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Blue Planet Response to the CEC Carbon Management Hub

Please see our attached RFI reply to the CEC request on carbon management hubs. Thank you for this opportunity to comment. Much appreciated!

Additional submitted attachment is included below.

Blue Planet.

January 29, 2025

California Energy Commission
Docket Number: 25-ERDD-01
Project Title: Carbon Management Hub RFI
TN Number: 261197
715 P Street
Sacramento, California 95814

Re: Blue Planet's Response to the California Energy Commission's Carbon Management Hub

Dear Members of the California Energy Commission:

I am writing on behalf of Blue Planet Systems to provide our insights and recommendations in response to the questions posed during the recent CEC Carbon Management RFI. We appreciate the opportunity to contribute to the development of this program, which will play a critical role in advancing breakthrough clean energy and climate change technologies in line with California's ambitious goals.

About Blue Planet

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 all types of industrial CO_2 facilities, including cement production, natural gas power plants, and biofuels production and direct air capture facilities. In addition to CO_2, Blue Planet can sequester particulate matter, NO_x, SO_x and other pollutants hazardous to surrounding communities. We are currently in year three of operations at our demonstration plant in Pittsburg, California on the Sacramento Delta, and we are involved in a strategic collaboration with Marathon Petroleum Corporation to advance the commercialization of our technology.

Blue Planet's technology produces coarse and fine limestone aggregates made from sequestered CO_2 utilizing the carbon mineralization process. It allows lower-cost carbon capture by avoiding the need to purify and enrich captured CO_2 before use, which

reduces 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, regardless of its proximity or access to a geological sequestration site. Recent research out of UC Davis and Stanford, published in *Science*, finds that the built environment offers significant potential to store carbon and advance the state's climate goals. It highlights the potential to store carbon in concrete and aggregates as especially promising.[1] CEC and CARB have also identified carbon mineralization and storage in concrete as a promising solution to advance the state's climate goals.[2,3]

Responses to RFI Questions

1. Please describe your interest in partnering with other entities to apply for DOE funding and outline the role and expertise your organization would contribute to a carbon management hub. Include any relevant experience from prior collaborative projects that could help inform and strengthen a hub-based partnership.

Blue Planet is involved in multiple regional DOE funded hubs, including the Ankeron DAC Hub in the US Pacific Northwest to demonstrate a commercial scale-up potential and a viable pathway for the DOE Carbon Negative Shot target pricing, and the CALDAC Hub located in San Joaquin Valley, CA.

We are interested in participating in additional hubs and working with collaborative and synergistic partners to further advance and showcase permanent CO_2 mineralization into low embodied carbon concrete via our synthetic limestone aggregate. We'd encourage the state to consider establishing a hub in the Los Angeles area to provide low embodied carbon concrete as part of the rebuild for infrastructure and new commercial and residential buildings following the devastating wildfires. The region is home to several large CO_2 emission sources, which could be captured, utilized and stored in the (re)built environment. Financial assistance from CEC or other sources would help accelerate the deployment process and enable local products to support redevelopment in the region. Blue Planet can contribute carbon capture and mineralization technology as an aggregate manufacturer and also mix designs for low embodied carbon concrete, while other innovative companies can bring additional technology and product solutions to support development of a broader carbon management hub.

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[1] https://www.ucdavis.edu/news/storing-carbon-buildings-could-help-address-climate-change
[2] 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
[3] See pg. 10 at: https://esd.dof.ca.gov/Documents/bcp/2223/FY2223_ORG3360_BCP5441.pdf

2. Which types of state-level support beyond grants — such as stakeholder convening, streamlined processes, technical assistance, research access, and community engagement — is your organization most interested in, and which does your organization believe would be most effective for advancing carbon management efforts, particularly with regards to a hub based approach?

