Office of Senate Floor Analyses
(916) 651-1520 Fax: (916) 327-4478

THIRD READING

Bill No: SB 308
Author: Becker (D)
Amended: 5/18/23
Vote: 21

SENATE ENVIRONMENTAL QUALITY COMMITTEE: 5-2, 4/19/23
AYES: Allen, Gonzalez, Limón, Menjivar, Skinner
NOES: Dahle, Nguyen

SENATE APPROPRIATIONS COMMITTEE: 5-2, 5/18/23
AYES: Portantino, Ashby, Bradford, Wahab, Wiener
NOES: Jones, Seyarto

SUBJECT: Carbon Dioxide Removal Market Development Act

SOURCE: Author

DIGEST: This bill requires the California Air Resources Board (CARB) to establish rules and processes for certifying carbon dioxide removal (CDR) processes that can be used for negative emissions credits. This bill requires CARB to adopt a regulation requiring certain emitting agencies to purchase negative emissions credits equal to a specified percentage of their greenhouse gas (GHG) emissions, with that percentage increasing over time.

ANALYSIS:

Existing law:

Under the Global Warming Solutions Act of 2006 and updates thereof (Health and Safety Code (HSC) § 38500 et seq.):

1) Requires CARB to ensure that statewide GHG emissions are reduced to at least 40% below the 1990 level by 2030.

2) States, under the California Climate Crisis Act, that it is the policy of the state to achieve net zero GHG emissions no later than 2045, and to ensure that by 2045 statewide anthropogenic GHG emissions are reduced to at least 85% below the 1990 level.

This bill:

1) Requires CARB to establish rules and processes for certifying carbon dioxide removal (CDR) processes that can be used for negative emissions credits by December 31, 2027. These rules and processes shall include criteria to ensure CDR processes are real, quantifiable, verifiable, enforceable, and additional and that sequestration is durable.

2) Requires CARB to adopt a regulation by December 31, 2027, to require certain emitting agencies to purchase negative emissions credits equal to a specified percentage of their GHG emissions beginning in 2028, with those percentages increasing in 5-year intervals to reach 100% in 2045.
   a) Emitting agencies are those subject to CARB's Mandatory Greenhouse Gas Emissions Reporting Regulation (MRR) and those who report 25,000 metric tons or more of GHG emissions per year.

3) Allows CARB to develop two-phase negative emission credit rules, in which emitting entities may purchase temporary carbon sequestration methods with a legally binding commitment to purchase durable carbon sequestration at the end of the guarantee period of the temporary negative emissions credits.

   a) Durable carbon sequestration is defined as a process that can reasonably be projected to retain a large majority of carbon atoms for 1,000 years and for which the responsible entity proves a guarantee of at least 100 years.
   b) Temporary carbon sequestration is defined as any method that does not meet the criteria for durable carbon sequestration.

4) Prohibits certification of CDR processes in which carbon dioxide (CO_2) is used for enhanced oil recovery (EOR).

5) Provides that at least 50% of negative emissions credits used by an emitting entity in any calendar year shall provide direct climate mitigation benefits to California.

6) Allows CARB to not certify CDR processes if the carbon removal benefits do not outweigh the impacts to neighboring communities, on deforestation, or of displacement of agricultural land.

Background

1) *Yes, And: The need for CDR.* Radical cuts in GHG emissions are critical to climate change mitigation, but in parallel with emissions reductions, most experts agree that carbon dioxide removal is necessary to avert further climate disaster. The Intergovernmental Panel on Climate Change's (IPCC) latest Sixth Assessment, finalized in March 2023, asserts that global emissions will need to be cut by almost half by 2030 if warming is to be limited to 1.5°C, the global target in the Paris Agreement. It acknowledged that CDR will be necessary to meet the 1.5°C target, especially in hard-to-abate sectors.

   California too has acknowledged the need for CDR. California has a statutory goal to achieve net zero GHG emissions by 2045, with a reduction in emissions of at least 85% from 1990 levels. This leaves 15% of emissions that need to be removed, estimated to be about 65 million metric tons (MMT). To balance out those remaining 15% of emissions, CARB's 2022 Scoping Plan projected that the state will need about 75 MMT of CDR by 2045 (65 MMT to balance out the 15% of remaining emissions in the state inventory plus 10 MMT to balance estimated net emissions from natural and working lands).

