



June 30, 2023

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

RE: Comments on May 31, 2023, Cement Sector Net-Zero Emissions Strategy Workshop

Dear Dr. Sippola:

Brimstone appreciates the opportunity to comment on the May 31, 2023 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 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.

About Brimstone

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

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.

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 together, and need not be considered tradeoffs.

Principles for decarbonizing California’s cement sector

In our comments pursuant to the fall workshop, we offered several recommendations for developing the Cement Sector Strategy. Building on those high-level comments, we suggest the following principles to guide development of the Cement Sector Strategy:

- The definition of cement should not assume production from limestone
- Support the most rapid and significant sector-wide emissions reductions possible, including from new market entrants
- Hold imported cement to similar standards as in-state production
- Maintain a level playing field in the marketplace, and avoid:
 - Incentivizing greenhouse gas emissions reductions at existing facilities over development of new, low carbon cement facilities
 - Incentivizing the production and capture of CO₂ at the expense of technologies that do not produce CO₂ in the first place
- Develop enabling policies supporting demand for low carbon cement (and concrete) products
 - These policies should enable low-carbon cement suppliers to obtain guaranteed and bankable purchase agreements
 - Most critically, as part of a demand-support strategy, advance market commitments are critical for enabling new technologies and ultra-low carbon solutions to reach the market and scale
- Develop enabling policies to support low carbon cement projects and facilities

Definition of cement should not assume production from limestone

CARB’s current definition of cement in the Cap-and-Trade Program and Mandatory Reporting Regulation does not include Brimstone’s technology, even though Brimstone produces the same material as conventional cement producers—ordinary portland cement. Our product is chemically, physically, and functionally identical to ordinary portland cement produced from limestone. As proposed at the workshop, we support a definition that includes materials meeting the requirements of ASTM C150, C595 or C1157, or a similar cement definition inclusive of our technology.

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 carbon capture, removal, utilization and storage (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 carbon capture and sequestration (CCS) – 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 strategies to incentivize and demonstrate new, low-carbon cement technologies

SB 596 requires CARB to evaluate measures “to provide financial support and incentives for research, development, and demonstration of technologies to mitigate emissions of greenhouse gases from the production of cement with the objective of accelerating industry deployment of those technologies.” We encourage CARB to consider targeted strategies to provide financial support for emerging technologies, including those that do not produce CO₂ via process emissions, through the Cap-and-Trade program, other mechanisms identified above, and through recommendations for targeted state incentives. We note that CCS is a well-supported technology through federal incentives already, as well as avoided Cap-and-Trade costs (assuming CARB amends the program to incorporate CCS), so we encourage CARB to consider a separate set of strategies and incentives to encourage development of low carbon cement operations that do not rely on CCS.

Develop demand-side policies to support the use of low-carbon cement, most critically, Advance Market Commitments

SB 596 also requires the Cement Sector Strategy to evaluate measures to support market demand and financial incentives for the production and use of low carbon cement. In addition to measures to support low carbon cement projects and facilities identified above, we hope CARB will recommend measures to support the use of low-carbon cement products. We are excited by proposals to modify building codes to require the use of low carbon cement and concrete, and otherwise to reduce the embodied carbon of construction. Moreover, state agencies, and specifically Caltrans, are by far the largest consumers of cement and concrete in California. Accordingly, they have tremendous market power, which should be leveraged to support and enable the objectives of SB 596. This includes a range of potentially valuable public procurement policies, such as incorporating cement and concrete into the state’s Buy Clean framework, specifying the use of low carbon cement in public projects, or including incentives for the use of low carbon cement in public projects.

Most critically, the State should create a pathway for agencies to enter advance market commitments to procure very low-carbon cement and concrete to foster a market for solutions that drive cement emissions even lower. Indeed, pairing this type of 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.

Brimstone is a member of the Decarbonized Cement and Concrete Coalition (DC2), and supports their comments regarding the role that 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), which would increase market certainty and financeability for new entrants like Brimstone to scale up more quickly and accelerate industrial decarbonization. This is the most powerful tool the state could deploy to accelerate commercialization of transformational cement solutions. These advanced market commitments (also referred to as offtake agreements) would not require any outlay of state funds until the materials are actually produced. But they would unlock the industrial-scale capital from private financial institutions needed for low-carbon cement suppliers to bring their solutions to the market.

Develop a broad set of policies to support low-carbon cement projects and facilities

We urge CARB to create a framework for the cement sector that drives carbon emissions from cement well below the legal minimum (i.e., a 40% reduction in emissions by 2035). The framework should prioritize incentives for even deeper emission reductions – to drive innovation, as well as align our state approach with federal incentives for CCRUS. In the Cement Sector Strategy, CARB should recommend specific actions to accelerate development of low-carbon cement projects and facilities, including:

- Amending the Cap-and-Trade Program to establish stronger market signals for continual emissions reductions in the sector, and technology-neutral incentives for accelerated development of low carbon cement projects and facilities.
- Through implementation of SB 905, develop new CCRUS protocols that expressly incorporate carbon mineralization, including as magnesite rock.
- Amend the Low Carbon Fuel Standard (LCFS) and Cap-and-Trade program to adopt the CCS protocol and incorporate new CCRUS protocols automatically once they are finalized.
- Develop incentives for fuel switching in the cement sector, either by allowing cement facilities to opt into the LCFS to generate credits for the use of low carbon fuels or through amendments to the Cap-and-Trade Program to incentivize the use of low carbon fuels in the cement sector.
- Support new low carbon cement projects through financial or tax incentives, streamlined permitting, and agency coordination.

Importantly, CARB's Cement Sector Strategy should resist a limited focus on the incumbent industry or on decarbonizing existing plants. This would lock in conventional processes and technologies, limit innovation, and mean a longer road to commercialization for the most

promising, transformational solutions on the horizon. By taking a sector-wide approach and reducing emissions through performance-based policies, CARB can support the widest array of strategies and competition to decarbonize the sector most quickly and deeply.

Conclusion

Thank you again for the opportunity to comment on this workshop and the Cement Sector Strategy. 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 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,

Simon Brandler
Vice President of Policy
Brimstone