

August 3<sup>rd</sup>, 2022

From:  
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Cheryl Laskowski, Ph.D.  
California Air Resources Board  
1001 I Street  
Sacramento, CA 95814

**RE: Low Carbon Fuel Standard (LCFS) should support continued innovation in carbon dioxide removal (CDR)**

Dear Dr. Laskowski:

Brimstone Energy appreciates the opportunity to comment on the July 7, 2022 LCFS workshop. We support amendments to the program that align with the state's climate neutrality goals and maintain a strong and consistent market signal to drive continued innovation around climate change solutions, including CDR strategies.

Brimstone Energy is a California-based company, headquartered in Oakland, developing the world's first carbon-negative Portland cement. Cement is responsible for about the same amount of greenhouse gas emissions as all of the world's cars on the road today. It has traditionally been one of the most difficult materials to decarbonize – until now. We have invented a way to make carbon-negative Portland cement that is identical to conventional cement and lower in cost. Simply put, our process will turn one of the most intractable climate problems into a carbon-negative climate solution.

Our process also produces a magnesium byproduct that passively mineralizes CO<sub>2</sub> from the ocean or air and permanently stores it as magnesite rock. This is a promising, low-cost CDR strategy that could allow Brimstone to eventually remove up to one ton of CO<sub>2</sub> per ton of cement produced. Our approach also could be used as pure carbon sequestration without cement production if a strong market for CDR were developed.

Brimstone is upending the conventional wisdom that CO<sub>2</sub> process emissions are a necessary outcome of cement production and that carbon capture and sequestration and associated high costs and/or subsidies are required to decarbonize the process. We are also proving that CDR and direct greenhouse gas emission reductions at their source can, and should, go hand-in-hand, and need not be considered tradeoffs.

We were excited to see Governor Newsom's letter to Chair Randolph calling for increased climate ambition, including more stringent LCFS targets and new CDR targets, including 20

MMTCO<sub>2</sub>/year by 2030 and 100 MMTCO<sub>2</sub>/year by 2045. While we hope the State will take additional steps to support market development and scale of CDR, including through implementation of SB 27 (Skinner) and inclusion of mineralization in that program, the LCFS is currently the only policy mechanism in place to support CDR strategies. The strong market signal provided by the LCFS is essential for deploying CDR at necessary levels to achieve carbon neutrality and meet the Governor's CDR goals. Until other mechanisms are adopted, the LCFS program will need to serve as the primary mechanism for achieving these goals.

Accordingly, we encourage you to take steps to support innovation and market scalability of CDR strategies through the LCFS, and in particular:

- **Set carbon intensity reduction targets for 2030 and beyond that align with the State's carbon neutrality and CDR goals and account for the necessary role the LCFS will play in achieving them.** We support a detailed analysis of carbon intensity targets and look forward to forthcoming workshops on the topic. We encourage CARB to thoroughly evaluate regulatory requirements, additional market trends, and Scoping Plan goals – including the Governor's new CDR targets – and avoid pre-determining or constraining the analysis ahead of time. We hope CARB will commit to developing carbon intensity targets that align with this analysis, which we expect could suggest that appropriate targets might be greater than a 30% reduction in 2030 and potentially greater than a 100% reduction in 2045.
- **Develop new Carbon Capture and Sequestration protocols that incorporate mineralization of carbon dioxide from air and ocean water using magnesium species to form magnesium carbonates and bicarbonates, and adopt those protocols in the LCFS.** Achieving significant scale of CDR will require deploying a wide array of solutions above and beyond natural and working lands strategies and direct air capture with geologic sequestration. Mineralization is a very promising and scalable strategy to achieve low cost and low energy use CDR and permanent sequestration, and CARB should enable its use in the LCFS. CARB should define CDR to include carbon dioxide removal from both air and ocean water. Removing carbon from the ocean may offer lower cost and additional CDR opportunities, including from mineralization of magnesium species.

Thank you again for the opportunity to comment on the workshop proposals. We look forward to working with you and other stakeholders in the coming months to support a renewed, strengthened LCFS that will keep the state on track to meet and exceed its climate goals. Please do not hesitate to reach out if you have any questions about Brimstone Energy or these comments.

Thank you,

**Cody Finke**  
**Co-Founder and CEO**  
**Brimstone Energy**