

October 6, 2025

California Air Resources Board
1001 I Street
Sacramento, CA 95814
[Submitted through web portal](#)

Re: Information Solicitation re SB 905: Environmental Justice Response

Dear California Air Resources Board Members and Staff:

We write as environmental justice groups and allies to express our profound concern about the proposed expansion of engineered carbon capture, utilization, and storage (CCUS) technologies as a climate strategy. While CARB's work to reduce emissions and protect the health of all Californians is critical, CCUS poses serious risks—particularly for environmental justice and frontline communities that already bear the brunt of pollution and climate impacts throughout California. Expanding CCUS threatens to entrench fossil fuel dependence, exacerbate environmental injustices, and undermine California's commitments to clean air, climate equity, and public health.

CCUS is being used to delay meaningful climate action and to increase our investments in fossil fuel and other hydrocarbon infrastructure at a time when we should be investing in zero emission energy and phasing out fuels that continue to drive the climate crisis and poison frontline communities. To date, CCUS projects worldwide have consistently failed to live up to promised climate benefits, and most have been net carbon emitters in a lifecycle analysis that considers upstream and downstream emissions. Further, engineered carbon capture can even increase air pollution, water pollution, and other harms for frontline communities. The risks of transporting and storing concentrated carbon dioxide include explosive releases of suffocating plumes that threaten immediate death and hospitalization, spoiling aquifers, degrading soil, and increasing seismicity. As we weigh the risks and benefits of technologies, we must implement a precautionary approach that prevents new harms, uses inherently safer systems and does not add to the cumulative pollution load.

We are part of a growing chorus of advocates and communities around the United States and across the globe condemning CCUS as an obstacle, not a vehicle, to a climate-safe planet, one that perpetuates fossil fuel dominance and exacerbates harms to frontline communities. While we urge policy makers to change course away from CCUS altogether and to pursue bolder, more justice-oriented direct emissions reductions, we feel simultaneously compelled to limit the harms and risks of CCUS to environmental justice communities as long as CCUS remains on the table. In April 2022, the Central Valley Air Quality Coalition (CVAQ) circulated their first [Engineered Carbon Capture, Use, and Storage \(CCUS\) Policy Platform](#) collaboratively developed by San Joaquin Valley based environmental justice organizations as a response to interest in the region for initial CCUS projects and its capacity for carbon storage. Over the next few months, environmental health and justice groups across the state published a [Collective Environmental Justice Statement on Engineered Carbon Capture, Use, and Storage \(CCUS\) in California](#) along with several other documents communicating the various CCUS concerns and recommended pathways for decision makers.

The 2022 legislative session realized several of that platform's policy protections, principally the passing of SB 1314 (Limón) to prohibit the use of captured carbon in enhanced oil recovery operations. Others include a moratorium on carbon pipelines (which was recently removed

through legislative action), project transparency through a statewide public database, minimizing full project co-pollutant emissions to the extent technologically feasible, and a minimum 100 year oversight of long-term leak, emission, and seismic risks, among others. However, there are many additional protections and considerations needed to protect California communities from the harms and risks of CCUS.

Environmental justice groups across the state reconvened in the wake of SB 905, which, while providing some important policy protections, also initiated reforms to speed investment in CCUS. We made a new collective 2023 [CCUS platform](#), based on CVAQ's previous work. As part of SB 905, CARB is required to produce strong rules to enact the legislative intent of protecting communities. This letter is written by environmental justice groups and allies in response to [CARB's August 22, 2025 Information Solicitation](#) to inform implementation of SB 905. We look forward to working with you throughout this process to ensure our communities are fully protected to the extent possible under this law.

Before we answer CARB's questions, we would like to make these high-level points:

Financial Assurance

CARB's regulatory framework must ensure the operators of CCUS projects remain financially responsible throughout the life of the project and through the post-closure period. The costs should not be externalized to the already overburdened communities living near sites of these projects, nor to taxpayers. The Legislature required CARB to develop regulations requiring the CCUS operator to maintain financial responsibility for at least 100 years after the last date of injection of carbon dioxide into a geologic storage reservoir and until such time as it can demonstrate the risk of carbon dioxide leakage poses no material threat to public health, safety, and the environment and to achievement of net zero greenhouse gas emissions.

