



February 20, 2023

Liane M. Randolph, Chair
California Air Resources Board
1001 "I" Street
Sacramento, CA 95814

Submitted via CARB's online Comment Submittal Form

Re: Opposition to the Proposed LCFS Provision to Allow Direct Air Capture Crediting Nationwide and to the Continued Crediting of Enhanced Oil Recovery Using Captured Carbon

Dear Chair Randolph and members of the CARB Board,

The undersigned groups write to express their strong opposition to the California Air Resources Board (CARB) staff proposal regarding the Low Carbon Fuel Standard (LCFS), specifically provisions regarding nationwide direct air capture (DAC) crediting and carbon capture and storage (CCS) crediting for projects that use captured carbon for enhanced oil recovery (EOR). These two programs risk undermining any climate benefits from the LCFS while exacerbating environmental injustice. As such, we urge CARB to revise the staff proposal to eliminate crediting for DAC and EOR using captured carbon.

DAC does not belong in the LCFS because it is not a transportation fuel.

The LCFS is a market mechanism intended to reduce the carbon intensity of California's transportation fuels. DAC is a new, speculative technology—so far never deployed at scale—that aims to reduce atmospheric carbon dioxide (CO₂) by capturing it from the ambient air. The main product of DAC is CO₂, a waste product from excessive combustion that must be buried deep underground.¹ While there are proposals to use CO₂ to create new transportation fuels, in almost all cases CO₂ from DAC will not be used to create fuels, let alone transportation fuels in California. Since it has no apparent relationship to California's transportation fuels, DAC does not belong in a program intended to address the carbon intensity of California's transportation fuels, and it should be omitted from the LCFS.

Including DAC in the LCFS would delay necessary direct emissions reductions and the phase out of fossil fuels.

The combustion of fossil fuels is the primary driver of the climate crisis, and the scientific consensus is that they must be phased out quickly to prevent global catastrophe and the collapse of human civilization. At the same time, the combustion of fossil fuels causes severe air pollution across the world, the nation, and the state, including in the San Joaquin Valley, the nation's worst air basin. Moreover, that air pollution burden is not just concentrated geographically but also socioeconomically and racially such that low-income communities of color are much more likely to live with far worse air pollution. As such, both public health and environmental justice require the swift phaseout of fossil fuels.

Over-reliance on CDR would present the grave moral hazard of delaying direct emissions reductions and the phaseout of fossil fuels. If we delay this needed action, we risk exacerbating the environmental justice, public health, and climate crises, and ultimately the collapse of our civilization.

Because the LCFS is a market mechanism that relies on tradable credits, any projects that generate credits allow the continuation and development of projects that need to purchase credits, such as fossil oil and gas refining. DAC crediting will thus directly facilitate the combustion of fossil fuels that would otherwise not be burned (or would need to be offset by other low-carbon-intensity fuels in California's market). The net impact is to decrease our ambition to reduce combustion of fossil fuels.

DAC must be reserved for truly hard-to-decarbonize sectors because it is so energy intensive and expensive.

The transportation sector can be decarbonized without relying on offsets from CDR such as DAC. CARB's own Advanced Clean Cars and Advanced Clean Fleets rules and accompanying analyses show that ambitious transition to zero emission vehicles (ZEVs) is possible in this sector. While transoceanic shipping and aviation are more difficult to decarbonize, those subsectors, too, include realistic decarbonization pathways in the relevant time frame.

¹ Captured CO₂ can also be used. The only use for CO₂ proven at scale is for EOR, discussed further below.

Because carbon is just 0.0421% of the atmosphere, capturing it from the ambient air is exceptionally expensive and energy intensive.² Considering the challenges of quickly deploying renewable energy with storage and transmission as we electrify our economy, we should be cautious about embarking on projects that require gross expansion of renewable energy capacity to power them. In the face of this reality, insofar as the state decides to include DAC in its climate plans, we must reserve DAC to offset emissions from truly hard-to-decarbonize sectors.

