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**SENATE COMMITTEE ON ENVIRONMENTAL QUALITY**

**Senator Allen, Chair**

**2021 - 2022 Regular**

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**Bill No:** AB 2944  
**Author:** Petrie-Norris  
**Version:** 5/2/2022  
**Urgency:** No  
**Consultant:** Jacob O'Connor  
**Hearing Date:** 6/16/2022  
**Fiscal:** Yes

**SUBJECT:** Greenhouse gases: carbon capture, utilization, and sequestration

**DIGEST:** Requires the California Air Resources Board (ARB) to include an evaluation of how carbon capture, utilization, and sequestration (CCUS) technologies are contributing to the state's greenhouse gas (GHG) emission reduction goals as part of its annual report to the Joint Legislative Committee on Climate Change Policies.

**ANALYSIS:**

Existing law:

- 1) Establishes the Air Resources Board (ARB) as the air pollution control agency in California and requires ARB, among other things, to control emissions from a wide array of mobile sources and coordinate, encourage, and review the efforts of all levels of government as they affect air quality. (Health and Safety Code (HSC) §39500 et seq.)
- 2) Requires ARB to reduce GHG emissions to 40% below 1990 levels by 2030. (HSC §38566)
- 3) Requires ARB to prepare and approve a scoping plan, on or before January 1, 2009, and at least once every five years thereafter, for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions from sources or categories of sources of GHGs. (HSC §38561)
- 4) Requires ARB to adopt regulations to require the reporting and verification of statewide GHG emissions and to monitor and enforce compliance with the state reduction goals. (HSC §38530)
- 5) Requires ARB to make available on its website the emissions of GHGs, criteria pollutants, and toxic air contaminants for each facility that reports to ARB in a

manner that illustrates the changes in emissions levels over time. (HSC §38531)

- 6) Requires ARB to annually present an informational report at a hearing of the Joint Legislative Committee on Climate Change Policies on the reported emissions of GHGs, criteria pollutants, and toxic air contaminants from all sectors covered by the scoping plan. (HSC §38531)
- 7) Establishes the California Public Records Act requiring inspection or disclosure of governmental records to the public upon request, unless otherwise exempted. (Government Code §6250 et seq.)
- 8) Creates an exemption to the California Public Records Act for information a business considers to be trade secrets, confidential, or otherwise privileged, subject to assessment by the authority the information was submitted to. (California Code of Regulations, Subchapter 4, §10037)

This bill:

- 1) Beginning January 1, 2023 and annually thereafter, requires ARB, as part of its annual report to the Joint Legislative Committee on Climate Change Policies, to include an evaluation of how CCUS technologies are contributing to the state's efforts to achieve the state's GHG emission reduction goals.
- 2) Requires the evaluation to identify details of each CCUS project, including:
  - a) Location;
  - b) Technology;
  - c) Carbon capture rate;
  - d) Energy source;
  - e) Energy use;
  - f) Air pollution;
  - g) Employment; and,
  - h) Cost-effectiveness relative to existing GHG emissions reduction measures.
- 3) Allows an entity that submits data to ARB for this report in a way consistent with ARB's policies for confidential information pursuant the California Public Records Act, may designate written materials such as trade secrets, or other information which is exempt from disclosure, as confidential.

## Background

- 1) *Put that carbon back where it came from.* Carbon capture and sequestration (CCS) technology separates CO<sub>2</sub> from a point source, such as the flue of a gas-fired power plant or a cement plant, and puts it into long-term storage, usually by injecting CO<sub>2</sub> into a geological reservoir. CCS is generally considered to be a CO<sub>2</sub> reduction strategy, not a CO<sub>2</sub> removal strategy, since it is only reducing CO<sub>2</sub> from anthropogenic sources that would have otherwise entered the atmosphere, rather than removing what was already there. Nevertheless, if properly developed CCS has the potential to reduce emissions by millions of tons every year. This April, Exxon Mobil estimated that there will be a \$4 trillion market for CCS technologies by 2050, which is about 60% of the \$6.5 trillion market for oil and gas predicted for the same year.

CCS is adoptable in California due to the existing geological storage from the state's history of fossil fuel extraction. However, according to a Lawrence Livermore National Laboratory report published in 2021, no CCS projects exist today in California, and it is unlikely that CCS could be scaled up at the pace needed due to the current regulatory framework for screening and authorizing projects. The federal government has acted to incentivize the further development of CCS by expanding certain federal tax credits that subsidize CCS projects. The Legislature is considering several proposals this year on encouraging the development of CCS.

