
SENATE COMMITTEE ON APPROPRIATIONS

Senator Anthony Portantino, Chair
2021 - 2022 Regular Session

SB 596 (Becker) - Greenhouse gases: cement and concrete production

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Urgency: No

Hearing Date: May 17, 2021

Policy Vote: E.Q. 5 - 1

Mandate: No

Consultant: Ashley Ames

Bill Summary: This bill would require the California Air Resources Board (CARB) to establish a strategy to reduce greenhouse gas (GHG) emissions in the cement and concrete industries by 40 percent (from 2019 levels) by 2030 and to achieve carbon neutrality no later than 2045.

Fiscal Impact:

- CARB estimates initial costs of \$2.4 million in the first year and \$2 million annually thereafter (Cost of Implementation Account) to develop a strategy, including developing lifecycle GHG reporting and tracking mechanisms for all cement and concrete used in California, measuring the GHG intensity of concrete used in 2019 to establish a baseline, and identify modifications to existing measures and develop new measures to achieve the objectives.
- Unknown but significant ongoing cost pressure (special fund) for CARB to implement any program that may be developed as a result of this strategy.

Background: Concrete is a mixture of cement (a binder usually made from lime or calcium silicate), aggregates (sand, rock, etc.), water, and air. In a typical mix, the cement represents 10-15% of the material by volume but 80-90% of the life cycle CO₂ emissions for the concrete. Cement is made by grinding clinker, an intermediary nodular material produced from heating limestone and clay in a rotary kiln to about 2700 °F. Most of the energy used in cement manufacturing is in clinker production. The remainder of emissions comes from quarrying, transporting, and preparing the other raw materials.

Cement accounts for 1.8 percent of California's GHG emissions and 7 percent of CO₂ emissions worldwide. California is the second largest cement producing state after Texas, accounting for 10-15 percent of the cement production and industry employment in the US as of 2009.

The state currently regulates emissions from the nine cement plants in the state through the Cap-and-Trade Program.

Cap and Trade. Cap-and-trade is one commonly discussed market-based approach to reducing GHG emissions. (The other market-based approach most commonly discussed is a carbon tax.) Cap-and-trade differs from other regulatory approaches, such as traditional command-and-control regulations. Under traditional regulations for reducing emissions, government requires businesses to install a certain type of emission reduction technology or meet a certain minimum emissions standard. In

contrast, a market-based approach like cap-and-trade adds a financial cost to producing GHGs, which provides a financial incentive for private businesses and consumers to reduce emissions. The private sector has flexibility to determine which emission reduction activities are least costly and whether the costs of the activities are less than the financial cost of continuing to emit GHGs.

As a result of the Global Warming Solutions Act of 2006 (Chapter 488 [AB 32, Núñez/Pavley]) CARB developed California's cap-and-trade regulation, which places a "cap" on aggregate GHG emissions from large emitters, such as large industrial facilities, electricity generators and importers, and transportation fuel suppliers. Capped sources of emissions are responsible for roughly 80 percent of the state's GHGs. To implement the program, CARB issues a limited number of allowances, and each allowance is essentially a permit to emit one ton of carbon dioxide equivalent. Entities can also "trade" (buy and sell on the open market) the allowances in order to obtain enough to cover their total emissions. Covered entities can also purchase "offsets" generated from projects that reduce emissions from sources that are not capped.

There is a broad consensus among economists that economy-wide carbon pricing—such as cap-and-trade or a carbon tax—is the most cost-effective way to reduce emissions.

CARB Scoping Plans. The latest scoping plan, released in 2017, did not include limitation on GHG emissions associated with concrete used in California. However, for industrial emissions as a whole, it did include potential or proposed solutions, including creating a market for low carbon intensity products.

The 2022 Scoping Plan Update will evaluate how to further decarbonize large energy intensive industry such as cement and how existing policies could be potentially leveraged, or new ones designed, to support a phase out of fossil fuel combustion that would deliver GHG and local air quality benefits.

Markets for Low Carbon Intensity Products. One example of a low carbon intensity product market in California is the Low Carbon Fuel Standard (LCFS). CARB adopted the LCFS regulation in 2009 and began implementing it in 2010. The primary purpose of LCFS is to reduce GHG emissions by reducing the carbon intensity (CI) of fuels used in California and to diversify the fuel mix to enable long-term decarbonization of the transportation sector.

The program establishes statewide CI standards for transportation fuels supplied in California. Carbon intensity is measured as GHGs per unit of energy (technically, grams of carbon dioxide equivalent per megajoule). The standards become more stringent annually through 2030, thereby requiring a reduction in average statewide fuel CI.

Unlike most other state climate regulations, the LCFS measures GHG emissions on a lifecycle basis. This includes direct emissions related to combusting the fuels (tailpipe emissions), as well as producing and transporting the fuels (upstream emissions). It also includes indirect emissions associated with changes in land use from producing crop-based biofuels, such as ethanol from sugarcane or corn. In contrast, CARB's GHG inventory does not include carbon dioxide emissions related to biofuels or upstream emissions from fuels that are imported from out-of-state.

CARB has approved hundreds of different fuel “pathways,” which assign an estimated CI to different fuels based on where they come from and how they are produced.

The program has some additional benefits related to reductions in co-pollutants, such as NO_x and PM. CARB estimates that LCFS will decrease annual NO_x emissions by over 1,500 tons and PM_{2.5} emissions by more than 200 tons. (This amount is less than 1 percent of statewide NO_x emissions and less than 2 percent of statewide PM_{2.5} emissions.) On the other hand, there may be some adverse environmental effects—such as erosion and habitat loss—associated with expanding the amount of land used to produce biofuels.