Under SB 905 financial responsibility should cover the short- and long-term costs arising from corrective action, well plugging and abandonment, geologic storage reservoir monitoring, site care and site closure, emergency and remedial response, liability associated with seismic activity triggered by the reservoir, loss of carbon dioxide containment by the geologic storage reservoir, and protection of irrigation and drinking water quality and public and environmental health and safety. SB 905 allows CARB to consider a range of financial instruments over the life of the project based on Section 39741.5 of the Health and Safety Code and Section 146.85 of Title 40 Code of Federal Regulations, particularly mentioning bonds.

Section 146.85 of Title 40 of the Code of Federal Regulations allows operators to rely on insurance, such as trust funds, surety bonds, credit lines, self-insurance (subject to strict stipulations), and escrow accounts. Given the long-term, indefinite nature of these projects, the financial responsibility instrument should not rely on the financial health of the project proponent. Surety bonds, trust accounts, and escrow accounts require the upfront payment of funds restricted for the purpose of repair, emergency response, and post closure.

CARB should also establish a state-administered fund for ongoing maintenance of site and repair and emergency response after the 100 year post-closure period. Several states require CCUS sites to be turned over to the state after the end of the post-closure period. Indiana,¹

¹ IN SB 442, IC § 14-39-1-14(a)(2019)

Texas,² and North Dakota,³ among others, all provide for the transfer of ownership to the state once operators are no longer responsible for on-going maintenance of the project site. This ensures that there is clear and transparent responsibility for the security of the project site as long as carbon is stored. The state should impose a fee per ton of CO₂ injected that would be used in part to administer post-closure responsibilities, so the responsibility does not fall on the public. The other part of this fund could be used to address claims by communities, businesses, and residents who are harmed from CO₂ storage in their area rather than rely on individual or private insurance policies to address the loss to property or personal injury.

Prohibited Projects

California's Health and Safety Code Section 39741.1, as amended by SB 905, details the following overall lens to this program:

- (a) The state board shall establish a Carbon Capture, Removal, Utilization, and Storage Program to do all of the following:
 - (1) Evaluate the efficacy, safety, and viability of CCUS and CDR technologies and facilitate the capture and sequestration of carbon dioxide from these technologies, where appropriate.
 - (2) Develop monitoring and reporting schedules to state regulatory agencies for carbon dioxide capture, removal, or sequestration projects to ensure efficacy, safety, and viability of the projects.
 - (3) Ensure that all carbon dioxide capture, removal, or sequestration projects include the following, as appropriate:
 - (A) Strategies to minimize, to the maximum extent technologically feasible, copollutant emissions from facilities where CCUS or CDR technology is deployed to ensure that the use of carbon dioxide removal technologies and carbon capture and storage technologies does not have an adverse impact on local air quality and public health, particularly in low-income and disadvantaged communities.
 - (B) Strategies to ensure that carbon dioxide capture, removal, or sequestration projects minimize, to the maximum extent technologically feasible, local water pollution or air pollution from construction- and transportation-related impacts from the projects in communities adjacent to carbon dioxide capture, removal, or sequestration projects, including a geologic storage complex.
 - (C) Strategies to minimize the risk of seismic impacts to, and from, geologic storage projects, including the risk of gas leakage due to seismic activity.
 - (D) Monitoring and reporting of seismic activity related to geologic sequestration of carbon dioxide, and monitoring of sequestered carbon dioxide, including movement within the geologic storage complex, for a period of time that is sufficiently long enough to demonstrate that the risk of carbon dioxide leakage poses no material threat to public health, safety, and the environment and to achievement of net zero greenhouse gas emissions in California and that terminates no earlier than 100 years after the last date of injection of carbon dioxide into a geologic storage reservoir. In adopting regulations pursuant to subdivision (c) that pertain to this subparagraph, the state board shall consult with the State Geologist.
 - (E) Monitoring of criteria pollutants and potential toxic air contaminants at the one or more sites within the geologic storage complex and at mobile or fixed sites within the facility, and monitoring of ambient carbon dioxide concentrations over the geologic storage complex to facilitate leak detection. Monitoring required under this section

