Office of Senate Floor Analyses
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THIRD READING

Bill No: SB 596
Author: Becker (D)
Amended: 3/4/21
Vote: 21

SENATE ENVIRONMENTAL QUALITY COMMITTEE: 5-1, 4/29/21
AYES: Allen, Gonzalez, Skinner, Stern, Wieckowski
NOES: Dahle
NO VOTE RECORDED: Bates

SENATE APPROPRIATIONS COMMITTEE: 5-2, 5/20/21
AYES: Portantino, Bradford, Kamlager, Laird, Wieckowski
NOES: Bates, Jones

SUBJECT: Greenhouse gases: cement and concrete production

SOURCE: Natural Resources Defense Council

DIGEST: This bill requires the California Air Resources Board (ARB) 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.

ANALYSIS: Existing federal law sets, through the Clean Air Act (CAA) and its implementing regulations, National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: ground-level ozone, particulate matter, carbon monoxide, lead, sulfur dioxide, and nitrogen dioxide. (42 U.S.C. §7401 et seq.)

Existing state law, under the California Global Warming Solutions Act of 2006 (Health and Safety Code (HSC) §38500 et seq.):

1) Establishes the ARB as the state agency responsible for monitoring and regulating sources emitting GHG.

2) Requires ARB to approve a statewide GHG emissions limit equivalent to the statewide GHG emissions level in 1990 to be achieved by 2020 (AB 32, Nunez, Chapter 488, Statutes of 2006) and to ensure that statewide GHG emissions are reduced to at least 40% below the 1990 level by 2030. (SB 32, Pavley, Chapter 249, Statutes of 2016)

3) Requires ARB to prepare and approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions and to update the scoping plan at least once every five years.

4) Requires ARB when adopting regulations, to the extent feasible and in furtherance of achieving the statewide GHG emissions goal, to do the following:

   a) Ensure that activities undertaken to comply with the regulations do not disproportionately impact low-income communities.

   b) Ensure that activities pursuant to the regulations do not interfere with efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminant emissions.

   c) Consider overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health.

   d) Consider cost-effectiveness of these regulations.

This bill:

1) Makes 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) States 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) Defines "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) Requires 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, requires 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.

Background

1) *Concrete and Cement*. 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 CO_2 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.

California is the second largest cement producing state after Texas, accounting for 10-15% of the cement production and industry employment in the US as of 2009. As of 2019, there were eight cement plants in California and more than 300 concrete manufacturing plants. Most of the cement used in California is produced in state. Cement and clinker production is expected to increase significantly in California as the population and economy grow.

2) *Concrete GHG Emissions.* Cement accounts for 1.8% of the California's GHG emissions and 7% of CO_2 emissions worldwide. It is often referred to as one of the most "hard to abate" industrial sectors. Cement plants are also the largest consumer of coal in the state. In 2015, 51% of fuel combustion and energy for California's cement industry came from coal while 12% came from electricity. Due to the high heat required, full electrification is difficult. GHG emissions decreased 20% between 2000 and 2015, mainly due to a decrease in production, however they have slowly been rising again since. According to an Energy Innovation Report, California won't meet 2030 GHG emission reduction goals unless heavy industry like cement producers reduce their emissions. The report notes that this would require plant retrofits, major changes to infrastructure, and would likely lean heavily on technologies that haven't yet been deployed at scale in California, like carbon capture and storage.

3) *Cement Decarbonization Roadmap*. The GHG emissions from making cement are approximately 40% from energy use (for heating and driving the processing) and 60% from the chemical reaction that occurs when limestone is heated at high temperatures to make cement, known as "process emissions."

In 2019, Global Efficiency Intelligence, an environmental consulting firm, published a report called *Deep Decarbonization Roadmap for the Cement and Concrete Industries in California*. They identified four key decarbonization levers for the cement industry. In order of greatest reduction potential to least, they are (a) carbon capture, utilization, and storage (CCUS) – capturing and compressing CO_2 emitted during cement production to be permanently stored; (b) clinker substitution – replacing conventional Portland cement clinker with supplementary cementitious materials (SCMs) that produce less CO_2; (c) fuel switching – replacing coal and petroleum coke used for heating with natural gas or a low carbon fuel; and (d) energy efficiency, including waste heat recovery. Implementing these levers could potentially reduce GHG emissions from concrete and cement by up to 68% compared to 2015 levels by 2040. A more

conservative estimate with moderate improvements and low adoption of CCUS is around a 13% reduction by 2040.

4) *Impact on Communities.* 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, which are often communities of color and children, bear the largest brunt of these health issues. California is home to eight cement plants, many of which are concentrated in the Inland Empire and Eastern Kern County regions. These areas already face existing air quality challenges as well.