DAC, insofar as the state relies on it despite its cost, energy burden, and lack of proven track record at scale, must not be used to offset transportation emissions—where other solutions exist—but instead must be reserved for other sectors without viable decarbonization options.

DAC only makes sense if it is carbon negative, yet crediting DAC in the LCFS ensures that it can be carbon neutral at best.

Given the moral hazard and extreme expense and energy burden of DAC, it only makes sense to employ DAC when it is carbon negative. However, when a DAC project generates LCFS credits, those credits will be acquired by fossil oil refiners, offsetting any possible reduction in atmospheric carbon and at best resulting in the DAC project being carbon neutral. DAC projects that are not carbon negative offer no benefit, but rather waste precious climate funding on fossil fuel greenwashing.

The staff proposal allows double- and triple-counting DAC credits, potentially resulting in significant increases in carbon emissions.

In other provisions of the proposed LCFS amendments (e.g., book-and-claim electricity, book-and-claim RNG, book-and-claim hydrogen, renewable or low-CI process energy), the regulation text prohibits generating LCFS credits if the Renewable Energy Certificates (RECs) or environmental attributes are “being claimed in any other voluntary or mandatory program” with certain exceptions. Conspicuously absent from this provision are both DAC and CCS projects.³ As such, DAC projects credited under the LCFS are likely to generate credits in multiple programs, and thus to offset carbon emissions in multiple markets. Anywhere DAC generates credits, it allows further emissions, so where credits are stacked, it effectively allows double or even triple counting. In other words, under the staff proposal, credited DAC projects could effectively cause emissions to increase by a factor of two or three relative to a scenario in which DAC does not occur—an outcome that would be simply unacceptable.

And that analysis only considers literal crediting programs, leaving out other incentive programs. If a project collects a grant from the U.S. Department of Energy, for example, the federal government will likely claim its negative carbon emissions in its own accounting while the project also generates offsets in the LCFS and other markets, allowing further over-counting. The above also leaves out opportunity costs, such as of the foregone transition from fossil fuels to renewables, with the renewable capacity that could

² See, e.g., Sekera, J., Lichtenberger, A., *Biophys Econ Sust., Assessing Carbon Capture: Public Policy, Science, and Societal Need* (Oct. 2020), <https://doi.org/10.1007/s41247-020-00080-5>.

³ E.g., Section 95488.8(i)(1)(B)(3).

have been used for the transition instead going to DAC. The implications from employing such flawed accounting in our climate programs is very alarming.

To be effective and safe, nationwide DAC projects need better oversight than CARB can provide through the LCFS.

Outside of California, CARB has a limited presence and jurisdiction. While CARB can certainly review documents from out of state, it is unlikely to conduct frequent onsite inspections for DAC projects in, say, Louisiana, but rather will count on oil majors to honestly conduct their operations, despite the well-documented history of oil companies lying for decades about climate science.⁴ Without careful oversight, projects likely will not provide any climate benefits at all and may instead cause net increases of greenhouse gases. Further, poor oversight and weak regulations in other states may result in significant local harms.⁵

DAC's extreme energy demands can be met by any energy source, but CARB must ensure that, where it allows or incentivizes deployment, DAC only employs clean renewable energy with storage. However, some DAC projects plan to use fossil fuels for energy, such as one of the Carbon TerraVault projects that intends to use methane fuel cells, which will paradoxically yield greenhouse gas emissions while trying to capture CO₂. Meeting DAC power demands with fossil fuels, whether onsite or through the grid, could cause projects to generate more greenhouse gases than they capture. In addition, they will cause local harms along the lifecycle of those fossil fuels, from extraction to refining to transportation to storage to combustion.

