June 6, 2023

Matt Botill
California Air Resources Board
1001 I St.
Sacramento, CA 95814

Re: Blue Planet Comments on May 23, 2023 Low Carbon Fuel Standard workshop

Dear Mr. Botill:

Blue Planet Systems Corporation (Blue Planet) appreciates the California Air Resources Board (CARB) hosting the May 23, 2023 Public Workshop to Discuss Potential Changes to the Low Carbon Fuel Standard (LCFS), and this opportunity to comment on the items covered. Blue Planet supports CARB amending the program to:

- Strengthen stringency in line with the State's climate goals, including targets to reduce average carbon intensity by at least 35% 2030 and 90% in 2045,
- Fully enable carbon capture, utilization and storage (CCUS) to contribute to the State's climate goals by adopting new CCUS protocols, including for carbonate mineralization, and incorporating them into the LCFS in the upcoming set of amendments,
- Include a near-term step down of 19% in 2024, in accordance with the analysis presented by BTR at the workshop, and
- Incorporate an auto-acceleration mechanism without a freeze that would pull forward compliance requirements by a year.

About Blue Planet

Blue Planet is a California company developing technology and products related to economically sustainable carbon management. Our goal is to solve the carbon capture problem by converting CO_2 into high-value building materials. Our technology can be deployed at a wide array of difficult-to-decarbonize industries, including cement and facilities involved in any number of transportation pathways participating in the LCFS – including ethanol, renewable gasoline/diesel, hydrogen, biogas, electricity, or direct air capture. Importantly, our technology captures not only CO_2, but also particulate matter, NO_x, SO_x and other pollutants hazardous to surrounding communities. We are currently constructing and beginning operations of a plant in Pittsburg, California on the Sacramento Delta, and our carbon-sequestered aggregate has been utilized at San Francisco International Airport, where carbon-sequestered concrete is specified.

Blue Planet's technology produces coarse and fine limestone aggregate made from sequestered CO_2 utilizing the carbon mineralization process. It allows lower-cost carbon capture, including from direct air capture or other carbon removal pathways, by avoiding the need to purify and enrich captured CO_2 before use, reducing the cost and energy needs

associated with carbon capture. It is also fully scalable and can be applied to any facility in any part of the state where concrete is utilized, regardless of its proximity or access to a geological sequestration site.

Carbonate mineralization offers a significant and permanent carbon storage and utilization solution

Almost all of earth's carbon – about 99 percent – is stored naturally through the process of mineralization in limestone rock. In fact, trillions of tons of CO_2 have been safely and naturally stored as carbonate mineral in the lithosphere for over 100 million years. As described previously in comments to CARB related to the Scoping Plan,[1] and validated in peer-reviewed research,[2] the mineralization process permanently stores carbon in rock, which can then be used in concrete and stored in our built environment.

Concrete is the most widely used building material on earth, and every year, California (and the world) uses enough rocks in concrete that we could store all emissions from major industrial sources in our buildings and roads. Compared to geological sequestration, which only entails cost,[3] carbon capture and conversion – in particular carbon storage in concrete – provides a value-added market that can make carbon capture cost effective without additional public subsidy.

While several technical, legal, and economic questions remain related to geologic sequestration, many of which CARB and other agencies will address through implementation of SB 905 (Caballero, Chapter 359, Statutes of 2022), carbonate mineralization offers a fully scalable, permanent carbon storage solution, ready for deployment today. We appreciate the state recognizing this opportunity, including:

- In the Final 2022 Scoping Plan Update, CARB discusses the role of carbon capture and carbonate mineralization in the context of decarbonizing cement and other sector transitions, stating "Direct air capture and carbon mineralization have high potential capacity for removing carbon..."[4]

- The CEC identifies carbonate mineralization, including carbon storage in aggregates, as one of the most promising strategies for decarbonizing the cement sector:[5]

> Capturing carbon from industrial processes and then utilizing it in a product is considered one of the essential components for mitigating CO_2 emissions since it can achieve net negative emissions, especially for sectors that are unable to achieve zero emissions. For example, carbon capture and utilization appear to be a pathway to achieve significant decarbonization of the cement industry where 60 percent of the carbon dioxide is from process emissions… For instance, carbon capture and utilization in the cement industry has recently emerged with sustainable techniques to use carbon emissions in concrete production. Some emerging utilization techniques, such as mineral carbonation, includes adding

[1] https://www.arb.ca.gov/lists/com-attach/73-sp22-kickoff-ws-UTMGbFEIVGJQCQd3.pdf
[2] For example, see: Xi, F., Davis, S., Ciais, P. et al. Substantial global carbon uptake by cement carbonation. Nature Geosci 9, 880–883 (2016). https://doi.org/10.1038/ngeo2840
[3] Unless it is used for enhanced oil recovery, which is unlikely in California given prohibitions included in SB 905 (Caballero, Chapter 359, Statutes of 2022) and SB 1341 (Limón, Chapter 336, Statutes of 2022).
[4] CARB (2022) 2022 Scoping Plan for Achieving Carbon Neutrality, California Air Resources Board, November 16, pg. 221. https://ww2.arb.ca.gov/sites/default/files/2022-11/2022-sp.pdf
[5] See pg. 10 at: https://esd.dof.ca.gov/Documents/bcp/2223/FY2223_ORG3360_BCP5441.pdf

carbon into cement to enhance the concrete's compressive strength. With almost 4 billion tons of construction aggregate produced in North America, mineral carbonation could be the most efficient route to CO_2 utilization.

