



March 20, 2025

The Honorable Dr. Steven Cliff
Executive Officer
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Re: Blue Planet Comments on the February 27, 2025 Workshop, Carbon Sequestration: Carbon Capture, Removal, Utilization, and Storage Program (SB 905)

Dear Dr. Cliff:

Thank you for the opportunity to submit comments on the implementation of Senate Bill 905 (SB 905) and for hosting the February 27, 2025, workshop on the development of the Carbon Capture, Removal, Utilization, and Storage (CCRUS) Program. We greatly appreciate CARB's recognition of the critical role of carbon capture in decarbonizing hard-to-abate sectors and commend the agency's efforts to scale and deploy CCRUS this decade, including carbon dioxide removal (CDR) technologies, to achieve California's carbon neutrality goals. We strongly support the 2022 Scoping Plan's goals to remove 20 million metric tons CO₂e per year (MMTCO₂e/year) of CCRUS by 2030 and 100 MMTCO₂e/year by 2045.

As a California-based company pioneering carbon mineralization technology, Blue Planet strongly supports CARB's efforts to develop a robust CCRUS framework pursuant to SB 905. Carbonate mineralization and storage/utilization in concrete aggregates offers one of the most significant carbon storage opportunities for California, and creates a value added product that can support carbon management at scale. We urge CARB to elevate this solution in its SB 905 framework, and leverage additional policies—including the embodied carbon framework, SB 596 and SB 27 implementation, public procurement, Cap-and-Trade, the Low Carbon Fuel Standard (LCFS), and others—to enable a wide array of CCRUS strategies and leverage the built environment to support California's CCRUS goals. We also offer the following additional recommendations, which are elaborated upon further below:

1. Adopt protocols that recognize a diverse range of CCRUS pathways, including carbonate mineralization, to enable broad industry participation, competition and innovation in carbon management and significant carbon storage opportunities.
2. Advance public procurement policies that prioritize low-carbon and negative-carbon building materials (including aggregate, cement and concrete), ensuring that agencies like Caltrans play a leadership role in accelerating market adoption through pilot testing

projects and advance market commitments to help stimulate and add additional value to CCRUS strategies and supply chains.

3. Address deployment barriers by streamlining permitting processes and creating regulatory clarity, allowing for the timely and efficient commercialization of CCRUS technologies and projects.
4. Incentivize CCRUS technology deployment through tax credits, grants, or other strategies, and ensure equitable treatment for utilization and geologic sequestration approaches.

About Blue Planet

Blue Planet is a California-based company pioneering technology and products for economically sustainable carbon management by converting CO₂ into high-value building materials. Our carbonate mineralization process can be deployed across a wide array of difficult-to-decarbonize industries, including power plants, refineries, cement production and others. Importantly, our technology captures not only CO₂, but also particulate matter, NO_x, SO_x and other pollutants hazardous to surrounding communities. We currently have operations at a demonstration 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 using the CarbonStar Standard (CSA/ANSI R118:24).

Blue Planet's technology produces coarse and fine synthetic limestone aggregate made from sequestered CO₂ utilizing the carbon mineralization process. It allows for lower-cost carbon capture, including from direct air capture or other carbon removal pathways, by avoiding the need to purify and enrich captured CO₂ before use, reducing the cost and energy needs associated with carbon capture. It also can be deployed at scale and free of geographical constraints like proximity to a CO₂ pipeline or geologic sequestration site to successfully manage carbon.

Carbonate Mineralization and Utilization/Storage in Concrete Offers Significant Potential Carbon Sink to Support State's Goals

Carbon capture, mineralization, and utilization as aggregate in concrete, such as the technology developed by Blue Planet, offers tremendous potential not only to eliminate CO₂ emissions from point sources or advance CDR, but also to permanently sequester CO₂ as a value-added product that can support the economics of CCRUS strategies. According to recent research from UC Davis and Stanford published in *Science*,¹ replacing conventional building materials with carbon storing alternatives could sequester as much as ~17 billion tons of CO₂ per year, *or roughly half of current global CO₂ emissions*. The researchers found that carbon storage in aggregates represents, by far, the greatest potential to store carbon in the built environment.

Indeed, storing carbon in concrete will advance the state's goals to reduce embodied carbon and can leverage the built environment to advance California's carbon neutrality goals. These technologies create a pathway to dramatically reduce emissions from hard-to-abate sectors and scale CDR. However, bringing these solutions to market and scaling them requires significant private-sector investment, which depends on CARB, the CEC and other state agencies putting in

¹ <https://www.science.org/doi/10.1126/science.adq8594>

place durable policies and frameworks to deploy projects – such as committed offtake agreements, including advance market commitments – clear protocols, strong market signals, and streamlined regulatory pathways to support their adoption.

