carbonfuture GmbH | Paul-Ehrlich-Straße 7, 79106 Freiburg i. Br. Germany

Contact person: Sebastian Manhart

Email: sebastian@carbonfuture.earth

Phone: +39 3516308373

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Structured Public Consultation - Removal Activities - Carbonfuture

We appreciate 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.

Carbonfuture is a pioneering company that has established the world's leading digital MRV (monitoring, reporting, verification) system for carbon removal. Our transparent and auditable system tracks premium carbon removal credits, providing best-of-class carbon removal. Our innovative approach allows us to scale across a wide range of carbon removal technologies, ultimately de-risking the adoption and long-term commitment to carbon removal by buyers. Inspired by the idea of carbon sink leasing, we developed a scalable framework for carbon sink financing and successfully created the first consistently monitored and fully documented and verified biochar-based carbon sinks. Our mission is to make a massive handprint of positive change by offering trusted carbon removal in the gigatonne range.

The role engineered carbon dioxide removal

We urge the Supervisory Body to align with the consensus of the scientific community, as reflected in the IPCC AR6 report, which emphasizes the indispensability of carbon removal alongside strong global efforts to reduce greenhouse gas emissions. It is crucial to accept this conclusion as the foundation for Article 6.4 deliberations and avoid rehashing the need for carbon dioxide removal (CDR).

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.

On biochar carbon removal (BCR)

We strongly encourage the Supervisory Body to adopt the broad and open definition of carbon removal provided by the Carbon Business Council, which describes it as "CDR encompasses land-based soil and forest carbon sinks; biomass-based carbon removal and storage; marine carbon dioxide removal; mineralization-based approaches; and direct air carbon capture and storage — as well as emergent and potentially as yet undiscovered methods.".

We disagree with the 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". These assertions lack evidence and fail to acknowledge the real-world advancements in the carbon removal sector. We recommend engaging directly with CDR practitioners and companies planning or considering projects in developing countries, notably biochar-based projects which have been on the radar for the past decade. This would provide valuable insights and refute the claims that technology-based carbon removal methods are unproven or economically unsustainable.

While uncertainties exist in technology-based CDR today, it is important to recognize the necessity of deploying CDR at a gigatonne scale to meet the temperature change targets of 1.5°C or 2°C, as outlined in the IPCC AR6 Synthesis Report. Rather than delaying progress out of caution, it is imperative to focus on accelerating testing and validation of high-potential pathways to mitigate uncertainties.

It is crucial to acknowledge that engineering-based carbon dioxide removal (CDR) encompasses a diverse array of pathways, such as biochar carbon removal (BCR), bioenergy with carbon capture and storage (BECCS) marine carbon dioxide removal (mCDR), mineralization-based approaches, enhanced weathering (EW), direct air carbon capture and storage (DACCS), and potential future methods. Including BCR as an engineered CDR method is crucial to push forward this permanent and mature technology.

Indeed, we wish to highlight the importance of considering the permanence of carbon removal, acknowledging the industry's maturity, and recognizing the associated co-benefits across various CDR pathways, including BCR. These aspects significantly contribute to the credibility and effectiveness of CDR as a viable climate solution.

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

MtCO2 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 CO2eq/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. This means that biochar made from pyrolysis represents a durable and permanent CDR technology that can sequester carbon for thousands of years.

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.

On enhanced weathering (EW)

We would like to emphasize the importance of considering the full potential of enhanced weathering (EW) as a method for atmospheric carbon dioxide removal (CDR) which enhances the exposure of mined or produced mineral solids to the atmosphere and thus facilitates the fixing and sequestration of CO2 into durable reservoirs. We acknowledge that the information note has looked at EW's potential, notably for SGDs. We would like to add that EW offers significant potential to contribute to CDR targets, with estimates suggesting that it could remove 2 Gt CO2 annually by 2050, representing 25% of the required CDR for scenarios aligned with Paris Agreement targets.

The costs associated with implementing EW are reasonable, with a global average cost estimate of US$80-180/tCO2. Leveraging existing technology, infrastructure, and labor, EW presents a rapid and cost-effective solution. Furthermore, it can be integrated into agricultural practices without requiring significant changes, providing additional benefits such as improved soil health, water management, increased crop yields, and enhanced stress and pest resistance (see here, here, here, and here)

From an environmental standpoint, while we acknowledge the potential risks associated with EW, such as toxic or environmentally harmful metals being released from rocks, EW has the potential to reduce reliance on chemical fertilizers, lime, and pesticides, thereby mitigating their detrimental impacts on soil health, water quality, and human well-being. The slow-release nature of rock powders used in EW also reduces nutrient runoff and helps address the issue of eutrophication in rivers. Additionally, the bicarbonate produced through weathering can replenish the ocean's alkalinity, countering the effects of ocean acidification. Overall, EW has a high technology readiness level with validation at lab and field scale, which shows more maturity than previously presented in the information note.

Monitoring, reporting and accounting

Advocating for a more flexible approach to permanence in carbon removal, we urge against setting an arbitrary time limit, such as 1,000 years, and instead emphasize the importance of considering timescales of at least several centuries. Scientific evidence must be synthesized into a commonly accepted understanding of the durability of the carbon sequestering material in storage environments that do not cause significant reflux of CO2 into the atmosphere. This aligns with the recommendations put forth by the European Union, accommodating all engineered removals and avoiding the imposition of rigid boundaries.

In addition, we emphasize the significance of robust monitoring, reporting, and verification (MRV) tools in establishing trust and credibility in carbon dioxide removal (CDR) processes as well as the dire need for improved digitisation & automatisation to speed up certification. To exemplify this, we highlight the use of recognized biochar standards like Verra, Puro, and Carbon Standards International (CSI), along with the Carbonfuture digital MRV platform. This combination of third-party standards and scalable, accurate digital MRV facilitates a robust process for ensuring trust in engineered CDR activities.

