

UNFCCC ARTICLE 6.4 CALL FOR INPUT – METHODOLOGY REQUIREMENTS: CARBON ENGINEERING RESPONSE

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CONTEXT & INTRODUCTION

Carbon Engineering appreciates the opportunity to respond to the call for input. We welcome the work of the UNFCCC to consider technological removals in the creation of the Article 6.4 Mechanism and are fully supportive of its objective to create linkages across international boundaries and signal integrity in carbon markets. This work is critical to modernize carbon markets and ensure that they generate products with environmental integrity needed to mobilize international project finance required to drive climate action.

The Direct Air Capture (DAC) technology we have partnered to deploy at a climate relevant scale will generate high-quality, tangible, and highly durable Carbon Dioxide Removals (CDR) when paired with safe and secure geologic storage. Direct air capture with secure geologic storage (DACCS) plays an important and growing role in potential net-zero pathways. The IEA Net Zero Emissions by 2050 Scenario estimates DAC technologies will need to annually capture more than 85 MtCO₂ in 2030 and around 980 MtCO₂ in 2050. This will require both rapid technological improvements and unprecedented growth for industrial-scale climate solutions. The rate of CDR adoption from 2050 onward will strongly depend on what is achieved for the first half of the century, with early inaction or emissions overshoot requiring steep adoption after 2050¹. Furthermore, the Intergovernmental Panel on Climate Change also recently affirmed the critical importance of carbon removal solutions such as DACCS in meeting the Paris Agreement's temperature goals. CDR will play a critical role in helping meet climate targets, but it cannot be a substitute for drastically reducing greenhouse gas emissions, which must remain a top priority.

Carbon markets will need to continue to evolve to encourage investment not only in reducing emissions to move us towards net zero emissions, but also to support investment in carbon removals. For CDR, including DAC, to scale at the rate necessary to achieve net-zero objectives, technology removals should be included in the Article 6.4 Mechanism.

GENERAL QUESTIONS

Carbon Engineering offers the following general comments on the document, *Draft Recommendation Requirements for the development and assessment of mechanism methodologies* as part of the call for input 2023 asking what is missing and what could be improved.

In summary:

- Leverage recent work from IETA on criteria for Carbon Geostorage Activities.

¹ <https://www.wri.org/insights/unlock-potential-direct-air-capture-we-must-invest-now>

- Develop a global standard for DACS methodology that takes a conservative approach to baseline scenario, project boundary, and project emissions resulting in high integrity credits.
- Develop a supportive procurement policy and environmental guardrails for renewable energy needed to support energy-intensive climate solutions such as DACCS.
- Distinguish removals from reductions to support net zero claims.

High-Level Criteria for Carbon Geostorage Activities

[IETA's High-Level Criteria for Carbon Geostorage Activities](#) are a set of principles to govern the development of tradable reductions and removals using technology-based carbon sink enhancements that can assume a major role in achieving the net zero goal of the Paris Agreement. The criteria provide recommendations for both methodological design and regulatory safeguards that can underpin safe, secure and permanent deployment of the technology.

The High-Level Criteria are built upon existing methodologies for geostorage projects that have been or are being drawn up by the United Nations' Clean Development Mechanism, the Global Carbon Council and the American Carbon Registry, as well as the carbon storage protocols developed by ISO TC265. The criteria also align with the rules and methods that countries will follow in tracking their actions in pursuit of NDCs.

Homologation - the need for consistencies in baseline scenario, project boundaries, and project emissions

Carbon Engineering has been involved in reviewing and adding input to the development of several methodologies in voluntary and compliance markets. Each system has a different approach which leads to inconsistencies in baseline scenario, project boundary, and project emissions. These differences between methodologies cause differences in the quality of carbon credits generated through removals. There is an urgent need for a standardization exercise which leads to a conservative approach, in order to ensure trust and integrity among stakeholders. The methodology developed for DAC under Article 6.4 is an opportunity to set a global standard.

