 2050, that 0.026% must grow by a factor of one million to the size of oil & gas industry.[3] There is no precedent for the scale or speed of the necessary transition: at no time in history has an industry this size been built in just three decades. However, growth on this timeline is "a necessity, not an option,"[4] and a tremendous opportunity for rural communities and the Global South to prosper.

We request that the Supervisory Body align with the consensus of the scientific community, as reflected in the IPCC AR6 report, and incorporate the equally important need to grow CDR capacity in unison with global efforts to reduce greenhouse gas emissions. A foundational focus on the inextricable connection between increased CO2 reductions and increased CDR to meeting global Net Zero goals will be crucial for Article 6.4 deliberations to achieve maximum impact with greatest efficiency; a task we and the world are counting on the Supervisory Body to do.

Biochar Is One of The Most Powerful Negative Emissions Technologies Available

Biochar is uniquely positioned, as "one of only a few permanent carbon removal technologies, and the one at highest technology readiness level" to meet the "massive incoming demand for carbon removal."[5] This combined with unparalleled climate, social, environmental, and financial co-benefits, makes biochar the U.S.'s most valuable carbon removal tool. In the same turn, it is also the most underfunded, undervalued, underutilized and unseen. In the same turn, Biochar CDR is also the most underfunded, undervalued, underutilized and unseen form of CDR Biochar can maximize the carbon and social impact of every dollar spent, action taken, and product made creating a tremendous opportunity for to set a just transition standard for CDR. By 2050, a global biochar industry scaled with appropriate policy

[1] International Biochar Initiative
[2] 700C and above
[3] Swiss Re
[4] Swiss Re
[5] (O. Mašek et al., Nature, 2019); Biochar & Carbon Credits: 2021 — The year of biochar, Pro-Natura International.

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200 Massachusetts Ave NW, Suite 320,
Washington, DC 20001 USA
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amymccraekessler@usbiocharcoalition.org

supports like those the Supervisory Body is charged with promulgating, could permanently remove gigatons of CO2 a year, far exceeding the removal capacity over the same timeframe of other forms of engineered CDR. We see inclusion in deliberations of the Article 6 mechanism as a powerful opportunity to change that for the benefit of the planet and the Global South.

More Than Just the Primary CDR: Biochar CDR Climate & Financial Dividends

When applied to soils for regenerative agriculture, soil health, landscape restoration, and biodiversity preservation, biochar amplifies its CDR impact by activating and strengthening natural CDR systems[6] that pay CDR and other climate[7] dividends long after the initial biochar CDR application has been made.

Moreover, biochar has immense potential to stimulate innovation and growth of the bioeconomy. In addition to its CDR and agronomic benefits, biochar reduces the carbon intensity and enhances the performance of hard to abate products like construction materials, cement, and plastics and dozens upon dozens more.

The CDR, social impact, and climate dividends[8] of biochar CDR make it a critical policy tool for achieving climate, sustainable development goal, economic prosperity, and just transition goals.

Carbon Negative Bioenergy with Biochar Carbon Capture & Removal

"Converting biomass into fuels with simultaneous capture of the process CO2 emissions holds the greatest potential for negative emissions."[9] To reach Net Zero Goals, the International Renewable Energy Agency has set a target for Bioenergy with Carbon Capture and Storage ("BECCS") growth of 14% a year through 2030. Bioenergy is expected to provide 28% of the renewable energy mix, 40% of transportation fuels, and annual BECCS project deployments in the U.S. are projected to reach 1 Gigaton CDR a year in 2050. And yet the world currently uses biomass wastes for a mere 3% of energy demand.

Biochar with Bioenergy: SDG, Climate & Just Transition Powerhouse

Integrating carbon negative bioenergy production with biochar CDR and biochar application to soils to support soil health, climate smart agriculture, and ecosystem conservation creates a pathway to removing multiple gigatons of CO2 a year by 2050, avoiding and displacing billions of tons CO2 from biomass waste recycling, fossil fuel displacement, and creating billions of dollars in economic impact and opportunity for rural communities and the Global South.

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[6] Biochar increases soil health, plant productivity and nutrient density; helps soils receive and hold water; facilitates reforestation and healthy forest management; aids in restoring degraded landscapes and strengthening ecosystem services; and regenerates the habitats that support terrestrial biodiversity.

[7] Additional biochar CDR climate returns include advancing climate adaptation measures and multiple U.N. Sustainable Development Goals through creation of climate resilient landscapes and agriculture, climate smart job and income creation, & providing food, water and climate security.

[8] Biochar improves soil structure & health, (soil organic matter, soil carbon content, microbial & fungi activity, cation exchange, pH, etc), soil's capacity to hold & draw down carbon and water; reduces NO2, CH4 and CO2 soil fluxes; increases crop productivity 20%-200%; increases farmer income up to 120%; reduces reliance on fossil based fertilizer; activates soil, forest, grassland & nature-based carbon sinks; protects biodiversity from habitat encroachment; enhances natural ecosystem services; increases crop nutrient density; facilitates climate resilient agriculture, landscape restoration, reforestation, & afforestation; supports healthy forest management; reduces wildfire risk; stimulates rural economies.