² TX HB 1796 (2009), TX Health and Safety Code § 382.507(a)

³ North Dakota Century Code § 38-22-17(6)(a).

shall continue for a period of time that is sufficiently long enough to demonstrate that the risk of carbon dioxide leakage poses no material threat to public health, safety, and the environment and to achievement of net zero greenhouse gas emissions in California and that terminates no earlier than the completion of the applicable postinjection site care and site closure plan pursuant to Section 146.93 of Title 40 of the Code of Federal Regulations.

(F) Projects meet best available control technology requirements as determined by the local air district.

- (b) In carrying out the objectives of the program, the state board shall prioritize the following:
- (1) Reducing the emissions of greenhouse gases.
 - (2) Minimizing land use and potential environmental, noise, air quality, water quality, traffic, seismic, and other related impacts, and any potential health and safety risks, to all communities where CCUS and CDR technologies are deployed, and carbon dioxide capture, removal, or sequestration projects are located to the maximum extent feasible.
 - (3) Maximizing workforce development and employment opportunities in each community where CCUS and CDR technologies are deployed, and carbon dioxide capture, removal, or sequestration projects are located, to the extent feasible.
 - (4) Leveraging private funding sources and public-private partnership structures alongside potential state funding sources
 - (5) Reducing fossil fuel production in the state.

A plain text reading of statute charges CARB with ensuring that the program in totality prioritizes reductions of greenhouse gas emissions and reducing fossil fuel production in the state. These thresholds alone preclude projects that fail to see a meaningful net reduction of carbon from an upstream and downstream perspective, and would certainly preclude projects that would incentivize greenhouse gas emissions so that there can be more projects to capture those emissions - like BECCS. We urge CARB to exercise discretion that aligns with the broader climate and air quality responsibilities trusted to your agency.

As such, CARB must confine deployment to truly hard-to-decarbonize sectors in order to limit harm to climate and communities. Extending billions of dollars in taxpayer subsidies to infrastructure we need to phase out in the next 10-20 years would be a bad choice that would lock in emissions, preventing us from reaching our climate goals while also ensuring continued pollution in disadvantaged communities, exacerbating environmental injustice, limiting our ability to attain NAAQS, and harming public health. CARB must at all times consider the holistic impact of CCUS and not take a narrow mathematical view toward carbon accounting that over-relies on faulty assumptions and ignores connected issues like public health and environmental justice. As such, carbon capture should only be considered a candidate technology for truly hard-to-decarbonize sectors, and even in those sectors, CARB should prioritize other mitigation strategies.

Sectors that should never be candidates for CCUS, and thus for which CCUS should be prohibited through this rulemaking in order to reach our climate and air quality goals, include:

Refineries

CARB's 2022 Scoping Plan relies heavily on deployment of CCUS on refineries despite significant concerns with feasibility. As Dr. Jennifer Wilcox, President Biden's Principal Deputy Assistant Secretary in the Office of Fossil Energy and Carbon Management at U.S. DOE and CARB's keynote speaker said at the 2022 CCUS Symposium in Stockton, CCUS is "not a good idea for refineries" and "not the right solution" because "refineries are very complicated systems.

They have many, many units that emit CO₂...not economic.” Dr. Wilcox said that refinery CCUS only made economic sense on one refinery unit– the fluid catalytic cracker, which emits a more concentrated carbon dioxide stream, but concluded that adding CCUS to one unit only reduces a small fraction of refinery emissions: “one unit out of many doesn’t help us with pollution at all of the other units.” Furthermore, because oil refineries are old, complex, hundreds to thousands of acres, and space-constrained, other regulatory proceedings determined that widespread pollution control equipment installation would compromise maintenance and safety.