Renewable energy – the need for good procurement policy and environmental guardrails

Carbon Engineering views Article 6.4 as an opportunity to responsibly deploy DAC technology in countries with high renewable energy potential connecting to countries where there is a demand for CO2 removals but lack appropriate site conditions for DAC deployment. We support DAC as a catalyst to build out additional renewable energy capacity bringing new renewable energy coming online.

DACCS projects will require large amounts of renewable power to effectively remove carbon dioxide from the atmosphere at a climate relevant scale. However, it is not always possible to co-locate DACCS projects with renewable power resources. Carbon Engineering encourages including guidance in the methodologies that allows DACCS projects to utilize indirect Power Purchase Agreements (PPAs) and a book-and-claim crediting period for the associated environmental attributes of the procured renewable power.

The recommended guidance below has been adapted from the California Air Resources Board (CARB) Low Carbon Fuel Standard (LCFS). We believe DACCS projects should be allowed to utilize indirect accounting mechanisms for low carbon intensity (CI) electrical power similar to those allowed for use in innovative technology deployment and infrastructure under the LCFS § 95488.8².

1. Low CI electricity for the project must be additional (defined here as either built or repowered specifically for supplying the DACCS project),
2. Low CI electricity must be supplied to the grid within the same local balancing authority as consumed,
3. Book-and-claim accounting for low CI electricity must be matched to the grid over a set period,
4. Low CI electricity must be supplied under contract and contracts must be made available for review by the VVB,
5. Low CI electricity must be in addition to local renewable portfolio requirements, and,
6. Low CI Renewable Energy Credits (RECs) or other environmental attributes associated with the electricity generated for the project must be claimed and retired for the project in a registry that can be audited by the VVB.

This guidance allows DACCS project developers to rely on existing contractual frameworks, developers, and supply chains to procure renewable power for DACCS at scale. It allows renewable resources to be expanded into power grids where they have optimal climate conditions for generation. Finally, it allows for flexibility in environmental accounting for climate-based mitigation systems on a broad yet still auditable scale.

Distinguish removals from emissions reductions

As a negative emission technology, DACCS plays an important and growing role in potential net-zero pathways providing high quality, tangible, and highly durable CDRs at climate relevant scale. Removals and reductions/avoidance need to be distinguished within methodologies as well as broader carbon markets. Removals are a critical pathway for net-zero plans, and they need to be distinctly identified for buyers to enable claims that specify the use of removal credits. Furthermore, removals and reductions should be considered separately when determining their respective baselines and additionality as they are inherently different.

BASELINE SETTING

Carbon Engineering would like to provide the following comment on baseline setting:

Performance-based approaches to baseline setting have been discussed since the early days of carbon crediting and trading. Using standardized baselines – i.e., performance benchmarks or default values – has reduced transaction costs and increased the transparency of CDM project activities: baselines are not set on a project-by-project level but can be determined for entire project types and sectors. Baseline setting in CDR is still being developed for many project types. However, DACCS has the unique

² [LCFS Guidance 19-01. Book and Claim Accounting for Low-CI Electricity.](#)

characteristic to define zero baseline. “For the purest-form CDR technology – all value-chain elements of which purely exist for the purpose of removing CO₂ from the atmosphere into durable storage – Direct Air Carbon Capture and Storage (DACCS) the baseline is no activity whatsoever.”³

ADDITIONALITY

Carbon Engineering would like to provide the following comments on additionality:

- Large-scale carbon removal projects, such as DACCS, are being developed with the single driving purpose of providing an environmental benefit to the climate and are inherently additional as a climate mitigation strategy to counterbalance hard to abate emissions as well remove historical emissions.
- The environmental integrity of any geological storage-based capture project, such as a DACCS project, is readily quantifiable; it requires no consideration of counterfactuals nor estimations. Hence, this conventional aspect of additionality can be empirically shown rather than assumed.
- Methodologies should require a cradle to grave life cycle accounting of project activity emissions, thereby reducing the possibility of any unaccounted GHG emissions that are locked in.