Insofar as DAC projects plan to rely on the electrical grid as a primary or secondary energy source, the projects will only be clean if the grid is clean, which will not be the case until it is fully supplied by renewables with storage. Further, renewable supply consumed by DAC is renewable supply that cannot meet other energy demands, so the proper baseline for assessment is against the grid with the same capacity but without DAC.

Given the impossible task of ensuring broad compliance with such tight parameters nationwide, CARB staff cannot responsibly manage such a program and call it CDR. As such, CARB must remove nationwide DAC crediting from the LCFS.

DAC must be deployed sparingly because of local harms.

⁴ See, e.g., Louis Sahagún, Los Angeles Times, California sues five major oil companies for 'decades-long campaign of deception' about climate change (Sept. 2023), <https://www.latimes.com/california/story/2023-09-16/california-sues-five-major-oil-companies-for-lying-about-climate-change>.

⁵ California also lacks strong community protections for DAC and CCS. We look forward to the SB 905 rulemaking to produce strong protections for our communities soon, before these projects beat regulators to the punch.

Apart from the climate harms discussed above, and even assuming that DAC relies exclusively on onsite, behind-the-meter renewables rather than fossil fuels, DAC is dangerous and must be carefully regulated and limited in deployment.

Most DAC projects rely on toxic materials like ammonia to filter carbon from ambient air, and thus they risk leaking toxic pollution into the air and water.⁶ Moreover, DAC's intended purpose is to gather and concentrate CO₂, which is a toxic waste.⁷ An accident at a DAC facility would present grave risks for workers and surrounding communities for miles around. DAC can be done anywhere, so it is feasible to construct DAC facilities away from communities and right above storage formations to avoid the need for carbon pipelines, but unfortunately, California, along with most other states, does not have a requirement that DAC only occur well away from where people live.

Storing carbon is also a significant concern. Underground geologic storage is not well studied for climate purposes.⁸ Perhaps the best studied projects are Norway's Sleipner and Snøhvit projects, often held up by industry as shining examples of the promise of CCUS technology. However, as the Institute for Energy Economics and Financial Analysis found in a 2023 report, these projects are better understood as cautionary tales, demonstrating that "carbon capture and storage is not without material ongoing risks that may ultimately negate some or all the benefits it seeks to create"; that "[e]very project site has unique geology, so field operators must expect the unexpected, make detailed plans, update the plans and prepare for contingencies"; and that "[e]nsuring storage is securely maintained implies a high level of proactive regulatory oversight, activities for which governments may not be adequately equipped". The report also finds that the facilities "cast doubt on whether the world has the technical prowess, strength of regulatory oversight, and unwavering multi-decade commitment of capital and resources needed to keep carbon dioxide sequestered below the sea – as the Earth needs – permanently."⁹

Leakage pathways for geologically stored carbon include the ~100,000 oil and gas wells just in Kern County, California's many tectonic faults, and other natural and manmade perforations or cracks in storage formations. Also, upon interacting with water, CO₂ forms carbonic acid. While carbonic acid is safe to drink, it harms irrigation supplies. In California, that could have serious implications because our storage formations are right below the nation's most productive agricultural lands in the Central Valley.

⁶ Hambdy L. B. et al., *The application of amine-based materials for carbon capture and utilisation: an overarching view*, in *Material Advances*, 2021, 2 5843-5880; EEA Technical report no. 14/2011, *Air pollution impacts from carbon capture and storage (CCS)*, (2011), <https://www.eea.europa.eu/publications/carbon-capture-and-storage>, at p. 10; Report of the Special Rapporteur, Okechukwu Ibeanu, *Adverse effects of the illicit movement and dumping of toxic and dangerous products and wastes on the enjoyment of human rights*, report no. A/HRC/5/5 (2007), <https://undocs.org/Home/Mobile?FinalSymbol=A%2FHRC%2F5%2F5&Language=E&DeviceType=Desktop&LangRequested=False> at p. 8.

⁷ When concentrated, CO₂ is indeed toxic, and, because it is a waste product from combustion and most plans involve burying it deep underground to keep it out of the atmosphere, toxic waste is an apt description.