- 2) *If you don't use it, you won't lose it.* Once CO<sub>2</sub> has been captured from a point source instead of being sequestered geologically it can be utilized for industrial purposes, called carbon capture utilization and sequestration (CCUS). One of the most common applications is in Enhanced Oil Recovery (EOR), where the highly pressurized captured CO<sub>2</sub> is injected into oil wells that have already been tapped in order to draw even more oil from the wells. Once injected the CO<sub>2</sub> is effectively permanently sequestered and will likely not leak – barring seismic events or accidents as have occasionally occurred at existing facilities such as in 2016 in Wyoming. California has extensive permitting and review requirements for EOR projects to guard against such events.

The EOR process requires using more energy than if the CO<sub>2</sub> was just sequestered and produces fossil fuels that will lead to more emissions. So, while EOR using CO<sub>2</sub> does result in decreased emissions overall, reductions are smaller than if the CO<sub>2</sub> was just sequestered. Because this results in the production of more oil, EOR is a way for the fossil fuel industry to turn their waste into further profit, while benefiting from state and federal incentives to reduce emissions. Unsurprisingly, more than 80% of the CO<sub>2</sub> captured to date has been used for oil extraction.

Captured CO<sub>2</sub> can also be utilized in industrial processes where it is used to produce more valuable materials, such as plastic, cement or biofuels. Like EOR these uses are energy intensive and likely result in fewer emission reductions than pure sequestration but result in useful products. Unlike EOR, in the case of plastic or cement, the final products will not generate more GHG emissions during use. These techniques are not widely deployed because they generally are not cost-effective and require further technology development.

- 3) *CCS has a long and spotty track record.* According to the 2021 Global CCS Institute Global Status of CCS Report, the earliest example of carbon capture technology being used was in 1972 in Texas at a natural gas processing plant where it supplied CO<sub>2</sub> to a nearby oilfield for EOR. After decades of development and investment, there are 27 commercial-scale carbon capture projects operating worldwide today, capturing a total of 36.6 million tons of carbon per year, an amount equivalent to nearly 9% of California's annual emissions. The majority of global CCS capacity operating today was built prior to 2011, and captures carbon from natural gas processing plants.

According to the US Department of Energy's National Energy Technology Laboratory approximately 300 projects to either capture or store carbon have been developed. Of those, about half are both carbon capture and storage, but 100 of the 149 CCS projects originally planned to be operational by 2020 had been terminated or placed on indefinite hold. Some recent failures have been especially dramatic, such as Chevron's Gorgon CCS plant in Australia, which captured only about half of the promised CO<sub>2</sub>.

- 4) *More capture, more problems?* Current industry estimates assume that CCUS captures about 85% of the CO<sub>2</sub> and ARB's 2022 draft Scoping Plan assumes a capture rate of as much as 90%. When using captured carbon for EOR it takes more captured CO<sub>2</sub> to recover one barrel's worth of oil than would be generated by the combustion of that barrel of oil, making it "carbon-negative".

Unfortunately, these assessments only hold up in a very specific frame of analysis. CCUS technologies require energy to operate, and that increased energy use (approximately 20%) increases direct air emissions. Furthermore, the total emissions from fossil fuels occur at multiple points in a facility and during their lifecycle, many of which CCS is not set up to address. When all emissions are taken into account, research has estimated the use of CCUS has only been able to capture approximately 10% of emissions at coal facilities. That same research estimates that when accounting for the health, equipment, and climate costs, combusting coal and using CCUS powered by natural gas is approximately 20% higher than simple coal combustion because of the extra

pollutants created by the natural gas combustion used to power the CCUS technology.

## Comments

- 1) *Purpose of Bill.* According to the author, “AB 2944 requires the Air Resources Board to evaluate how carbon capture, utilization, and sequestration technologies are contributing to the state's efforts to reduce greenhouse gas emissions. This information will be valuable in informing our future decisions about how these technologies can be deployed as a part of our strategy to combat climate change.”
- 2) *Accounting for all emissions is critical to understanding the efficacy of CCS.* One of the great points of contention around CCS is how effective it actually is at reducing emissions. Proponents will point to recorded capture rates of 90% at a specific point source and extrapolate that to large savings in emissions. However, it’s important to consider the many different points of emissions in a facility not being captured, as well as the increase in energy required to run the CCS technology. ***The committee may wish to consider amending the requirement for reporting capture efficiency to require reporting of capture efficiency at the point of capture, capture efficiency when accounting for the increase in energy to run capture technology, and capture efficiency in the context of an estimate of all points of emissions within and upstream of a facility.***
- 3) *Carbon capture can serve as a bridge to new technologies– or a tether to old ones.* There are industries in which eliminating the majority of GHG emissions is not viable. The chemical reactions that generate important products such as cement, steel, glass, aluminum, and ethanol all create CO<sub>2</sub> as byproduct. These emissions cannot be avoided and so in these sectors some form of CCS will likely be an important component in achieving net zero emissions. Furthermore, many industrial-scale chemical and manufacturing reactions require extremely high temperatures which currently can only be practically obtained through the combustion of fossil fuels. In the future, the need for this may be abated somewhat by electric furnaces, “green” hydrogen, or other technological advances, but within the time-frame of California’s emission reduction goals these solutions are not widely implementable. CCS could buy time for these industries to develop new technologies and mitigate the remaining emissions that cannot be abated.