Currently, discussions on carbon removal within compliance markets are limited, with carbon credits for carbon removal activities primarily issued on the voluntary carbon market. Various methodologies, including the CSI C-Sink methodology, Puro's methodology for biochar application, and the VM0044 methodology issued by the Verra, outline MRV requirements for carbon removal projects involving biochar. These methodologies generally address emissions from biochar production, biomass harvesting and transport, biochar treatment and transport, and the degradation of the non-stable fraction of biochar over time.

Environmental and societal impacts: SDGs

We urge the Supervisory Body to consider that engineering-based carbon dioxide removal (CDR) methods, including BCR, have the potential to contribute significantly to addressing both environmental and societal impacts, notably through the production and utilization of biochar.

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Biochar carbon removal can contribute to several Sustainable Development Goals (SDGs) while considering the objective of avoiding other negative environmental and social impacts associated with carbon dioxide removal (CDR) methods. Here's how biochar carbon removals can align with the objectives outlined in the information note:

Impact on land, biodiversity, and water: Properly implemented biochar production and application can enhance soil fertility and improve water retention, leading to increased agricultural productivity without negatively impacting biodiversity. Biochar can be produced from a range of biomasses, the most readily-available feedstocks being agricultural residues. It was estimated for instance that transforming the most abundant agricultural residues worldwide (coconut husks and shells, olive pomace, palm kernel shell, rice husk, sugar cane bagasse and wheat straw) into biochar (373 Mt/year of biochar) could lead to a removal of 1.04 Pg $CO2$/yr. By using clear guidelines and rules for sustainable biochar feedstocks as currently set by existing methodologies and ensuring responsible land management practices, the risk of potential negative ecosystem impacts from biochar production can be minimized.

Sustainable development context: Biochar production and application can be integrated into sustainable development practices, where carbon removal becomes a co-benefit rather than the sole objective. Heat/Electricity grid-connected Biochar production infrastructure can be an important tool to add resilience and flexible sector-coupling to the energy system as operation can be engineered to provide tunable distributions of carbon-conserving, heat, or electricity output (BCR and BECCS as edge cases of the same technological family). By aligning biochar initiatives with broader sustainability goals, such as improving soil health, enhancing agricultural productivity, and promoting circular economy principles, adverse impacts can be avoided.

Impacts on food security and local livelihoods: In addition to its environmental benefits, biochar holds significant potential for economic empowerment in the global South. Aligning with the sustainable development goals outlined by the United Nations, biochar offers an opportunity to enhance soil health and foster the development of sustainable green materials such as carbon negative concrete. Biochar displaces the need for continued cycles of high cost synthetic fertilizer applications, reducing 60-80% of farm operational expenditure costs. Additionally, it can be operated in both low and high-tech environments, providing an equitable and universal, high-accountability removal pathway.

By adhering to these considerations, biochar can effectively contribute to SDGs such as No Poverty (SDG 1), Zero Hunger (SDG 2), Responsible Consumption and Production (SDG 12), Climate Action (SDG 13), and Life on Land (SDG 15). Biochar offers the potential for sustainable agricultural practices, improved soil health, increased carbon sequestration, and enhanced resilience to climate change, while ensuring the avoidance of negative environmental and social impacts. This is why we suggest to the Supervisory Body to fully recognise its potential in the Article 6 publications.

Tonne-year crediting

We acknowledge that the supervisory body has taken into account the stakeholder feedback on tonne-year accounting. We would still like to reaffirm that the tonne-year crediting method should no longer be considered by the Supervisory Body due to several fundamental flaws. This method creates a false equivalence between temporary and permanent carbon storage, which goes against the concept of a carbon budget and cumulative emissions. By counting short-term carbon storage as equivalent to permanent reduction or removal, tonne-year accounting undermines the goal of the Paris Agreement. The primary objective of climate policy is to limit long-term global warming, which is driven by cumulative CO_2 emissions. The short-term timing of emissions is insignificant compared to long-term climate change. Reversing CO_2 mitigation, even far in the future, means it no longer contributes to staying within the carbon budget. Tonne-year accounting methods, whether physical or economic, fail to consider the science of temperature stabilization and the need to compensate for any CO_2 reversal to achieve temperature targets. These deficiencies have been recognized for a long time, and it is important to prioritize permanent mitigation over short-term storage to effectively address climate change and adhere to a global carbon budget.

Conclusion

Carbonfuture appreciates the opportunity to provide input on integrating carbon removals into UNFCCC Article 6.4. Key recommendations include recognizing engineered-based removal methods like biochar carbon removal. Robust monitoring, reporting, and verification (MRV) tools and collaboration with insurers are crucial for establishing trust and financial resilience. The potential of enhanced weathering (EW), direct air carbon capture and storage (DACCS) and other technical removal methods as a cost-effective CDR method should be fully considered. The importance of considering timescales of at least several centuries for permanence is key. Biochar production and application align with SDGs, offering environmental and societal benefits while avoiding negative impacts. In conclusion, by implementing these recommendations, we can ensure the effective integration of carbon removals, promote sustainable development goals, and make significant progress in our collective efforts to address climate change.

Kind regards,

Sebastian Manhart

Senior Policy Advisor, Carbonfuture

carbonfuture GmbH
Paul-Ehrlich-Str. 7
79106 Freiburg i. Br.
Germany

www.carbonfuture.earth
Carbon removal you can trust

Headquarter: Freiburg
CEO: Dr. Hannes Junginger-Gestrich
Registry court: Amtsgericht Freiburg
Commercial register: HRB 721282