Financing assistance is foremost for a carbon capture and sequestration plant. Beyond that the other elements mentioned above would be useful. Assistance in identifying future customers who can provide advance market commitments to help with future plant financing would be beneficial. Resources to advance testing and demonstration projects would help advance our capabilities. We could also use resources to test our products for coastal protection to protect vulnerable shorelines in the states with reefs, seawalls and other mitigation measures that can utilize our low embodied carbon concrete and associated aggregate (sand and coarse).

The state has various active forums or other opportunities to advance strategies to utilize the built environment to help manage and store carbon. In particular:

- CARB should finalize its Net-Zero Emissions Strategy for the Cement Sector, pursuant to SB 596 (Becker), and include a wide array of recommendations to support market demand and financial incentives to encourage the production and use of cement with low greenhouse gas intensity, as required by the law.
- Pursuant to SB 905 (Caballero), CARB should develop new carbon capture, removal, utilization and storage (CCRUS) protocols, including protocols for permanent storage in the built environment via carbon mineralization and storage/utilization in concrete and aggregates. It should incorporate these protocols into the state's climate change programs, including the Low Carbon Fuel Standard, Cap-and-Trade program, and others.
- Pursuant to AB 2446 (Holden) and AB 43 (Holden), CARB should take steps to measure and reduce embodied carbon in new buildings by at least 40% by 2035.
    - In order to minimize costs and ease implementation, and as directed by the law, CARB should utilize environmental product declarations, but also allow use of similarly robust material life-cycle assessment approaches, such as use of the CarbonStar standard.
    - As required by the law, CARB should develop a strategy that includes measures to support market demand and financial incentives to encourage the production and use of materials used in construction-related projects with low greenhouse gas intensity.
    - In developing the strategy, CARB should consider support strategies to enable carbon sequestration in building materials, including the

opportunity for the built environment to become a net sink for carbon emissions (that is, the potential for the built environment to store more carbon than is emitted in the process of producing building materials and constructing buildings.)

- Pursuant to the Pacific Coast Collaborative's Low Carbon Construction Task Force Vision and Action Plan,[4,5] State Buy Clean Partnership through the U.S. Climate Alliance,[6,7] Executive Order N-19-19,[8] which among other things directs CalSTA to leverage their investments to reduce greenhouse gas emissions associated with the transportation sector and DGS to leverage its management and ownership of state buildings to minimize the state's carbon footprint, and agency priorities and activities to reduce embodied carbon,[9,10] Caltrans, DGS, DWR, High Speed Rail Authority, and other relevant agencies should leverage public procurement to advance new technologies, reduce embodied carbon associated with state building projects, and store carbon in the state's roads, buildings, and other infrastructure. In particular, these agencies should:
    - Develop and enter into advance market commitments for novel, ultra-low carbon building materials, so that developers of low carbon building materials can secure financing for developing new facilities or upgrading existing ones,
    - Develop low-carbon public procurement policies (e.g., Buy Clean) for public buildings and infrastructure,
    - Prioritize utilization of salvaged and reused construction materials,
    - Support pilot projects to showcase and advance innovative and best practices using regional and external funding mechanisms, and
    - Collaborate with other subnational partners to create model frameworks, policies, and growing regional markets for low carbon building materials.
- Pursuant to SB 27 (Skinner), the California Natural Resources Agency should incorporate mineralization projects, including carbon storage in concrete, into the California Carbon Sequestration and Climate Resiliency Project Registry.
- In implementing SB 253 (Weiner) and SB 261 (Stern), CARB should encourage companies to utilize and report on carbon management and CCRUS efforts, including carbon storage in the built environment, in order to reduce their Scope