2) *CDR vs. CCS.* Carbon Capture and Storage (CCS) is a process that separates CO_2 from a point source, such as the flue of a gas-fired power plant or a cement plant. CCS is generally considered to be a CO_2 reduction strategy, not a CO_2 removal strategy, since it is only reducing CO_2 from anthropogenic sources that would have otherwise entered the atmosphere, rather than removing what was already there. CCS remains controversial because of fears it could prolong the life of fossil fuels and delay the transition to more sustainable fuels, among other concerns.

   Carbon Dioxide Removal (CDR) is an umbrella term used to describe a range of strategies used to remove CO_2 from the atmosphere, without a relationship to where or when the CO_2 was emitted. In contrast to CCS, CDR is a negative emissions strategy when it involves capturing legacy CO_2 directly from the atmosphere. To store the CO_2 for long periods, it is generally injected underground into geological formations, such as former oil and gas reservoirs, deep saline formations, and coal beds.

Comments

1) *Purpose of bill.* According to the author, "In 2022, California passed landmark legislation committing the state to achieve net zero greenhouse gas (GHG) emissions by 2045, with a reduction in emissions of at least 85% from 1990 levels. To achieve the net zero target, the state will need carbon dioxide removal (CDR) to balance the remaining 15% of emissions. Today, the state has no plan for scaling up that CDR capacity to produce the needed "negative emissions," and there are no rules for what should count as negative emissions or how to keep track of it. There are a wide variety of approaches to CDR being developed, but they are early-stage, low volume, and expensive. Since California is going to need large volumes of negative emissions to meet its climate targets, we need a plan for helping those CDR solutions – and the supporting transport and storage infrastructure – mature, scale up, and reduce costs over time."

2) *How much CDR do we need?* First, it is critical to underscore that CDR is no replacement for dramatic emissions reductions. CDR will only feasibly be able to help us reach net-zero CO_2 emissions when deployed alongside substantial emissions cuts.

   Permanent storage of carbon is a nascent industry. The Global CCS Institute released a report in 2021 that provides a sense of scale. The report found 6 commercial-scale projects worldwide that geologically stored a total of 9 MMT of CO_2 per year, with only one in the U.S. that had a capacity of 0.55-1 MMT per year. CARB's 2022 Scoping Plan projects a need for 75 MMT of carbon removed and stored annually by 2045 in California alone.

   Increasing CDR capacity to the scale projected to meet climate goals will take a massive amount of money. Current CDR prices with durable storage are typically around $200-$700 per ton of carbon, though many available solutions cost upwards of $2,000 per ton. Lawrence Livermore National Laboratory's 2020 "Getting to Neutral" report projects prices for direct air capture (DAC) projects to fall to approximately $200 per ton by 2045, gasification or pyrolysis of biomass to between $30 and $150 per ton, and natural solutions to $10-20 per ton (natural solutions generally do not store carbon as long). Using the $200 per ton projection and CARB's 2022 Scoping Plan scenario of 75 MMT of CDR, $15 billion worth of CDR would be needed a year in California by 2045. For a 7 MMT intermediate goal in 2030 laid out in the Scoping Plan, $1.4 billion will be needed by seven years from now, but this number could feasibly

be three times higher or more as prices per ton of carbon are likely to still be high.

3) *CDR Carrots and Sticks*. To get CDR deployed at the scale projected we need, it is important to consider the need for a compliance obligation, such as the one proposed in this bill, alongside other market mechanisms incentivizing CDR: LCFS and federal tax credits. In 2019, certain CCS projects became eligible to generate LCFS credits, including capturing emissions associated with fuel production (examples of CCS, not eligible under this bill) and DAC (a CDR method). LCFS credits were worth on average between $122 and $190 per ton of carbon in 2019 but have recently plummeted to between $60-70. At the federal level, the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) have provisions supporting CDR, including a tax credit of up to $180 per metric ton of carbon removed, commonly referred to as 45Q credits after the section describing them in the U.S. Internal Revenue Code.