   In 2019, the Lehigh Cement Company reached a settlement for alleged violations of the Clean Air Act. As part of the settlement, Lehigh has to invest $12 million in pollution control technology at 11 of their cement manufacturing plants, three of which are in California.

Comments

1) *Purpose of Bill.* According to the author, "Concrete and cement are vital to building roads, bridges, buildings, and even the infrastructure used to decarbonize the electrical grid or support low-carbon public transportation options here in California, but they are also a major source of GHG emissions -- 7% of all CO2 emissions globally. 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 without policy support. This bill requires CARB to establish a strategy to reduce lifecycle greenhouse gas (GHG) emissions from the concrete and cement used in California by 40% (from 2019 levels) by 2030 and to achieve carbon neutrality no later than 2045.

   "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 plan be chosen for a community emissions reduction program under CARB's Community Air Protection Program."

2) *Policy Mechanisms*. SB 596 requires ARB to evaluate a low carbon product standard for concrete or cement. This would be similar to a low carbon fuel standard, which encourages the use of lower carbon intensity transportation fuels. The same could potentially be applied to products which use fossil fuels to generate heat to reduce their GHG emissions intensity over time.

   Additionally worth noting, the Buy Clean California Act (2017) established environmental performance standards for four leading construction materials used in state building projects: steel rebar, flat glass, structural steel, and mineral wool-board insulation. Starting in 2020, the law required private material suppliers to submit Environmental Product Declarations (EPDs) as part of the competitive procurement process. Notably, cement and concrete are exempt from this regulation. AB 1365 (Bonta, 2021) requires the Department of General Services to establish a maximum acceptable global warming potential for concrete, and would require a winning bidder for an eligible project to submit an EPD developed in accordance with that standard prior to installation of any concrete products.

   These are two different policy approaches to regulating emissions from cement and concrete. A low carbon product standard would regulate emissions from all concrete used within the state whereas only state-funded projects using concrete would be required to submit EPDs.

3) *Feasibility of Decarbonization*. Improving energy efficiency and switching fuel sources are the most achievable levers of cement and concrete decarbonization in California. These mainly rely on retrofits and changes to infrastructure. Cleaner combusting kiln fuel also shows the greatest co-benefit for reducing health damages. Finding low-carbon materials to supplement cement may be limited by their availability in-state. Lastly, carbon capture and storage technologies are still nascent technologies and will require more demonstration and support. Because of process emissions, achieving carbon neutrality in the cement industry will not be possible without some sort of negative emissions technology.

   Based on the projections of GHG emissions under various decarbonization scenarios, reaching the goals set by SB 596 requires the best-case scenario, plus additional future advancements in carbon reduction from the concrete and cement industry, to achieve carbon neutrality by 2045.

4) *SB 32 Scoping Plan*. 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, they do include many of the

solutions discussed above as potential or proposed solutions, including creating a market for low carbon intensity products. Cap-and-trade is also important for this sector, although ARB's Environmental Justice Advocacy Committee has expressed a strong preference to forgo the existing cap-and-trade program and instead rely on prescriptive facility level regulations to prioritize direct reductions from large stationary sources, such as cement plants.

Related/Prior 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.

FISCAL EFFECT: Appropriation: No Fiscal Com.: Yes Local: No

According to the Senate Appropriations Committee:

- ARB 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 ARB to implement any program that may be developed as a result of this strategy.

SUPPORT: (Verified 5/20/21)

Natural Resources Defense Council (source)
350 Bay Area Action
350 Contra Costa
350 Humboldt: Grass Roots Climate Action
350 Sacramento
350 Silicon Valley
Acterra
Benisol, LLC
Blue Planet

California League of Conservation Voters
Carbon Free Palo Alto
Climate Youth Ambassador Program
Elders Climate Action, Norcal and Socal Chapters
Harker Green Team
Menlo Spark
Mothers Out Front Silicon Valley
Pacifica Climate Committee
Project Green Home
San Diego County Democrats for Environmental Action
Sierra Club California
Sierra Club Loma Prieta Chapter
Silicon Valley Democratic Club
Silicon Valley Youth Climate Action
Sunnyvale Cool
Sunnyvale Democratic Club
The American Institute of Steel Construction & the National Steel Bridge Alliance
The Climate Center
The Climate Reality Project: Santa Clara County
Union of Concerned Scientists
UUCPA Green Sanctuary Committee
Youth Public Policy Institute

OPPOSITION: (Verified 5/20/21)

South Coast Air Quality Management District

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