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Comments on IEPR Commissioner Workshop to Accelerate Industrial Decarbonization

Additional submitted attachment is included below.

August 19, 2021

Commissioner Andrew McCallister
California Energy Commission
1516 9th St
Sacramento, CA 95814

Re: Blue Planet Comments IEPR Commissioner Workshop to Accelerate Industrial Decarbonization

Dear Commissioner McCallister:

Blue Planet Systems Corporation (Blue Planet) appreciates the CEC hosting the August 3rd workshop to accelerate industrial decarbonization and the opportunity to comment on it.

Blue Planet is a California company developing technology and products related to economically sustainable carbon capture. Our goal is to solve the carbon capture problem by converting CO_2 into high-value building materials. Our technology can be deployed at cement, steel and other difficult-to-decarbonize industries and can capture not only CO_2, but also particulate matter, NOx, SOx 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.

We hope the CEC will recognize the promising role that carbon capture, utilization and storage (CCUS) in aggregates and concrete can play in helping achieve carbon neutrality and net-negative emissions in California. Furthermore, we appreciate and support actions by the CEC to advance this important strategy when identifying programs, resources and policies needed to help industries accelerate decarbonization and meet statutory energy and environmental goals, including through the EPIC program and potential incentive programs pursuant to the FY 2021/2022 budget.

Our Level of Commitment to CCUS Defines Our Climate Ambition

CCUS is one of the best, and sometimes only, ways to decarbonize stationary sources of emissions, such as cement facilities and other industrial operations. As highlighted in a recent study by Stanford and the Energy Futures Initiative,[1] deploying CCUS in just 4 geographic

[1] https://sccs.stanford.edu/2020-ccs-report-launch

industrial hubs could quickly reduce greenhouse gas (GHG) emissions by 60 million metric tons per year ($MMTCO_2e/yr$). This is equivalent to about half of the combined GHG emissions from all industrial facilities and power plants in California.[2] It's not hard to imagine that the rate of GHG emissions reductions from these "hard-to-abate" sectors could quickly outpace that from other sectors, such as buildings and transportation – if we embrace CCUS and strategies to deploy it at scale.

What's more, as outlined in the report led by Lawrence Livermore National Laboratory, *Getting to Neutral*,[3] biomass with CCUS could quickly remove 83 $MMTCO_2e/yr$ from the atmosphere, while delivering an additional about 60 $MMTCO_2e/yr$ in avoided emissions, and direct air capture of carbon dioxide is essentially infinitely scalable, but pairs especially well with CCUS at industrial facilities.

The State has clearly defined goals and intentions for transitioning the power sector, transportation sector and buildings sector to zero GHG emissions over time. (Actually, in the SB 100 Report, the energy agencies suggest ongoing GHG emissions of about 24 $MMTCO_2e/yr$ from 2045 on in an SB 100-compliant future, largely because they don't consider CCUS on natural gas power plants.) Ultimately, while decarbonizing tens of millions of buildings and vehicles will take several decades – no matter how quickly the state pushes on electrification – decarbonizing the industrial sector can be relatively quick and straightforward. By comparison, the state just needs to address dozens of facilities, mostly in and around a few key regional hubs, to quickly and deeply decarbonize California's industrial sector.

Rocks Provide Infinite and Permanent Carbon Storage

Almost all of earth's carbon – more than 99 percent – is stored naturally through the process of mineralization forming limestone rock. In fact, trillions of tons of CO_2 have been safely and naturally stored in a permanent crystalline form as carbonate mineral in the lithosphere for over 100 million years. Much less than 1 percent of the earth's carbon resides in the atmosphere, biomass and hydrosphere combined.[4]

We appreciate CalPortland's presentation, which highlights the role of CCUS in achieving carbon neutrality in the cement and concrete sectors, as well as other presentations and commenters highlighting the critical role CCUS will play in meeting the State's climate goals. However, much of the state's focus, and that of the other presentations, continues to be on geological sequestration. A limited focus on geological sequestration makes CCUS appear to be a more costly and difficult proposition than it is.

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[2] https://ww3.arb.ca.gov/cc/inventory/data/tables/ghg_inventory_scopingplan_sum_2000-19.pdf
[3] https://www.climateworks.org/programs/carbon-dioxide-removal/getting-to-neutral/
[4] Kayler, Z., Janowiak, M., Swanston, C. (2017). "The Global Carbon Cycle". *Considering Forest and Grassland Carbon in Land Management*. *General Technical Report WTO-GTR-95*. United States Department of Agriculture, Forest Service. pp. 3–9.

For example, Blue Planet's CCUS 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, by avoiding the need to purify and enrich captured CO_2 before use. This reduces the cost and energy needs associated with carbon capture. It is also fully scalable and can be applied to any facility in regions in any part of the state where concrete is utilized, regardless of its proximity or access to a geological sequestration site.

As validated in peer-reviewed research,[5] 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 and requires ongoing public subsidy, CCUS, and in particular carbon storage in concrete, provides a value-added market that can make carbon capture cost effective without additional public subsidy.

If we add CCUS in rocks into our energy and climate planning and policy, we can introduce a game-changing, cost-effective and virtually infinite solution for addressing climate change. We hope that the CEC will fully evaluate the promising opportunities offered by storing carbon in rock in its programs.

Mineralization and other CCUS Strategies Reduce Criteria Air Pollutants, Too

What's more, Blue Planet's mineralization technology captures and stores other pollutants, as well. Based on years of data gathered from our in-field demonstration at the Moss Landing Power plant, the mineralization process captures and reduces 40-100% of toxic air contaminants including mercury, silver, arsenic, cadmium, chrome, copper, nickel, lead, selenium, vanadium, and zinc. It also captures over 50% of NOx and nearly 100% of SOx, which are incorporated as a solid solution in carbonate minerals of limestone at safe concentrations, similarly as they occur in natural limestone where these levels are commonly higher. These pollutants are thus captured and permanently stored in our produced limestone aggregate for permanent storage in concrete – just like CO_2.

Accordingly, the faster and more deeply we deploy CCUS, the faster we will achieve air pollution benefits in the communities in and around industrial operations. We encourage the CEC to work with CARB and other state agencies to deeply evaluate the science on this topic and open a dialogue around it with environmental justice and other community groups. Blue Planet would be eager to support such an evaluation and participate in related conversations.

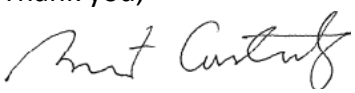
We Look Forward to the Ongoing Dialogue around CCUS

[5] 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

We are grateful for your attention and consideration of our comments and thank you again for hosting this important workshop. We are excited to see CEC looking at CCUS as an important energy and climate solution, and we look forward to engaging in the ongoing workshops and discussions with CEC 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,



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