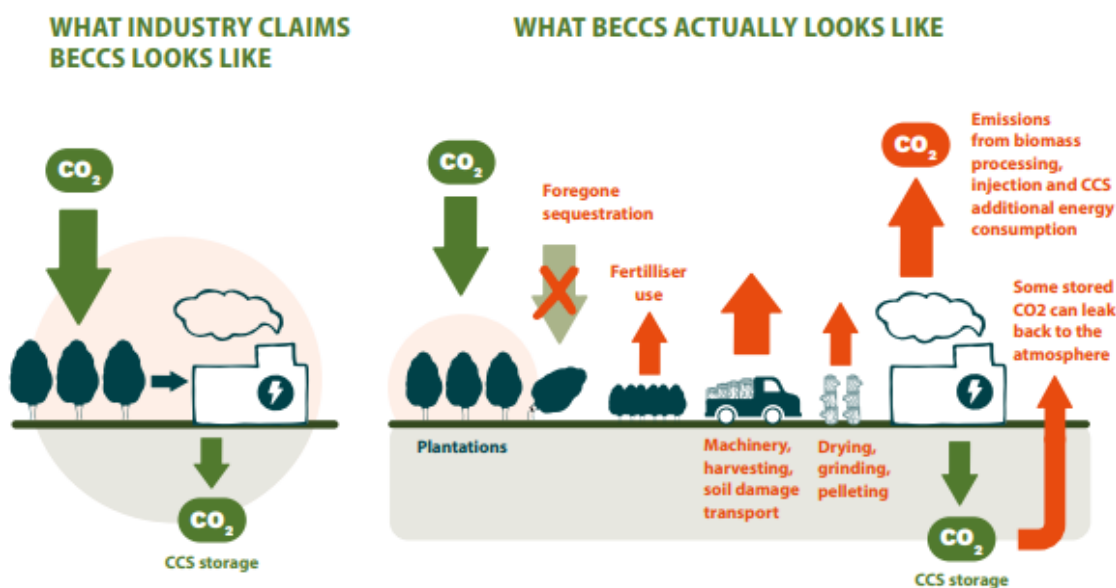
CARB must phase out fossil fuel infrastructure instead of funneling billions of public and private equity into it, investments which must be amortized over decades and thus require that infrastructure to remain for decades, if not longer. Thus, CARB must prohibit the use of CCUS on refineries. Refinery carbon capture is a climate dead end.

Natural gas power plants

As discussed above, CARB must not pour billions of taxpayer dollars into fossil fuel infrastructure that we must phase out to meet our climate targets. We simply need to stop burning natural gas for electricity, instead of wasting taxpayer and ratepayer money on massive new infrastructure projects to perpetuate the obsolete technology. Further, it would take decades to amortize billions of dollars in new public and private investment in methane power plants, even as we need to phase out the power plants in the short- to medium-term. If there is any sector that is relatively easy to decarbonize, it is the power sector, where we can rely on clean renewables like solar and wind with storage.

BECCS

Bioenergy with carbon capture and storage, or BECCS, must not be allowed for two reasons. First, it is bad for the climate, increasing emissions while purporting to do the opposite. On paper, turning biomass into energy and capturing the carbon produced may appear net negative, but only if unrealistic modeling assumptions are baked into the math. In other words, BECCS facilities will be net emitters of carbon in a life cycle analysis in the real world, and BECCS only makes sense if it is net negative, which it will never be in practice. This graphic illustrates the point well:



Source: https://www.fern.org/fileadmin/uploads/fern/Documents/2022/Six_problems_with_BECCS_-_2022.pdf

Second, many of the planned BECCS facilities rely on refurbishing existing biomass plants that were shuttered because they were uneconomic. When active, and despite grand promises to improve air quality, these facilities ranked among the top point sources for particulate matter, causing severe local and regional pollution in EJ communities located in nonattainment zones. Even with these facilities shuttered, we are out of attainment for PM NAAQS. Indeed, the San Joaquin Valley Air District has never met any federal PM2.5 standard, and it is in severe nonattainment for even the original 1997 standard,⁴ despite multiple more stringent standards layered on top. Adding these new/old point sources will be disastrous for our regional air quality and even worse for the communities where the projects will be sited. Note also that, while open agricultural burning has been fairly common in the Valley, it is being phased out under new Air District rules, so the comparison of a biomass facility is not properly comparable to open burning but to more sustainable biomass waste management processes.