While geological sequestration is a well-known approach, it requires access to underground storage sites, which are not always geographically available, economically feasible or have available capacity for many industrial emitters. Carbon mineralization provides a decentralized solution that can be implemented statewide without reliance on specific geologic formations, expensive costs and high energy transportation. Other emerging CDR pathways – including direct air capture (DAC) with CO₂ utilization, biochar, and ocean-based carbon removal – also require regulatory clarity to scale.

Key Recommendations

Below, we offer key, high level recommendations to guide CCRUS market development in California. We look forward to continuing to work with CARB and stakeholders through the CCRUS framework process to refine these proposals and create a strong framework to advance the objectives of the Scoping Plan and SB 905.

I. Adopt Protocols that Recognize a Diverse Range of CCRUS Pathways, including Carbonate Mineralization in Aggregates

As emphasized during the February 27 workshop – and previously in our July 9, 2021, comments related to the Scoping Plan² and validated in peer-reviewed research³ – carbon mineralization is a scientifically validated process that offers permanent carbon storage while creating valuable building materials. Unlike geological sequestration, which requires costly purification, injection and monitoring, mineralization locks CO₂ into a durable product with economic value and circularity, making carbon capture more financially viable.

We appreciate reference in the workshop to CARB’s SB 905 responsibilities, including adopting new protocols to support additional CCUS and CDR approaches. We strongly support CARB adopting a wide array of protocols, especially for scalable solutions like carbonate mineralization and storage in concrete aggregates. Ultimately, to fully enable the commercialization of CCRUS projects, CARB must ensure that SB 905 regulations include a wide array of protocols to accommodate a broad range of CCRUS technologies and strategies, rather than a one-size-fits-all regulatory framework. Many strategies, including durable storage of carbon in the built environment, can help alleviate some concerns associated with other CCRUS pathways identified in the workshop.

² <https://www.arb.ca.gov/lists/com-attach/73-sp22-kickoff-ws-UTMGbFEIVGJQCQd3.pdf>

³ 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>

II. As Part of a Broad CCRUS Framework, include Policies that Support Low- and Negative-Carbon Building Materials and Leverage Existing State Efforts

We appreciate CARB must develop a broad CCRUS framework pursuant to SB 905, including geologic sequestration and other pathways, and we encourage CARB to adopt appropriate frameworks that are unique to a given CCRUS pathway. Carbon storage in rocks, for example, will not require ongoing monitoring for emissions leakage, and quality assurance protocols should be designed accordingly. However, this framework should extend beyond protocol development, and CARB should identify and advance unique market supporting opportunities for additional effective sequestration CCRUS pathways as part of its SB 905 framework.

For CCRUS in building materials, and as highlighted in the panel discussion, public procurement policies can play a transformative role in scaling CCRUS and development of low-carbon construction materials. One panelist noted that nearly 50% of all concrete construction in the country comes from federal or state agencies. As one example, advance market commitments (AMCs) from the public sector can create a market and send a strong demand signal for emerging technologies, helping to de-risk investments and drive private-sector funding for next-generation cement and concrete solutions.

To accelerate the adoption of a broad range of CCRUS strategies, including carbon utilization and storage in the built environment, Blue Planet recommends CARB:

1. Formally incorporate carbonate mineralization and storage in concrete aggregates into the CCS Protocol and LCFS.
2. Adopt the expanded CCS Protocol into the Cap-and-Trade Program, ensuring projects storing CO₂ in aggregates and concrete qualify for market-based incentives.
3. In recommendations pursuant to SB 596, support a public procurement framework that:
 - a. Encourages California state agencies to enter into AMCs for low-carbon building materials, including low carbon aggregate and concrete, and
 - b. Prioritizes the use of building materials that sequester CO₂, including those with low and negative embodied carbon that sequester significantly more CO₂ than is emitted during their production.
4. Elevate the California Carbon Sequestration and Climate Resiliency Project Registry pursuant to SB 27:
 - a. Incorporate a wide array of CDR strategies, including carbonate mineralization.
 - b. Encourage investment in the Registry, including via corporate climate disclosures pursuant to SB 253 and SB 261, as offsets for CEQA compliance purposes, mitigation for GHG compliance violations, or other means.
5. Encourage investments in CCRUS via corporate climate disclosure (including Scope 3 emissions) reporting required via SB 253 and SB 261.
6. In developing the state's framework related to reducing embodied carbon:
 - a. Develop accounting frameworks for embodied carbon that include both emissions associated with producing building materials as well as durable carbon stored in building materials.
 - b. Enable broad and streamlined reporting of embodied carbon in building materials by incorporating multiple certified lifecycle assessment tools. These tools, in

addition to environmental product declarations, should include “similarly robust material life-cycle assessment approaches,” as outlined in AB 2446 and AB 43, such as the CarbonStar Standard (CSA/ANSI R118:24).

