Office of Senate Floor Analyses
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UNFINISHED BUSINESS

Bill No: SB 596
Author: Becker (D), et al.
Amended: 9/3/21
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

SENATE FLOOR: 31-9, 5/24/21
AYES: Allen, Archuleta, Atkins, Becker, Bradford, Caballero, Cortese, Dodd, Durazo, Eggman, Glazer, Gonzalez, Hertzberg, Hueso, Hurtado, Kamlager, Laird, Leyva, Limón, McGuire, Min, Newman, Pan, Portantino, Roth, Rubio, Skinner, Stern, Umberg, Wieckowski, Wiener
NOES: Bates, Borgeas, Dahle, Grove, Jones, Melendez, Nielsen, Ochoa Bogh, Wilk

ASSEMBLY FLOOR: 74-2, 9/8/21 - See last page for vote

SUBJECT: Greenhouse gases: cement sector: net-zero emissions strategy

SOURCE: Natural Resources Defense Council

DIGEST: This bill requires the California Air Resources Board (ARB), by July 1, 2023, to develop a comprehensive strategy for the state's cement sector to achieve net-zero greenhouse gas (GHG) emissions no later than December 31, 2045.

Assembly Amendments remove a specified interim GHG emission reduction target and revise the strategies that ARB may take to achieve net-zero GHG emissions in

the cement sector, including striking requirements to analyze life cycle GHG emissions and evaluating a low carbon product standard and replacing them with defining a metric for GHG intensity and evaluating measures to support market demand and financial incentives, among other things.

ANALYSIS:

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) Requires ARB by July 1, 2023, to develop a comprehensive strategy for the state's cement sector to achieve net-zero GHG emissions as soon as possible, but not later than December 31, 2045. In developing strategy, requires ARB to:
   a) Define a metric for GHG intensity and evaluate data submitted by cement manufacturing plants for the 2019 calendar year and other relevant data to establish a baseline from which to measure reductions.
   b) Assess the effectiveness of existing measures, identify modifications to those measures, and evaluate new measures to overcome the market, statutory and regulatory barriers inhibiting achievement of the objectives described by the bill.
   c) Identify actions to reduce adverse air quality impacts and support economic and workforce development in communities neighboring cement plants.
   d) Include provisions to minimize and mitigate potential leakage and account for embedded emissions of GHGs in imported cement similar to those for cement produced in-state, such as through a border carbon adjustment mechanism.
   e) Coordinate and consult with state agencies and other stakeholders.
   f) Evaluate measures to support market demand and incentives to encourage the production and use of low-GHG cement, as provided.

4) Requires ARB to establish interim targets for GHG reductions with the goal of reducing GHG intensity of cement used in the state to 40% below the 2019 average by December 2035. In evaluating the feasibility of interim targets, ARB:
   a) Is authorized to adjust the targets upward or downward by July 1, 2028; and,
   b) Is required to document any feasibility constraints and recommended measures, including statutory changes, to overcome those constraints if a downward adjustment is made.

5) Requires ARB to implement the strategy upon appropriation of funding by the Legislature.

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) *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 support and development in California. Because of process emissions, achieving carbon neutrality in the cement industry will not be possible without some sort of negative emissions technology.

3) *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 Assembly Appropriations Committee:

- ARB estimates initial costs of $720,000, including $500,000 in contracting funds, in the first year and $220,000 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 identified strategies.

SUPPORT: (Verified 9/8/21)

Natural Resources Defense Council (source)
350 Bay Area Action
350 Contra Costa
350 Humboldt: Grass Roots Climate Action
350 Sacramento
350 Silicon Valley
Acterra
Alameda County Democratic Party
Bay Area for Clean Environment
Benisol, LLC
Blue Planet
California Democratic Party Environmental Caucus
California League of Conservation Voters
California Nevada Cement Association
Carbon Free Palo Alto
Climate Reality Project, Orange County
Climate Reality Project, San Fernando Valley
Climate Reality Project, Santa Barbara Chapter
Climate Youth Ambassador Program
Coalition for Clean Air
Coalition for Sustainable Cement Manufacturing and the Environment
Elders Climate Action, Norcal and Socal Chapters
Harker Green Team
Interfaith Climate Action Network of Contra Costa County
Menlo Spark
Mothers Out Front Silicon Valley

Napa Climate Now
Pacifica Climate Committee
Project Green Home
San Diego County Democrats for Environmental Action
Santa Clara County Democratic Party
Sierra Club California
Sierra Club Loma Prieta Chapter
Silicon Valley Democratic Club
Silicon Valley Youth Climate Action
Sunnyvale Cool
Sunnyvale Democratic Club
Sustainable Walnut Creek
The American Institute of Steel Construction & the National Steel Bridge Alliance
The Climate Center
The Climate Reality Project: Santa Clara County
U.S. Green Building Council, Inc.
Union of Concerned Scientists
Unitarian Universalist Church of Palo Alto Green Sanctuary Committee
Youth Public Policy Institute

OPPOSITION: (Verified 9/8/21)

None received

ASSEMBLY FLOOR: 74-2, 9/8/21
AYES: Aguiar-Curry, Arambula, Bauer-Kahan, Bennett, Berman, Bloom, Boerner Horvath, Mia Bonta, Bryan, Burke, Calderon, Carrillo, Cervantes, Chau, Chen, Chiu, Cooley, Cooper, Cunningham, Daly, Davies, Flora, Fong, Frazier, Friedman, Gabriel, Gallagher, Cristina Garcia, Eduardo Garcia, Gipson, Lorena Gonzalez, Gray, Grayson, Holden, Irwin, Jones-Sawyer, Kalra, Lackey, Lee, Levine, Low, Maienschein, Mathis, Mayes, McCarty, Medina, Mullin, Muratsuchi, Nazarian, Nguyen, O'Donnell, Patterson, Petrie-Norris, Quirk, Quirk-Silva, Ramos, Reyes, Luz Rivas, Robert Rivas, Rodriguez, Blanca Rubio, Salas, Santiago, Seyarto, Stone, Ting, Valladares, Villapudua, Waldron, Ward, Akilah Weber, Wicks, Wood, Rendon
NOES: Bigelow, Smith
NO VOTE RECORDED: Choi, Megan Dahle, Kiley, Voepel

Prepared by: Rylie Ellison / E.Q. / (916) 651-4108
9/8/21 21:33:27

****** END ******