Project proponents are once again making bold promises on air quality. We don't believe them, and, following the old adage "Fool me once, shame on you; fool me twice shame on me," it would be shameful for CARB to trust them a second time. Our mistrust is also backed up by sound science that remains skeptical that we can burn—or even gassify—a bunch of organic matter without causing significant local and regional pollution.

Instead, biomass should be sustainably mulched with attention to local externalities and be incorporated as a soil amendment, ideally in diversified organic production, where it can improve soil health, reduce the need for fertilizers and pesticides (and associated GHG emissions), improve soil water retention, reduce irrigation demand, improve infiltration, improve crop yields, and sequester carbon.

Waste incinerators and chemical recycling facilities

Burning garbage is a bad idea. It releases a host of air and water pollution. That remains true even when some of the carbon is captured. Also, even if some of the carbon would be captured, as with almost all CCUS projects worldwide, most of the carbon will be released in the real world, no matter what the modeling shows. Burning garbage releases carbon faster than other waste management practices, so it is worse for the climate. CARB must not pour billions of dollars of taxpayer money into a practice that is bad for the climate and terrible for local communities, and it must prohibit this harmful practice.

Chemical recycling is functionally the same, with a coat of greenwashing to help the poison go down, and the dubious benefit of also producing more plastic.

Ethanol production facilities

Ethanol is less a climate program than an inefficient farm subsidy, given that it has been shown to produce more carbon than gasoline. Adding CCUS would increase funding and drive ethanol production while only exacerbating climate harms by providing lucrative incentives to change land use toward domestic corn production and pushing cultivation of other domestic crops onto unused land, often in forested areas such as the Amazon Rainforest.⁵ Razing the rainforest to produce ethanol is not a coherent climate policy, and the land use implications of this application of CCUS are sufficient to demonstrate that this approach is a climate dead end. Further, ethanol

⁴ U.S. EPA is considering claims that the Valley met the 1997 PM2.5 standard in 2024. Regardless of whether those claims are true, the Valley is certainly far off from current standards.

⁵ <https://carbonplan.org/research/ethanol-cdr-claims>

facilities create significant local harms, comparable to oil and gas refineries. The only winners are corn and ethanol producers, with frontline communities and the world population losing.

Monitoring

SB 905 requires CARB to develop monitoring and reporting schedules for CCUS projects to ensure the efficacy, safety, and viability of the projects. The goal of monitoring is to demonstrate that carbon dioxide leakage is not a material threat to public health, safety, and the environment and to achieve California's net zero emissions target for at least 100 years after the site's last injection.

To appropriately monitor the safety of the storage site, CARB must establish a baseline of the onsite conditions that will be the basis of comparison. CARB should require operators to provide baseline information regarding site conditions, including air quality, temperature, pressure, local sources of drinking water, groundwater quality, and any nearby sources of surface water, and any other criteria demonstrating suitability for long-term carbon storage. CARB should develop a schedule for regular inspections of the site to ensure that the site is behaving as expected. CARB should require annual inspections until the post-closure period where site inspections could be every 5 years unless there is evidence of leakage, seismic activity in the area, or another reason to question the structural integrity of the storage site formation.