   Though individual companies' climate commitments and choices to take advantage of such benefits are helpful, a voluntary market is unlikely to achieve the projected scale of implementation necessary for the state to meet its climate goals. In April 2022, an alliance of prominent Silicon Valley companies, including Google, Meta, Shopify, and Stripe, announced that it is purchasing $925 million in carbon removal over the next eight years. While far larger than any other such commitments to date, that purchase would still buy less over eight years than what just California is projected to need just in the year 2030 (~$1.4 billion, likely higher), with that need per year over ten times higher by 2045 (~$15 billion), even considering the likely reduction in the cost of CDR.

   LCFS and 45Q credits are "carrots;" SB 308 would implement a "stick" in that it would require certain GHG emitters to purchase certain volumes of CDR. This bill adopts a "polluter pays" principle. CDR regulations that obligate emitters to purchase negative emissions could stimulate private investment as investors know that there will be growing demand for CDR. As a result, CDR costs should fall as the technology matures.

   This bill's negative emissions purchase obligation is in addition to cap-and-trade but closely related in concept. On February 28, 2023, CARB issued a notice on upcoming topics to inform potential regulatory amendments to the cap-and-trade regulation with workshops to be held this spring and a rulemaking schedule to be put out this summer. This list of topics includes carbon dioxide sequestration and removal projects developed under an SB 905

(Caballero, 2022) Carbon Capture, Removal, Utilization, and Storage (CCRUS) Program. While it is not yet clear what role CDR will play in future cap-and-trade regulations, it is important to note that conversations about this topic are upcoming. Currently, carbon capture, whether through CCS or CDR, does not count towards a covered entity's cap-and-trade obligation.

4) *Two-phase credit purchases.* This bill allows CARB to develop two-phase negative emission credit rules, in which emitting agencies may purchase temporary carbon sequestration methods with a legally binding commitment to purchase durable carbon sequestration at the end of the guarantee period of the temporary sequestration. This first phase can be a helpful temporary option if durable sequestration methods take time to be scaled up. However, enforcing the second phase purchase could be a challenge. The responsible party to fulfill the purchase of durable sequestration after the temporary sequestration would be a business, and businesses can dissolve, which could leave the second purchase requirement unfulfilled.

5) *CDR isn't (yet) happening in California.* No large-scale CDR projects yet exist in California. SB 905 (Caballero, 2022) directed CARB to adopt regulations by January 1, 2025, for a unified permit application for carbon dioxide capture, removal, or sequestration projects to expedite the process. It is worth noting the possibly slow development of CDR in the state in light of this bill's requirement that at least half of negative emissions credits provide direct climate mitigation benefits to the state, meaning at least half of the CDR must be done in-state or sufficiently close. This bill does, however, include a clause allowing CARB to adjust the 50% requirement if determines it to be infeasible.

6) *Protecting communities.* Emitters purchasing offsets or negative emissions credits to "undo" their emissions may balance out GHG emissions in the big picture but allow pollution to continue in neighboring communities. For this reason, CCS gained significant opposition from environmental justice organizations. While CDR is not linked to point source emissions like CCS and may be less likely to extend the lifetime of an emitting facility, having emitters "undo" their emissions through CDR may not alleviate impacts to communities near the emitters' operations.

   At the very least, ensuring that CDR operations do not further burden neighboring communities is important for an environmentally just implementation. SB 905 (Caballero, 2022) directs CARB, as part of its CCRUS Program, to ensure that all carbon dioxide capture, removal, or sequestration

projects minimize local water or air pollution in adjacent communities as well as monitor criteria pollutants and toxic air contaminants at geological storage sites. SB 308 gives CARB the authority to not certify a CDR process if it determines its benefits do not outweigh the impacts to neighboring communities, considering, among other things, increases in criteria air pollutants. This clause does not have specific thresholds regarding acceptable increases in air pollution and leaves it to CARB to weigh costs and benefits. Moving forward, the author may wish to provide more direction to CARB in the bill if they wish to ensure any specific considerations or protections are included.