[9] Getting to Neutral

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Soils made healthier by biochar could generate $50 billion in social & environmental impacts annually and $37M in on-farm economic value. **"**Good soil is gold for businesses**"** and will require $700B capital expenditure over next 30 years generating $10 Trillion in net financial return.[10] Moreover, "Bringing carbon back to soils through biochar and regenerative agriculture is one of the greatest opportunities to address human and climate health, along with the financial well-being of farmers."[11]

Circular economies built around biochar systems processing sustainably certified biomass waste take unused, accessible biomass waste residues currently emitting 6.7 tons of CO2 into the environment and creating $3,000 of climate damage per ton of waste, and turn them into:

- carbon negative electricity to meet Global South electrification goals,
- permanent biochar CDR to meet national CDR goals,
- biochar in regenerative agriculture to stop shift agriculture, its resulting deforestation, and to free time for women to engage in activities other than subsistence agriculture
- biochar for degraded landscape restoration to bring the world's 30% of degraded soils and ecosystems back to health so that they fully support CO2 drawdown and support local nature based livelihoods
- 45 permanent jobs per biochar BECCS system
- 100 value chain jobs per biochar BECCS system
- $5,000 of economic value from 1 ton of biomass waste
- $175 million in local economic value for a 4MW biochar BECCS system

There is no more powerful climate solution available to us than biochar CDR and BECCS systems to advance Article 6 goals of halting and reversing climate change in a manner that supports advancement of 12 to 15 SDGs; protects biodiversity; promotes climate agricultural, community, natural ecosystems and economic resiliency; and provides a powerful path to just transition in the Global South.

ARTICLE 6 RECOMMENDATIONS

Article 6 Mechanism Framework & Tools

To ensure the effectiveness of CDR, we advocate for clear national and international targets for large-scale CDR by 2035, 2040, and 2045. These targets should be distinct from emission reduction goals and aligned with the objective of limiting global temperature rise to 1.5°C. Additionally, we support implementing a range of regulatory and financial incentives, such as direct procurement, project-based support, or output-based subsidies.

To establish a world-class CDR framework, it is essential to define clear quality standards for CDR credits based on principles of durability, verifiability, sustainability, additionality, and quantifiability, while remaining technology-neutral. Equitable deployment of CDR is crucial from both climate and community perspectives, addressing the historical responsibility of fossil fuel-based economic development in cooperation with developing economies.

Engineered Removal and Biochar Carbon Removal

[10] *Forbes*
[11] Project Drawdown

We encourage the Supervisory Body to adopt the definition of CDR provided by the IPCC : "anthropogenic activities removing carbon dioxide (CO_2) from the atmosphere and durably storing it in geological, terrestrial, or ocean reservoirs, or in products." This extensively deliberated definition, crafted by scientists and experts, should form the basis for the future Article 6.4 mechanism.

On the contrary to assertions made in Table 3 that engineered carbon removal solutions "do not contribute to sustainable development, are not suitable for implementation in the developing countries and do not contribute to reducing the global mitigation costs, and therefore do not serve any of the objectives of the Article 6.4 mechanism", biochar CDR and bioenergy with carbon capture and storage (BECCS) do indeed make significant contributions to sustainable development and are ideally suited to meet the objectives of the Article 6.4 mechanism.

Permanence & Capacity Potential

BCR and BECCS are the only durable CDR approaches currently contributing to carbon dioxide removal at a significant scale. BCR for instance is estimated to already remove around 0.5 $MtCO_2$ per year from the atmosphere (State of CDR, 2022). In 2022, BCR accounted for 40% of all high-quality CDR purchases in the voluntary market, 87% of all deliveries, and 90% of the biggest suppliers of durable high-quality CDR, all while having the lowest average cost per ton at €179/t (see cdr.fyi). This achievement highlights the maturity and scalability of BCR as a permanent CDR technology, which is substantially contributing to achieving the objective of removing at least 5 Mt CO_2eq/year by 2030.

The potential of biochar to remove carbon for centuries is well-established and recognised by the IPCC since 2018. Extensive research in organic geochemistry and organic petrology confirms that biochar, when produced at temperatures exceeding 600°C, possesses exceptional stability. Microscopic analysis reveals that biochar shares carbon aromatization and molecular ordering characteristics with highly stable forms like anthracite coal. In recent studies by Sanei et al. (2023), all analyzed biochar samples produced at high temperature of 500C or more consist of over 97% "inert organic matter", hence resisting degradation from surface processes such as oxidation or biodegradation and providing durability on geological timescales. Additionally, a growing scientific consensus suggests that 75-80% of biochar consists of highly stable aromatic carbon rings with a durability of thousands of years. Moreover, the thermochemical scientific community has known for decades that biochar produced at 850-900C reduces O:C and H:C ratios in the biochar to the point of permanent carbon stablization over millenia. This means that biochar made from pyrolysis represents a durable and permanent CDR technology that can sequester carbon for thousands of years.

Conclusion

The U.S. Biochar Coalition appreciates the opportunity to provide input on integrating biochar CDR into UNFCCC Article 6.4. We encourage the Supervisory Body to consider these perspectives and engage in discussions with stakeholders to gain a comprehensive understanding of the rapidly evolving field of carbon removal. By doing so, we can ensure that CDR plays a vital role in our collective efforts to address climate change.

U.S. Biochar Coalition
200 Massachusetts Ave NW, Suite 320,
Washington, DC 20001 USA
www.usbiocharcoalition.org
amymccraekessler@usbiocharcoalition.org

Sincerely,

Amy McCrae Kessler, Esq.
Co-Founder & Founding Director, U.S. Biochar Coalition
Co-Founder & President, FACET Power, Inc.
Co-Founder & Director, Quintessential Carbon, Inc.

U.S. Biochar Coalition
200 Massachusetts Ave NW, Suite 320,
Washington, DC 20001 USA
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