⁸ The oil and gas industry has studied EOR using captured carbon extensively, but as a climate tool geological carbon storage remains in its infancy.

⁹ Institute for Energy Economics and Financial Analysis, *Norway's Sleipner and Snøhvit CCS: Industry Models or Cautionary Tales?* (June 2023), <https://ieefa.org/resources/norways-sleipner-and-snohvit-ccs-industry-models-or-cautionary-tales>.

Further, carbonic acid tends to carry heavy metals such as arsenic, which *can* spoil drinking water supplies.¹⁰

The LCFS is effectively a gas tax, and forcing low-income communities of color to pay at the pump for DAC is unjust.

As CARB notes in its Standardized Regulatory Impact Assessment (SRIA) for the LCFS, the proposed amendments are expected to increase gas prices by as much as \$1.83 per gallon, especially in the late 2030s and 2040s. In the same document, CARB acknowledges that these price increases are likely to impact disadvantaged communities more than others “because individuals living in these communities traditionally spend a larger share of their income on transportation fuels” and because “individuals in these communities may lack the means to effectively make use of ZEV technology as quickly as wealthier individuals, and therefore would rely on more expensive fossil fuels for longer.”¹¹ CARB neglected to mention that people of color and people with lower incomes also tend to have longer commutes. These problems are even more acute in rural areas, where public transit tends to be minimal or nonexistent, and where needed services and retail like schools, doctor’s offices, and grocery stores tend to be much farther from where people live. Moreover, charging infrastructure tends to be much scarcer in rural areas; some communities in the Central Valley and elsewhere lack access to the electric grid altogether because of disinvestment and environmental racism. Thus, low-income people of color living in disadvantaged rural communities are likely to be among the last to adopt expensive electric vehicles (EVs), will pay the most through increased gas prices, and can least afford to pay higher gas prices. While the LCFS is not technically a gas tax, its impacts are effectively the same, and gas taxes are inherently a regressive form of revenue generation for the reasons stated above.

The SRIA also notes that disadvantaged communities tend to benefit the most from the reduced emissions of heavy duty vehicles, which is both true and another way of saying that communities of color face the greatest harms from pollution in this sector (among others) in the status quo. However, offsetting emissions with DAC does nothing to reduce emissions and in fact brings new harms and risks to frontline communities, as discussed above, with projects likely to be located near rural, disadvantaged communities. So, under the current proposed amendments to the LCFS, rural disadvantaged communities will pay the most through increased gas prices while being the least able to afford them, get no local benefits, and face local harms and risks from DAC, all to subsidize a speculative climate technology that, at least in the LCFS context, is more likely to harm our climate efforts than advance them. In short, low-income communities of color—especially in rural areas—would be forced to pay for their own degradation. That outcome is unjust.

This injustice flies in the face of AB 32, which requires that CARB, “to the extent feasible and in furtherance of achieving the statewide greenhouse gas emissions limit, . . . [e]nsure that activities undertaken to comply with the regulations do not disproportionately impact low-income communities.”

¹⁰ Catherine M. Cooney, Inside Climate News, *Study Charts How Underground CO2 Can Leach Metals into Water*, <https://insideclimatenews.org/news/07122010/study-charts-how-underground-co2-can-leach-metals-water/>.

¹¹ California Air Resources Board, *Standardized Regulatory Impact Assessment (SRIA): Proposed Amendments to the Low Carbon Fuel Standard Regulation* (Sept. 9, 2023).

The staff proposal would do the opposite: disproportionately harm low-income communities. CARB must chart a different course and remove DAC from the LCFS.

CARB must immediately cease crediting CCS projects that use captured carbon for enhanced oil recovery in harmony with the statewide prohibitions in SB 1314 (Limón 2022) and SB 905 (Caballero 2022).