7) *Aligning with MRR and cap-and-trade.* Author amendments taken in the Senate Appropriations Committee to align with cap-and-trade criteria stated that emitting entities who report 25,000 tons or more of greenhouse gas emissions per year are subject to the requirements in this bill. The threshold for cap-and trade and for CARB's MRR is 25,000 tons or more of carbon dioxide equivalent. Carbon dioxide equivalent (CO_2e) is a widely used unit that facilitates comparison between amounts of different GHGs that have different global warming potentials. The author may wish to consider adopting the unit CO_2e instead to more closely align with existing regulations.

Related/Prior Legislation

SB 905 (Caballero, Chapter 359, Statutes of 2022) directed CARB to establish a CCRUS Program to evaluate the efficacy, safety, and viability of CDR and CCRUS and facilitate their implementation where appropriate. This bill requires CARB to track the deployment of CCRUS and CDR and adopt regulations for financial responsibility for CO2 capture, removal, or sequestration projects. This bill also directs the California Geological Survey to establish a Geologic Carbon Sequestration Group that identifies injection wells capable of maintaining integrity for at least 1,000 years, identifies appropriate monitoring of injected carbon dioxide and identifies hazards.

SB 1314 (Limón, Chapter 336, Statutes of 2022) prohibited an operator from injecting a concentrated carbon dioxide fluid produced by a carbon dioxide capture project or carbon dioxide capture and sequestration project into a well for the purposes of EOR.

SB 27 (Skinner, Chapter 237, Statues of 2021), among other things, directed CARB to establish carbon dioxide removal targets for 2030 and beyond as part of its Scoping Plan.

NOTE: See the Senate Environmental Quality Committee analysis for detailed background of this bill.

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

According to the Senate Appropriations Committee, unknown ongoing costs, likely in the millions of dollars annually (Cost of Implementation Account [COIA]), for ARB to implement the provisions of this bill.

SUPPORT: (Verified 5/18/23)

350 Humboldt
350 Sacramento
Carbon Removal Alliance
Climate Action California
Climeworks
Conservation Strategy Group
Elders Climate Action, NorCal and SoCal Chapters
Environmental Defense Fund
Heirloom Carbon
Indivisible CA Statestrong
Indivisible Yolo
Ocean Iron Fertilization Alliance
Openair Collective
Planetary Technologies
Project 2030
Santa Cruz Climate Action Network
World Resources Institute

OPPOSITION: (Verified 5/18/23)

American Forest & Paper Association
Biofuelwatch
California Carbon Solutions Coalition
California Chamber of Commerce
California Farm Bureau
California Manufacturers and Technology Association
Center for Biological Diversity
Center on Race, Poverty & the Environment
Central California Asthma Collaborative
Central Valley Air Quality Coalition

Leadership Counsel for Justice and Accountability
Little Manila Rising
Physicians for Social Responsibility - Los Angeles
San Francisco Bay Physicians for Social Responsibility
Western States Petroleum Association

ARGUMENTS IN SUPPORT: According to the Carbon Removal Alliance, "Just as California has successfully done with other climate solutions, the state will need new policies that help scale carbon removal technologies. This will ensure that our state can take full advantage of the climate and socio-economic benefits of carbon removal technologies. Market creation, in particular, is an important lever to drive capital and resources towards these technologies from the private sector. There are a number of ways to create markets for permanent carbon removal, and SB 308 lays out a clear path for one such mechanism, engaging the private sector to create demand for high quality removals from projects that create local jobs. Importantly, the legislation reflects several core principles that are critical for growing the market for carbon removal at the scale and pace needed to achieve climate goals, including a focus on permanent removals and the need for technology-inclusive solutions."

ARGUMENTS IN OPPOSITION: According to a coalition of eight environmental and environmental justice groups, "In addition to our concerns with the efficacy of carbon markets and local externalities from the technologies this bill would advance, we foresee unintended consequences of diminished urgency on proven solutions, a loss of urgency that would prove catastrophic for our communities and our climate. California must focus on direct emissions reductions that decrease both carbon dioxide and co-pollutants that for far too long have been poisoning communities across California, and we cannot allow ourselves to be distracted from this imperative. The state cannot drag its feet on actual climate solutions as it over-relies on the questionable technofix of direct air capture and the blatant climate dead-end of bioenergy with carbon capture and storage."

Prepared by: Theresa Keates / E.Q. / (916) 651-4108
5/23/23 13:07:56

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