However, CCUS has instead been primarily used in sectors where there are other options to reduce emissions: energy production and the production of

fossil fuels. Implementing CCS for fossil fuel production or EOR cuts into the emissions savings from CCS and perpetuates economic and infrastructure reliance on fossil fuels as an energy source. Furthermore, CCS technologies on their own do nothing to reduce the criteria pollutants emitted from these facilities, continuing the health burden they place on nearby (usually disadvantaged) communities. The best way to mitigate the emissions from these industries is to replace them with no GHG-emission energy production wherever possible.

- 4) *Staff recommends the committee adopt the bolded amendments contained in comment 2 above.*

### **DOUBLE REFERRAL:**

If this measure is approved by the Senate Environmental Quality Committee, the do pass motion must include the action to re-refer the bill to the Senate Judiciary Committee.

### **Related/Prior Legislation**

SB 905 (Skinner) tasks ARB with developing and administering the Geologic Carbon Sequestration Demonstration Initiative to fund 1-3 geologic CCS projects at cement production facilities. It was heard on the Senate floor on May 24, 2022 and passed on a vote of 27-2 and ordered to the Assembly

SB 1101 (Caballero) requires ARB, in consultation with the California Geological Survey, to establish a CCUS program for developing the commercial application of CCUS technologies and equipment. It also specifies that the definition of free space in existing property rights includes pore space that can be possessed and used for the storage of gaseous or liquid substances. It was heard on the Senate floor on May 25, 2022 and passed on a vote of 38-1 and ordered to the Assembly where it has been referred to the Committee on Natural Resources.

SB 1399 (Wieckowski) requires the California Energy Commission (CEC) to establish a grant program to fund carbon capture demonstration projects at industrial facilities in the state. It was heard on the Senate floor on May 25, 2022 and passed on a vote of 30-5 and ordered to the Assembly.

SB 1314 (Limón) prohibits the use of carbon captured in CCUS projects to be injected into wells for the purposes of EOR. It was heard on the Senate floor on May 25, 2022 and passed on a vote of 24-9 and ordered to the Assembly.

AB 2578 (Cunningham) requires the State Energy Resources Conservation and Development Commissions to include in its 2-year integrated policy report an assessment of CCUS technologies in use in operating power plants. It was heard on the Assembly floor on May 25, 2022 and passed on a vote of 66-1 and ordered to the Senate.

SB 34 (Calderon, 2012) would have required ARB to regulate the injection of CO<sub>2</sub> at an EOR project seeking to demonstrate CCS capabilities. The bill was held in the Senate Appropriations Committee.

**SOURCE:** Author

**SUPPORT:**

California Carbon Capture Coalition

**OPPOSITION:**

Central Valley Air Quality Coalition

**ARGUMENTS IN SUPPORT:** According to the California Carbon Capture Coalition, “California needs a clear, coordinated and comprehensive policy framework for CCUS that optimally positions a number of key economic sectors in the state to deliver critically needed greenhouse gas emission reductions. Application of CCUS technologies in California will enable dozens of industries in the state to cost-effectively cut greenhouse gas emissions, deliver hundreds of millions of dollars in annual consumer energy savings and support thousands of new and existing jobs for Californians. AB 2944 is an important step to ensure that California can maximize the benefits of successfully integrating CCUS into our planning for clean energy and climate action.”

**ARGUMENTS IN OPPOSITION:** According to the Central Valley Air Quality Coalition, “CVAQ is led by organizations working alongside frontline communities living in the shadows of smokestacks, oil extraction, and refining for decades and who are now also confronting several proposals for CCUS projects. We are all too familiar with industry’s schemes to reduce emissions on paper while perpetuating a fundamentally harmful practice for local communities and ecosystems while further exacerbating the human cause climate crisis and delaying long overdue direct reductions. Thus we are highly concerned that AB 2944 enshrines into law that California “must” utilize engineered carbon capture to meet its goals, that the California Air Resources Board should only consider its “contributions” to meeting climate goals, as well as with the discussion only of

economic and environmental benefits. What is glaring missing is any mention of public health and social costs, harms and risks to ecosystems and the climate posed by every step of the process—from capture to transport to utilization to storage—and the perpetuation of injustices posed by CCUS projects.”

**-- END --**