In 2022, California prohibited the use of captured carbon for enhanced oil recovery in recognition of the local and climate harms of the practice, and it is incoherent for CARB to continue subsidizing the practice in other states. Apart from the hypocrisy of subsidizing outside of our state what is illegal inside it, the same reasons that we outlawed enhanced oil recovery in California demand that we immediately stop issuing LCFS credits for EOR using captured carbon outside the state.

Using captured carbon for EOR results in serious climate harms under the guise of climate action. When captured carbon is used for EOR, four times more carbon is emitted than is captured.[1] This is deeply troubling given that an estimated 80% of global captured carbon is being used to increase oil production.[2] Expanding EOR in the United States could result in an additional 400,000 barrels per day oil production by 2035, which would directly lead to as much as 50.7 million metric tons of net CO₂ emissions annually.[3] Funded largely by taxpayers and—through the LCFS—car drivers, that is not a climate solution but rather a fossil fuel subsidy. We should not use the LCFS as a fossil fuel subsidy, so we should discontinue this crediting practice immediately.

[1] Jaramillo, Paulina et al., *Life Cycle Inventory of CO₂ in Enhanced Oil Recovery System*. *Environmental Science & Technology* (2009), <https://pubs.acs.org/doi/10.1021/es902006h>.

[2] Garcia Freites, S. & Jones, C., *A Review of the Role of Fossil Fuel-Based Carbon Capture and Storage in the Energy System*, (2021), https://www.research.manchester.ac.uk/portal/files/184755890/CCS_REPORT_FINAL_v2_UPLOAD.pdf.

[3] Oil Change International, *Expanding Subsidies for CO₂-Enhanced Oil Recovery: A Net Loss for Communities, Taxpayers, and the Climate* (2017), <http://priceofoil.org/content/uploads/2017/10/45q-analysis-oct2017-final.pdf>.

Further, the local impacts of EOR using captured carbon are significant. EOR is a threat to local and regional air and water quality, and using captured carbon only exacerbates those harms. Pressurizing oil and gas wells with CO₂ leads to serious risks of leaks of not just carbon dioxide but also methane, hydrogen sulfide, and various air toxics and volatile organic compounds (VOCs), in addition to oil and toxic produced water. Further, CO₂ can leak catastrophically from pressurized wells, leading potentially to serious harm and death because concentrated CO₂ is a toxic asphyxiant that is heavier than air. This problem is not without history; although carbon capture has so far seen limited deployment, we've

already seen a major leak. In 2016, a Wyoming school was forced to shut down for almost a year because old, plugged oil and gas wells leaked dangerous levels of CO2 that had been injected for EOR.¹²

Given the clear climate and local harms and utter lack of benefits beyond oil industry profits, as well as the illegality of the practice within the state, CARB must not delay in ending LCFS credits for enhanced oil recovery. While we recognize that the SB 905 rulemaking is gearing up and could also address this problem, that rulemaking is moving slowly at CARB, with little visible activity in the year and half since SB 905 was passed. Further, we see other changes to CCS crediting in the proposed amendments, and CARB would advance no public benefit by continuing crediting and subsidizing EOR while that rulemaking progresses, even as CARB makes other changes to the LCFS CCS protocol. Thus, CARB must end its fossil fuel subsidy for EOR under the LCFS in the current rulemaking.

This rulemaking provides CARB the opportunity to improve the LCFS, bring it into closer alignment with principles of climate justice, and strengthen it as a climate tool. Or, CARB can double down on the extractive past. We urge CARB to revise the staff proposal to eliminate crediting for DAC and EOR using captured carbon because of the negative consequences for climate and for disadvantaged communities both in-state and across the nation.

Sincerely,

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¹² Inside Climate News, *Exxon Touts Carbon Capture as a Climate Fix, but Uses It to Maximize Profit and Keep Oil Flowing* (Sept. 27, 2020), <https://insideclimatenews.org/news/27092020/exxon-carbon-capture/>.

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