- c. Align state procurement policies, building codes, and other policies around the goals of AB 2446/43, SB 905, AB 1279, and the State’s CCRUS goals identified in the Scoping Plan.

III. Address Barriers to Deployment and Streamline Permitting Processes

One of the most pressing challenges raised during the workshop was the permitting obstacles facing companies deploying CCRUS technologies. Panelists emphasized that local permitting offices often lack the technical expertise to evaluate novel low carbon removal and sequestration technologies, causing significant delays as applications are sent to third-party reviewers. For companies relying on private investment, this uncertainty increases financial risk and can hinder project deployment.

To accelerate deployment while maintaining rigorous oversight, CARB should:

1. Clarify the benefits of novel CCRUS technologies that pose minimal environmental risk, and how they may be unique from conventional approaches.
2. Develop clear guidance for local and regional permitting agencies related to unique CCRUS pathways for novel materials, to ensure consistency and avoid unnecessary delays.
3. Consider a state-supported technical review process to assist jurisdictions with limited permitting expertise and accelerate the approval process.

IV. Incentivize CCRUS Technology Deployment and Ensure Equitable Treatment for Utilization and Geologic Sequestration Approaches

To accelerate CCRUS technologies, Blue Planet recommends CARB support robust incentives like tax credits, grants, and market-based mechanisms. These incentives can help offset initial capital costs and operational costs associated with CCRUS projects, which may not otherwise be incentivized in the marketplace. For example, there is currently no financial incentive in the market for sellers of low carbon or carbon-sequestered concrete, outside of voluntary markets or corporate sustainability efforts. Additional incentives, preferred public procurement, and other approaches are needed to scale private sector investment in CCRUS and expedite widespread commercialization.

In considering incentives, CARB should also promote a diverse array of CCRUS technologies and avoid skewing the marketing by incentivizing one technology over another. Federally, under the Section 45Q Carbon Capture Tax Credit, geologic sequestration projects are eligible for a tax credit of \$85 per metric ton.⁴ In comparison, projects that utilize captured carbon dioxide, or use utilization approaches, receive only \$60 per metric ton. This disparity, stemming largely from the assumption that utilization is synonymous with enhanced oil recovery, creates an imbalance that

⁴ https://carboncapturecoalition.org/wp-content/uploads/2023/11/45Q-primer-Carbon-Capture-Coalition.pdf?utm_source=chatgpt.com

inadvertently disadvantages other utilization strategies, such as mineralization, compared to geologic sequestration.

As discussed above, mineralization transforms captured CO₂ into stable carbonates for use in building materials, providing a permanent and potentially large-scale carbon sequestration solution. By prioritizing incentives for geologic sequestration, current policies may overlook the potential of these alternative utilization pathways. As such, CARB should establish technology-neutral incentive frameworks. CARB should consider exploring additional state-level incentives to level the playing field and account for these incentive gaps at the federal level. This could include targeted grants or procurement policies that prioritize innovative carbon-storing materials.

We recommend that differentiated incentives for CCRUS approaches be considered – including incentives prioritized based on social outcomes, like air quality co-benefits, energy efficiency, economic feasibility, and potential to scale – in order to prioritize public investments in the technologies that best align with State priorities. By implementing a well-rounded and equitable incentive system, CARB can cultivate a diverse array of CCRUS technologies, thereby enhancing California's capacity to achieve its both its embodied carbon and carbon neutrality goals while fostering innovation and economic growth within the state.

Conclusion

By adopting a broad and inclusive approach to SB 905 implementation, CARB can ensure that a full suite of carbon management technologies including CCRUS is available to meet California's 2045 carbon neutrality targets while maximizing economic, environmental, and community benefits at the scale requisite to meet this imperative.

Blue Planet strongly supports CARB's efforts to develop a robust CCRUS framework under SB 905. We appreciate CARB's leadership in advancing CCRUS solutions and look forward to continued engagement to support achievement of California's climate and sustainability goals.

Sincerely,

David Gottfried
Senior Advisor
Blue Planet Systems Corporation