CARB should also require the operator to develop a Monitoring and Reporting Plan as part of project approval. That report should identify the criteria emissions and toxic air contaminants emitted during each phase of project operation- site preparation, injection, closure, and post-closure. There should be continuous air quality monitoring with annual reporting for those emissions until the post-closure period if there is no sign of leakage where reporting would transition to three years of monitoring. Water quality monitoring should occur on a quarterly basis during injection activities and annually until post-closure and then every five years as long as there is no evidence of leakage. CARB should coordinate with local drinking water authorities, private well owners, relevant Regional Water Quality Control Boards, and the State Water Board to ensure there are no changes in water quality in the areas of CCUS projects and take action in the event monitoring data shows there is an issue.

The purpose of the monitoring program is to determine the effectiveness and safety of CCUS. In the event monitoring demonstrates leakage, CARB's regulations should also outline a menu of corrective actions. This should include fine schedules, surrendering of emissions reductions allowances or credits, and options for repair and timeline for repairs. Monitoring results and corrective action should be posted on CARB's CCUS portal in order to ensure transparency of the program.

Throwing caution to the wind with untested CCUS projects would jeopardize both California's climate goals and its responsibility to protect health. We urge CARB to take a precautionary approach: prioritize prevention, prohibit projects that add new risks, and champion solutions that truly advance clean air, climate equity, and community well-being.

The rest of this letter will respond to CARB's questions directly. Thank you for your time and consideration of our responses.

Sincerely:

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Little Manilla Rising

Gracyna Mohabir
California Environmental Voters

EJ Response to CARB's Information Solicitation Submitted October 6, 2025

Definitions

The statute already includes several key definitions, including definitions for:

- “Carbon dioxide capture, removal, or sequestration project”
- “CCUS technology”
- “CDR technology”
- “Program”
- “Carbon dioxide capture, removal, or sequestration project operator”
- “Carbon dioxide capture project”
- “Carbon dioxide removal project”
- “Concentrated carbon dioxide fluid”
- “Geologic storage complex”
- “Geologic storage reservoir”

1. In addition to the terms defined in statute, are there other key terms that should be defined? Please provide any proposed definitions with applicable citations.

“Bioenergy with carbon capture and storage” means the process of capturing and permanently storing carbon dioxide from processes where biomass is converted into fuels, electricity, or other biomass products using combustion, gasification, pyrolysis and other conversion processes.

Note: we recommend against a separate definition for “biological carbon removal and storage” or “biomass-based carbon removal with storage” or similar. Those processes are functionally identical to bioenergy with carbon capture and storage, and the only difference is whether the process is net carbon negative. Such claims are highly disputed and subject to differences in analysis, baseline, and protocol such that a project could be BiCRS one day and BECCS the next, subject to a change in protocol, which seems counterproductive. We argue that BECCS is never BiCRS, but even if we are wrong, there is no technical benefit to defining the problem away.

“Agricultural biomass resources” means crop, orchard, vineyard, or other agricultural residues, and excludes both dairy biogas and crops grown for the purpose of producing energy, fuels, and edible produce. [definition adapted from SB 88 (Caballero)]

“Forest biomass resources” means material removed for wildfire mitigation, forest restoration projects, or the protection of public safety and infrastructure, excluding trees that are harvested for the primary purpose of producing energy and fuels, and excluding native trees of 8 inches diameter or greater. [definition adapted from SB 88 (Caballero)]

Note: “Agricultural biomass resources” and “Forest biomass resources” are important to define because we suggest restrictions on the use of BECCS to apply only to waste, instead of primary biomass, should CARB reject our suggestion to prohibit BECCS altogether. If BECCS is prohibited, then these definitions may become surplusage.

2. Are there any definitions in the statute that may require further expansion or clarification?

Some terms and project categories in the statute need clearer definitions to make sure they are applied consistently. For example, “carbon capture and sequestration or storage from large

emitters” should define what counts as a “large emitter,” such as specific emissions levels, types of facilities, or industry sectors, and clarify whether “sequestration” and “storage” mean the same thing or are different. Similarly, terms like “carbon capture from large emitters and ambient air for ‘permanent’ sequestration through utilization” and “direct” or “passive” air capture should clearly explain key concepts, including the difference between direct and passive capture, the limits of air capture, and what qualifies as “permanent” sequestration. Terms related to bioenergy, like “bioenergy with carbon capture and storage” and “biomass-based carbon removal with storage,” should clarify CARB definition of “acceptable feedstocks”, how emissions are counted, and standards for permanence. Providing clear thresholds, permanence requirements, and guidance on monitoring, reporting, and verification would reduce confusion, ensure consistent implementation, and support all parties to understand if the projects meet environmental and equity goals.

