



November 30, 2022

Mark Sippola, Ph.D.
California Air Resources Board
1001 I Street
Sacramento, CA 95814

RE: Comments on Kick-off Workshop for SB 596 Cement Sector Net-Zero Emissions Strategy

Dear Dr. Sippola:

Brimstone appreciates the opportunity to participate in, and comment on, the October 20, 2022 Kick-off Workshop for the SB 596 Cement Sector Net-Zero Emissions Strategy (Cement Sector Strategy). The cement sector, which has long been considered “hard to abate,” offers a unique opportunity to lead the way to net-zero, and even net-negative emissions. We look forward to working with CARB, other state agencies, and a wide array of stakeholders through this process and related efforts to develop an effective Cement Sector Strategy that will put the state on the path to meet and exceed the goals of SB 596 and the objectives of achieving carbon neutrality and net-negative greenhouse gas emissions statewide, as soon as possible.

Summary of Recommendations

We hope you’ll consider the following observations and recommendations as you develop the Cement Sector Strategy. These are explained in greater detail below.

- Support the most rapid and significant sector-wide emissions reductions, including from new market entrants
- Hold imported cement to similar standards as in-state production
- Maintain a level playing field in the market-place, and avoid incentivizing the production and capture of CO₂ at the expense of technologies that do not produce CO₂ in the first place
- Develop guaranteed and bankable demand-side policies, akin to the Low Carbon Fuel Standard or clean power purchase agreements, to support the use of low carbon cement, including:
 - Forward guaranteed procurement of low-carbon cement,
 - Incorporating cement and/or concrete into the State’s Buy Clean framework, and/or
 - Developing a Low Carbon Product Standard for cement and/or concrete

About Brimstone

Brimstone is a California-based company, headquartered in Oakland, with a carbon-negative process for making ordinary portland cement, which we expect to sell at cost-parity or better. Cement has nearly the same greenhouse gas impact as all of the world's cars on the road today, and it has traditionally been one of the most difficult materials to decarbonize – until now.

We have invented a way to make portland cement that is identical – chemically and physically – to conventional cement, through a process that results in less CO₂ in the air, not more. At scale, it will sell at or below the prices of traditionally-made cement. Simply put, our process will turn one of the most intractable climate problems into a carbon-negative climate change solution.

Our process produces ordinary portland cement from calcium silicate rocks, which do not contain CO₂, rather than limestone. It avoids any process emissions associated with producing portland cement, and also produces a magnesium byproduct that passively mineralizes CO₂ from the ocean or air and permanently stores it as magnesite rock.

This offers a scalable, low-cost carbon removal strategy that could allow Brimstone to eventually remove up to one ton of CO₂ per ton of cement produced. Given that the world produces 4.3 billion tons of cement every year, our process could contribute significantly to the carbon removal targets established in the Final 2022 Scoping Plan Update. Our approach also could be used as pure carbon sequestration without cement production, if a strong market for carbon removal were developed.

Brimstone is upending the conventional wisdom that CO₂ process emissions are a necessary outcome of cement production and that carbon capture and sequestration (CCS) and associated high costs and/or subsidies are required to decarbonize the traditional process. We are also proving that carbon removal and direct greenhouse gas emission reductions at their source can, and should, go hand-in-hand, and need not be considered tradeoffs.

Support the most rapid and significant sector-wide emissions reductions, including from new market entrants

We urge CARB to create a framework for the cement sector that goes beyond the minimum letter of the law (eg, 40% reduction in emissions by 2035), to drive greater and continual progress from the sector. Such a framework should create incentives for even deeper emission reductions to drive innovation, as well as align our state approach with federal incentives for carbon capture, removal, utilization and storage (CCRUS), including those available under the federal Inflation Reduction Act. In particular, amendments to the Cap-and-Trade Program and Low Carbon Fuel Standard (LCFS) can establish stronger market signals for continual emissions reductions in the

sector, through the design of allowance allocation and including CCRUS protocols in both programs that expressly incorporate carbon mineralization, including as magnesite rock. CARB could also develop a low carbon cement standard, which would create a similar program to LCFS or Cap-and-Trade, but only for credits produced within the cement industry.

