



IN BRIEF

SB 596 requires the California Air Resources Board (CARB) to establish a strategy to reduce greenhouse gas (GHG) emissions in the cement and concrete industries by 40% (from 2019 levels) by 2030 and to achieve carbon neutrality no later than 2045.

BACKGROUND

Concrete is the most widely used building material in the world.¹ On a global basis, it represents approximately 7% of all CO₂ emissions² and it is often referred to as one of the most important but “hard to abate” industrial sectors.

Concrete is a mixture of cement (for binding), aggregates (sand, rocks, etc.), water, and air. In a typical mix, the cement represents 10-15% of the material by volume but 80-90% of the lifecycle CO₂ emissions for the concrete. (The remainder of emissions comes from quarrying, transporting, and preparing the other raw materials.) In 2017, cement production in California accounted for 1.8% of California’s GHG emissions.³ The emissions from making cement are approximately 40% from energy use (for heating and driving the processing) and 60% from the chemical reaction that occurs in making the cement (known as “process emissions”). Higher efficiency or switching to low-carbon energy inputs can only reduce the 40% of emissions associated with energy use. Reducing the process emissions would require reducing the amount of cement that is produced, switching to lower carbon cement formulations, or capturing the CO₂ released during the chemical process.

Concrete is mixed in a wide variety of formulas to meet different building requirements for strength and other properties, and those variations in mix can have significant impact on the CO₂ emissions per quantity of concrete. Cement can also be mixed with other binding materials with a smaller carbon footprint (such as ground limestone) to reduce the total emissions for concrete while maintaining equivalent performance parameters.

¹ Carbon180, “Paving the Way for Low-Carbon Concrete”:

<https://static1.squarespace.com/static/5b9362d89d5abb8c51d474f8/t/5fd95907de113c3cc0f144af/1608079634052/Paving+the+Way+for+Low-Carbon+Concrete>

² McKinsey, “Laying the Foundation for Zero-carbon Cement”:

<https://www.mckinsey.com/industries/chemicals/our-insights/laying-the-foundation-for-zero-carbon-cement>

³ CARB:

https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2017/ghg_inventory_trends_00-17.pdf

THE PROBLEM

Cement and concrete are vital to building roads, bridges, buildings, and even the infrastructure used to decarbonize the electrical grid or support low-carbon public transportation options, but they are also a major source of GHG emissions. Cement production and concrete use is expected to grow by as much as 40% by 2040 in California,⁴ so unless we tackle emissions from this industry, they will become a growing share of California’s total GHG emissions.

Cost-effective technologies and processes exist for achieving large reductions in emissions from concrete and cement, but they have usually not been deployed at scale because there has been insufficient demand from customers or regulatory requirements to deploy these solutions. In a highly competitive industry with very tight margins, there are strong reasons not to adopt low-carbon approaches if they will put a company at a competitive disadvantage.

Currently, the only state policy that attempts to reduce emissions within the concrete and cement industry is the cap-and-trade program. By putting a price on CO₂ emissions from cement plants, this creates an incentive to lower emissions. However, with cap-and-trade market prices consistently below \$20/ton CO₂, the incentive has not been high enough to encourage substantial changes. And by focusing only on cement, it does not encourage the use of concrete mixes that could reduce the emissions intensity of the end product by substituting other, lower-carbon binding materials for a portion of the cement.

THE SOLUTION

SB 596 requires CARB to establish a strategy to reduce lifecycle GHG emissions from the use of concrete and cement in California by 40% (from 2019 levels) by 2030 and to achieve carbon neutrality no later than 2045. To achieve those targets, it directs CARB to develop standardized ways for calculating lifecycle emissions and producing a GHG emissions intensity metric that can be compared across different mixes and strength classes of concrete or cement. This will allow the state and the industry to focus on reducing the emissions intensity within the industry steadily over time even as total production may increase (or decrease) from year to year.

⁴ ClimeWorks, “Deep Decarbonization Roadmap for the Cement and Concrete Industries in California”: <https://www.climeworks.org/wp-content/uploads/2019/09/Decarbonization-Roadmap-CA-Cement-Final.pdf>

The bill also directs CARB to consider (but does not require) a low-carbon product standard for concrete or cement similar to the Low-Carbon Fuel Standard (LCFS), which has been used very successfully to drive reductions in the carbon intensity of transportation fuels and fosters a vibrant clean fuels industry in California. A low-carbon product standard provides a technology-neutral and market-oriented way to provide incentives for industry participants to adopt technology or process changes to achieve an overall reduction in industry emissions intensity in the most cost-effective way possible.⁵ The strong financial incentives provided by the LCFS, for example, have helped encourage investment in electric charging infrastructure or lower-carbon liquid fuels that would have been too expensive to compete with standard transportation fuels without the market credits. The LCFS achieves this without taxpayer money paying to subsidize those changes, and applies lifecycle scores to all fuels sold in California (imported or produced in-state) to maintain a level playing field. While suggesting a similar approach for concrete and cement, the bill leaves CARB the flexibility to adopt the most effective means of achieving the emissions reduction targets if CARB determines that there are better options than a low carbon product standard.

Besides GHG emissions, cement plants are also a major source of local air pollution. To address this, the bill encourages CARB to prioritize actions that reduce adverse air quality impacts and support economic and workforce development in communities neighboring cement plants. The bill also specifically requires that at least one community located next to a cement plant be chosen for a community emissions reduction program under CARB's Community Air Protection Program.⁶

SUPPORT

NRDC

⁵ See Rhodium Group, "Clean Products Standard: A New Approach to Industrial Decarbonization": <https://www.rhg.com/research/clean-products-standard-industrial-decarbonization/> and World Resources Institute, "Designing Low-Carbon Product Standards for Cement and Steel in the United States": <https://www.wri.org/blog/2021/03/insider-designing-low-carbon-product-standards-cement-and-steel-united-states>

⁶ <https://ww2.arb.ca.gov/capp>