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[4] https://pacificcoastcollaborative.org/low-carbon-construction-task-force-releases-vision-and-action-plan/
[5] https://pacificcoastcollaborative.org/wp-content/uploads/2024/01/PCC-Low-Carbon-Construction-Vision-and-Action-Plan-011124.pdf
[6] https://usclimatealliance.org/member-support/federal-state-buy-clean-partnership/
[7] https://usclimatealliance.org/wp-content/uploads/2024/11/federal-state-partnership-principles.pdf
[8] https://www.gov.ca.gov/wp-content/uploads/2019/09/9.20.19-Climate-EO-N-19-19.pdf
[9] https://dot.ca.gov/programs/engineering-services/low-carbon-materials-initiatives
[10] https://water.ca.gov/News/Blog/2022/Nov-22/Sustainable-Techniques-Bring-Concrete-Results-Making-DWR-Infrastructure-Carbon-Friendly

1, 2 and 3 emissions and reduce their financial risks to the impacts of climate change.
- In updating and implementing CalGREEN building code, state agencies should continue to ratchet down embodied carbon standards as low carbon building materials become available, and develop reach standards that support utilization of building materials with the lowest, and eventually net-negative, levels of embodied carbon.

3. What is the current Technology Readiness Level (TRL) of your technology and/or the development stage of your project (e.g., preliminary front-end engineering and design, demonstration)? Please provide potential outcomes from partnering with your organization, including estimated annual carbon capture capacity (in tonnes per year), description of product (if carbon utilization), co-benefits (e.g., hydrogen or water production), and other relevant details.

Blue Planet is at a TRL level of approximately TRL 5-6. We are pursuing expansion projects that could utilize CEC's rapid assistance. Most urgently, we are focused on expanding our current San Francisco Bay Aggregates plant in Pittsburgh, CA to increase its CO_2 capture capacity from a small demonstration level to approximately 10,000 of CO_2 annually. We already have a 90 foot absorber column on the site and new funds to stand it up and integrate into our five trains of the manufacturing process. This includes hiring the requisite EPC contractor to develop the plans and specifications. We are also interested in quickly moving from that commercial-scale demonstration to developing full, commercial scale projects with our partners.

Blue Planet has substantial interest in the future purchase of our produced product, including a large local precast panel manufacturer, data centers, and San Francisco developments. Our internal concrete lab testing is highly positive, including meeting the requisite ASTM and other industry standards. However, we do not yet have firm offtake agreements, given the early state of our product demonstrations and lack of policy requirements or public procurement mechanisms supporting use of ultra-low carbon building materials. There is an urgent need to help scale our production and create clear market signals for carbon capture and low carbon building materials.

4. What challenges are you currently facing, particularly related to funding (e.g., offsetting construction or operating costs, securing offtake agreements)? What challenges – financial or otherwise - do you anticipate in scaling these technologies within a hub-based approach, and are there any challenges unique to establishing a hub in California?

As mentioned, we greatly need help in funding plant expansion to 10,000 TCO_2/yr CO_2 at our Pittsburg, CA SFBA plant and to enable our progress to commercial-scale projects. These funds would go to CapEx for EPC design and construction costs. We also need support for ongoing operating costs and securing advance market offtake agreements in the State, starting with the governmental agencies - including Catrans and DGS. As mentioned, a rebuild LA hub-based approach would be highly beneficial to the rebuilding efforts. Help with accelerating the pace of establishing a plant to supply low embodied carbon concrete for the region could greatly help lower the carbon footprint of the rebuild and be highly circular.

The normal process is slow and cumbersome and urgency created through financing, aggregating stakeholders and critical path facilitation would help greatly. The Governor's Executive Orders will also help, and others that may be needed to accelerate the massive need in the State.

In conclusion, Blue Planet Systems is committed to contributing to the success of the CEC's future Hubs to help technologies like ours accelerate with urgency to address the massive CO_2 problem, and rebuilding in Los Angeles as a result of the devastating fires. We believe our technology aligns well with the Hub(s) objectives, accelerates the timeline to meet climate goals, and provides substantial economic and environmental benefits for our State.

Thank you for considering our input. We look forward to continued collaboration in working closely with the CEC and in advancing California's clean energy and climate change goals.

Sincerely,

David Gottfried
Chief Commercial Officer
Blue Planet Systems Corporation