Importantly, CARB's Cement Sector Strategy should reject a limited focus on decarbonizing existing plants, which would lock in the use of conventional processes and technologies and limit innovation. By taking a sector-wide approach and driving emissions reductions through performance-based policies, CARB can support the widest array of strategies and competition to decarbonize the sector most quickly and deeply.

Hold imported cement to similar standards as in-state production

Per SB 596, CARB must develop a framework that avoids emissions leakage and holds imported cement to a similar emissions standard as in-state production. We strongly support this provision of law and look forward to working with CARB and other stakeholders to implement it in a manner that supports economic activity and business in California, while reaching a broader set of market players beyond California's borders to deliver additional emissions benefits.

Maintain a level playing field in the market-place, and avoid incentivizing the production and capture of CO₂ at the expense of technologies that do not produce CO₂ in the first place

As CARB develops the Cement Sector Strategy, as well as a CCRUS framework pursuant to SB 905 (Caballero, Chapter 359, Statutes of 2022), it is important to ensure a level playing field and that those frameworks – and potential incentives associated with CCRUS – do not advantage technologies that produce CO₂ and subsequently sequester it over those designed to avoid those emissions altogether. Coupled with the recent increase in the federal 45Q tax credit for CCS, legacy emitters could potentially make money by producing CO₂ only to capture it, and thereby gain an advantage compared to technologies from Brimstone and others designed to dramatically cut CO₂ production or avoid it altogether. This perverse incentive may grow further if California further incentivizes CCRUS through other programs, such as Cap-and-Trade.

As you implement these policies, we urge you to carefully look at the costs associated with CCS of the process emissions from cement production and federal and state CCS incentives to ensure a level playing field for new low-carbon or carbon-neutral technologies. Specifically, we request that you ensure that (1) entities are not incentivized to produce CO₂ (that is, incentives do not exceed costs of CCS) and (2) conventional CO₂-intensive processes and technologies are not being supported at a greater level than new low-carbon or carbon-neutral technologies. Put simply, if a company is paid \$130/MTCO₂ to produce and capture CO₂, Brimstone and similar

companies that avoid producing CO₂ in the first place should receive a similar incentive for CO₂ avoided.

Develop demand-side policies to support the use of low carbon cement

We hope that CARB will evaluate and support new policies in the Cement Sector Strategy that not only support the production of low carbon cement, but also its use. In particular, incorporating cement and concrete into the State's Buy Clean framework or developing a low carbon product standard for cement or concrete – similar to the LCFS for transportation fuels – would create strong, additional market signals for the purchase and use of low carbon cement.

Critically, the State should consider forward procurement of very low-carbon cement and concrete as a means of foster a market for solutions that drive cement emissions even lower. For example, if Caltrans or other public agencies agree to procure low-, zero-, or negative-carbon cement and concrete at market rates when available in the future (for example, five years from now), it would provide increased market certainty and financeability for new entrants like Brimstone to scale up more quickly and accelerate industrial decarbonization. (To be clear, Brimstone and other new companies do not need advanced payment, they just need advanced commitment to payment so they make take that contract to a bank and receive financing to build a plant.) Indeed, pairing forward procurement with Buy Clean or a low carbon product standard could serve as a powerful policy driver for even more rapid innovation and accelerated carbon reducing strategies from the traditional sector.

We look forward to participating in this process

Thank you again for the opportunity to participate and comment in this initial workshop. We look forward to working with you and other stakeholders in the coming months to support development of a Cement Sector Strategy that will lead to the greatest, most rapid greenhouse gas emission reductions and demonstrate that emissions in even the most “hard-to-abate” sectors can be quickly and completely eliminated once we put our minds to it.

Please do not hesitate to reach out if you have any questions about Brimstone or these comments.

Thank you,

Cody Finke
Co-Founder and CEO
Brimstone