Applicability

General project categories may include:

- **Nature-based solutions**
- **Carbon capture and sequestration or storage from large emitters**
- **Carbon capture from large emitters and ambient air for “permanent” sequestration through utilization**
- **Direct capture from ambient air for “permanent” sequestration**
- **Passive air capture from ambient air for “permanent” sequestration**
- **Bioenergy with carbon capture and storage**
- **Biomass-based carbon removal with storage**

3. Are there any project categories missing from this list?

Enhanced rock weathering is in its nascent stages of deployment, but California contains eligible locations, so this set of technologies should be included in regulations.

Marine carbon dioxide removal is a wide category of approaches, largely in early stages of development. However, there are significant risks that should be managed and mitigated in its onset. Further, SB 643 (Caballero) contemplates providing large grants for marine carbon removal. As such, marine CDR should be included in regulations.

Soil carbon sequestration and organic regenerative practices are holistic, ecological, systems-based, and do not use harmful, GHG-emitting pesticides. Robust scientific research demonstrates that on average, diversified organic farming systems sequester more carbon, build healthier soils, increase biodiversity, and improve resilience. Investing in low-input, systems-based approaches like diversified organic agriculture is a climate smart solution for addressing excess carbon emissions in the atmosphere. Similarly, forestry and ecosystem restoration projects—including large-scale reforestation, afforestation, wetland restoration, and mangrove protection—can provide long-term carbon storage beyond the scope of conventional nature-based solutions. Other approaches, such as blue carbon initiatives that enhance carbon storage in coastal and marine ecosystems, enhanced weathering and mineralization techniques, and circular economy or industrial carbon utilization strategies, also offer potential climate benefits. Additionally, community-driven or decentralized carbon removal projects, which may not fit into large-emitter or industrial categories, can contribute to emissions reductions while advancing environmental justice objectives. Expanding the statute to explicitly include these categories would ensure a more comprehensive, equitable, and scientifically grounded approach to carbon removal.

4. Are there suggestions for further description of these categories, or ways to group categories?

As noted above, we recommend against separating biomass-based carbon removal with storage from bioenergy with carbon capture and storage. Those processes are functionally identical, and the only difference is whether the process is net carbon negative. Such claims are highly disputed and subject to differences in analysis, baseline, and protocol such that a project could be BiCRS one day and BECCS the next, subject to a change in protocol, which seems counterproductive. We argue that BECCS is never BiCRS, but even if we are wrong, there is no technical benefit to defining the problem away.

Financial Responsibility

SB 905 requires CARB to develop financial responsibility requirements that are “no less stringent than Section 146.85 of Title 40 of the Code of Federal Regulations, as that section read on January 1, 2022

5. In addition to the instruments listed in §146.85 of Title 40, are there other existing financial responsibility instruments CARB staff should consider?

The Legislature required CARB to develop regulations requiring the CCUS operator to maintain financial responsibility for at least 100 years after the last date of injection of carbon dioxide into a geologic storage reservoir and until such time as it can demonstrate the risk of carbon dioxide leakage poses no material threat to public health, safety, and the environment and to achievement of net zero greenhouse gas emissions. Since the financial responsibility requirements must be “no less stringent”, the list is in fact over-inclusive of what good public policy would allow. We need hundreds or thousands of years of accountability.