- In the final clean energy budget, the legislature includes carbonate mineralization in concrete as an eligible industrial decarbonization strategy, while excluding geologic sequestration.[6]

Enable CCUS through additional CCUS protocols as part of LCFS amendments

We hope CARB will recognize the promising role that CCUS in aggregates and concrete can play in helping to achieve carbon neutrality and net-negative emissions in California, and take steps to advance this important strategy with revised carbon sequestration protocols and their adoption through LCFS amendments. Those protocols, at a minimum, should include carbonate mineralization and allow storage of carbon in concrete and aggregate as eligible carbon storage pathways.

The LCFS is a critical program for advancing California's climate objectives, and likely the most important program currently in place anywhere in the world to advance CCUS and carbon dioxide removal, both of which will be necessary to achieve California's goals of carbon neutrality as soon as possible, and then to achieve and maintain net-negative greenhouse gas emissions. Indeed, the Final Scoping Plan identifies a significant role for CCUS to play in decarbonizing transportation fuel pathways and supporting carbon dioxide removal, both in 2030 and through 2045. Now is the time to fully enable CCUS as a solution if the State is to stay on track to achieve these objectives, especially in 2030. If CARB were to wait until the next set of LCFS amendments to adopt new CCS protocols, it simply may be too late to deploy sufficient projects to meet the 2030 carbon capture/removal goal of at least 20 $MMTCO_2$.

Comments on the Workshop Proposals

We strongly support the proposals to step down carbon intensity reduction requirements in 2024 and to adopt a ratchet mechanism to automatically strengthen the program over time, should additional opportunities materialize to deliver additional greenhouse gas benefits for California. Notably, we hope that CARB will enable mineralization and other CCUS opportunities to deliver additional greenhouse gas benefits through the program, above and beyond what is otherwise expected. Such a mechanism would support additional opportunities to accelerate greenhouse gas reductions associated with transportation fuel use in California.

Regarding specific proposals presented in the workshop, Blue Planet:

- **Strongly supports BTR's proposal of a step down to 19% carbon intensity reductions in 2024.**
    - As they described, a significant step down in magnitude and as soon as possible (e.g., 2024) is necessary to return the market to similar conditions that existed during most of life of the regulation.

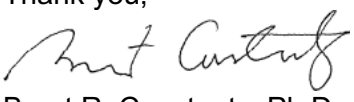
[6] Under the Industrial Grid Support and Decarbonization Program, eligibility is defined to include projects that "Develop and deploy novel decarbonization technologies and strategies, including carbon capture for use in products, such as carbonate mineralization and carbon curing of concrete that reduces or eliminates the emissions of greenhouse gases, except geologic storage."
https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB209

    - We discourage CARB from waiting until 2025 to implement a step down, which would only contribute to a growing credit bank and further depress the price signal under the LCFS.
    - Should CARB choose to wait until 2025 to implement a step down for whatever reason, it should be even greater than 19% to account for a linear trajectory to a 2030 target (e.g. of 35% or more) and the further accumulation of credits in the bank. We anticipate this would require a step down to at least 22% in 2025.
- **Strongly supports the AJW proposal for an auto-acceleration mechanism with the following minor adjustments:**
    - **We do not believe there should be limits placed on a continuous increase.** This would undermine the benefits of the proposal by introducing significant uncertainty into the process. Further, we note that:
        - The proposal does not increase the *magnitude* of CI reductions required, but only pulls them forward in time, should the market already be over-complying. This is a reasonable approach that doesn't require unforeseen technology developments compared to baseline assumptions underlying creation of the compliance path originally. It only requires greater market interest and more rapid development of projects and low carbon fuels that CARB would have anticipated to eventually become available, regardless.
        - By our read, the proposed triggers are conservative, and unlikely to be consistently triggered unless credits far outweigh deficits.
        - Given the lag time built into the mechanism, it is likely that the CARB Board will consider another amendment regulatory package, like it will do this year, before a third consecutive auto-acceleration event were triggered (i.e., within no less than 5 years). It would therefore have an opportunity to consider any necessary adjustments to the mechanism then, which is naturally likely to come before the proposed limit would occur.
    - **We do not believe a dual trigger is necessary.**
        - Blue Planet supports a credit-based trigger mechanism, including any of the proposals suggested by CARB or AJW, however encourages CARB to adopt a single trigger test. This will be most clear and transparent, and will avoid unnecessary duplication or unforeseen consequences.

We look forward to ongoing discussions and the formal regulatory process

We are grateful for your consideration of these comments and thank you again for hosting this important workshop. We look forward to engaging in the upcoming LCFS amendment process and with CARB and other agencies in various forums around CCUS. Please do not hesitate to reach out if you have any questions about Blue Planet, our technology, or the recommendations and comments offered in this letter.

Thank you,



Brent R. Constantz, Ph.D.
Chief Executive Officer
Blue Planet Systems Corporation