Carbon Engineering supports positive lists or performance-based tests against a zero baseline as the preferred option for assessing additionality of DACCS projects with the guardrail of disclosing public funding and subsidies for transparency.

GENERAL QUESTIONS ON BASELINE AND ADDITIONALITY

20. How might the application of the elements and approaches for baseline and additionality identified vary according to countries, sectors, technologies or practices or implementation scale?

We recommend that there be two separate and distinct models for assessing additionality: one for physical carbon dioxide removals and another for emissions reductions.

- Emission reduction projects often rely on a counterfactual baseline to demonstrate reductions beyond business as usual, where some form of high-integrity assessment does need to be conducted to determine that the emissions reductions being claimed by the proponent are real and additional. Further, the assessment in this category should also ensure there are no perverse incentives that allow for increased GHG emissions from the projects over what the emissions would have been in the absence of carbon markets.
- In contrast, there is a growing set of technologies – such as direct air capture with geologic sequestration (DACCS), or bioenergy with carbon capture and sequestration (BECCS) - which physically remove carbon dioxide from the atmosphere and provide it for permanent sequestration. In the case of DACCS specifically, carbon removal is the **only** “product” generated

³ Poralla, M.; Honegger, M.; Gameros, C.; Wang, Y.; Michaelowa, A.; Sacherer, A.-K.; Ahonen, H.-M; Moreno, L. (2022): Tracking greenhouse gas removals: baseline and monitoring methodologies, additionality testing, and accounting, NET-Rapido Consortium and Perspectives Climate Research, London, UK and Freiburg i.B., Germany.

by a facility, thus the only reason to invest in deploying such a facility is in order to generate the units of carbon removals. We recommend that when assessing removals projects, it should be assumed that they are additional by nature, and high-integrity MRV and evaluation instead be focussed on ensuring permanence of sequestration, accurately quantifying the net units of carbon removed (and thus available for credit generation) and avoiding any double-counting of benefits.

CONTACT

Kel Coulson, P.Eng, M.A.Sc.

Policy and Engagement Lead

Carbon Engineering Ltd.

Kcoulson@carbonengineering.com

ABOUT CARBON ENGINEERING

Carbon Engineering is a global leader in the development of Direct Air Capture (DAC) technology capable of removing CO₂ from atmospheric air and, through a series of chemical reactions, delivering it in a pure compressed stream suitable for storage or use.

Carbon Engineering was founded more than a decade ago with the mission to develop and commercialize affordable and highly scalable carbon removal technology. Carbon Engineering is a developer and licensor of direct air capture (DAC) technology. A standard commercial-scale CE DAC facility will annually capture over 1.0 MtCO₂ directly from the atmosphere. Carbon Engineering's DAC technology is a liquid-based DAC technology (L-DAC) that deploys an aqueous basic solution to pull CO₂ directly from the atmosphere and, after a series of clever chemical looping processes, conditions the atmospheric CO₂ into a dense phase that is optimized for transport and final end-use.

Carbon Engineering's DAC technology can provide highly durable CDR when combined with secure geologic storage. This rock-solid combination of DAC+ secure geologic storage (DACCS) provides a highly scalable and verifiable CDR mechanism for safely storing CO₂ for 1,000+ years, all with relatively low land and water use. Today, leading commercial markets are ready and we're working with global partners to deploy large-scale commercial facilities in multiple locations around the world.

The first large-scale commercial facility to utilize our DAC technology is in active development with our partner, 1PointFive, and is expected to have an annual atmospheric capture capacity of 1.0 MtCO₂ when complete.⁴ It's our goal to have this first plant ignite an industry by demonstrating that megaton-scale

⁴ [Occidental, 1PointFive to Begin Construction of World's Largest Direct Air Capture Plant in the Texas Permian Basin](#)



DAC technology is feasible, affordable, and available. We envision fleets of DAC facilities working alongside emissions-free electricity, energy efficiency, and clean innovations in all commercial and industrial sectors to fully tackle the climate challenge. Additional information on Carbon Engineering's technology and commercial developments is provided at www.carbonengineering.com.