Externalities Associated with Cement Manufacturing. Externalities are costs or benefits that affect someone other than the buyer and seller, and they often occur as a side effect or consequence of an industrial or commercial activity. Since the buyer and seller are not affected by the externality and they determine a product’s price, the externality is not reflected in the market price. Pollution is a traditional example of a negative externality.

Cement kilns release numerous harmful pollutants, including nitrogen oxides, sulfur dioxide, and particulate matter. Research shows that local air pollution from cement kilns are both damaging to the environment and cause numerous adverse health effects, including heart and lung disease. Communities near these cement kilns, especially low-income communities, bear the largest brunt of these health issues.

In a recent UC Davis study, researchers quantified the cost of climate change impacts and death and illness from air pollution associated with concrete production. They found that, globally, concrete production causes about \$335 billion per year in damages, a large fraction of the industry value.

Proposed Law: This bill would:

1. Make findings and declarations regarding the potential for the California cement and concrete industry to implement technologies and practices to reduce GHG emissions in order to lead and accelerate the commitments made by trade associations representing cement producers to achieve carbon neutrality.
2. State that it is the intent of the Legislature that attaining net-zero or net-negative emissions of GHG from the cement and concrete sector in a manner that enhances California’s competitiveness, supports high-paying jobs, improves public health, and aligns with local community priorities to become a pillar of the state’s strategy for achieving carbon neutrality.
3. Define “low carbon product standard” as a technology-neutral and performance-based standard to reduce the GHG intensity of products sold in California over time on a life-cycle basis.
4. Require ARB by December 31, 2022, to develop a comprehensive strategy for California’s cement and concrete sector to reduce the carbon intensity of concrete used in the state by at least 40% from 2019 levels by 2030 and to achieve carbon neutrality as soon as possible, but no later than 2045. In developing strategy, would require ARB to:

- a. Develop life-cycle GHG emissions reporting and tracking mechanisms for cement and concrete used in California.
- b. Evaluate the average GHG intensity of concrete used within the state during 2019 to establish a baseline from which to measure reductions.
- c. Identify modifications to existing measures and evaluate new measures, including a low-carbon product standard for concrete or cement, to achieve those objectives.
- d. Prioritize actions that reduce adverse air quality impacts and support economic and workforce development in communities neighboring cement plants.
- e. Include provisions to minimize and mitigate potential leakage.
- f. Coordinate and consult with other state agencies, districts, and experts in academia, industry, and public health, and with local communities.
- g. Prioritize actions that leverage federal incentives where applicable.
- h. Evaluate measures to support the use of building materials with low embodied GHG emissions, including low-carbon concrete utilizing cement with net-zero or net-negative GHG emissions.
- i. Select one or more communities located adjacent to a cement plant for a community emissions reductions program pursuant with specifications in the Facility Toxic Air Contaminant Risk Reduction Audit and Plan.

Related Legislation:

AB 966 (Bonta, 2019) would have required the state's cement plants to submit a facility-specific Environmental Product Declaration to ARB to disclose the environmental impacts of the plant. AB 966 died in the Assembly Appropriations Committee.

AB 1452 (Skinner, 2009) would have required ARB to develop and adopt limitations on GHG emissions that result from the production of all cement sold in the state. AB 1452 died in the Assembly Appropriations Committee suspense file.

Staff Comments:

Not a Cost Effective Method for Reducing GHG Emissions. Economists generally consider economy-wide carbon pricing, such as cap-and-trade, to be a more economically efficient method for reducing emissions than carbon intensity standards. Existing programs in California support this idea. For example, market prices for LCFS credits are currently about \$200 per ton. Credit prices reflect market expectations about the marginal costs to meet the CI standard. Notably, the marginal costs are more than ten times higher than the state's cap-and-trade program, where the market price for allowances is currently about \$17 per ton. It is also worth noting that credit prices are

about three times higher than the level of CARB's recently adopted 2021 allowance price ceiling (\$65) for the cap-and-trade program, which AB 398 directed CARB to implement as a way to limit program costs.

Moreover, intensity standards provide relatively little incentive to reduce emissions by reducing consumption of GHG-intensive goods. In contrast, carbon pricing can encourage emissions reductions in a variety of ways—including reducing the carbon intensity of fuels as well as reducing the overall amount of fuels that are consumed.

Program Overlap Increases Costs. Multiple programs with the same or similar objectives tend to increase administrative overhead costs for achieving an outcome. Program overlap may also increase costs for consumers. For example, under LCFS, gasoline and diesel fuel suppliers have to pay for both LCFS credits and cap-and-trade allowances. Most or all of the costs of purchasing credits and allowances are likely passed on to fuel consumers in the form of higher retail prices. This would likely also be the case for carbon intensity standards for cement and concrete.

Addressing Negative Externalities. Some policies that are not cost effective for GHG emission reduction might still be worthwhile based on the other benefits they provide (such as reducing co-pollutants). These policies should be effectively targeted toward achieving non-GHG benefits, and the policy's overall benefits should outweigh the costs. The committee may wish to consider if the strategy that would be developed as a result of this bill (1) would achieve some other significant benefits—beyond California GHG reductions—that cap-and-trade does not and (2) whether these additional benefits would outweigh higher program and administration costs.

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