Oil companies are doing the vast majority of geologic carbon storage. Given their business models of pushing off liabilities until eventual bankruptcies, expecting oil companies to be around for a disaster in even the next few decades is ill-advised. A letter of credit is a far cry from third party insurance, and self-insurance is functionally the same as no financial responsibility instrument at all. We strongly recommend against allowing letters of credit and self-insurance as financial responsibility instruments given the scale of the problems, the unusual length of time of risk, and the business models of most of the participating companies.

Even third-party insurance requires that the operator maintain an active insurance policy well past when we can reasonably expect oil companies to continue paying insurance premiums, not to mention the risks that a long-term policy creates in the case of an insurance company going out of business over the course of centuries. Surety bonds, escrow accounts, and trust accounts are reasonable instruments for dealing with the scale of the risks.

CARB should also establish a state-administered fund for ongoing maintenance of site and repair and emergency response after the 100 year post-closure period. Several states require CCUS sites to be turned over to the state after the end of the post-closure period. Indiana,⁶ Texas,⁷ and North Dakota,⁸ among others, all provide for the transfer of ownership to the state once operators are no longer responsible for on-going maintenance of the project site. This ensures that there is clear and transparent responsibility for the security of the project site as long as carbon is stored. The state should impose a fee per ton of CO₂ injected that would be used in part to administer post-closure responsibilities, so the responsibility does not fall on the

⁶ IN SB 442, IC § 14-39-1-14(a)(2019)

⁷ TX HB 1796 (2009), TX Health and Safety Code § 382.507(a)

⁸ North Dakota Century Code § 38-22-17(6)(a).

public. The other part of this fund could be used to address claims by communities, businesses, and residents who are harmed from CO₂ storage in their area rather than rely on individual or private insurance policies to address the loss to property or personal injury. The same program should also be run as a socialized collective insurance fund, backing up companies whose set aside funds and insurance policies are insufficient to pay claims from impacted community members and businesses. This fund should be built up through a per-ton fee.

6. What other additions or changes to the existing requirements for financial responsibility should CARB consider and why?

Again, we recommend not allowing letters of credit, self-insurance, or other options that require oil companies to be financially healthy over hundreds of years. We are also skeptical of third party insurance.

7. How should the requirements account for scenarios such as ownership transfer, bankruptcy, change of ownership structure, change in insurance carrier, etc.?

Joint, several, and strict liability must attach to any company, person, or entity that owns, operates, or profits from any stage of carbon capture, use, and storage and downstream impacts. Ideally, such liability should also transfer upstream since, unlike in most toxic waste management, the money actually flows from the storage site upstream and thus control may be most effective from downstream up. Companies selling properties or shares must not be able to change this dynamic; that is, if, for example, California Resources Corporation were to sell its Carbon TerraVault I property to, say, Chevron, then CRC would still be jointly, severally, and strictly liable for any harms attributable to the project. Companies can (and will), of course, indemnify and assign liability as they see fit through contract, but ultimately all parties will be on the hook, given the likelihood that companies will cease to be in operation increases as a concern over time. Relatedly, we must ensure that these liabilities cannot be discharged in bankruptcy and that the state is the first in line during any bankruptcy proceedings.

Insurance companies must be likewise strictly, jointly, and severally liable, having profited from the projects. Even if coverage expires and/or a project operator chooses a new carrier, that change will only shift liabilities among the parties, not ultimate liability held among all parties. CARB must keep in mind that the alternative to internalizing these risks among project operators and owners and their insurance companies is to externalize the risks to the public, and particularly to the low-income, overburdened communities that these projects are likely to systematically target.

8. Are there other ways to address investment uncertainty through insurance, or other mechanisms?

CARB should also establish a state-administered fund for ongoing maintenance of site and repair and emergency response after the 100 year post-closure period. Several states require CCUS sites to be turned over to the state after the end of the post-closure period. Indiana,⁹ Texas,¹⁰ and North Dakota,¹¹ among others, all provide for the transfer of ownership to the state once operators are no longer responsible for on-going maintenance of the project site. This ensures that there is clear and transparent responsibility for the security of the project site as long as carbon is stored. The state should impose a fee per ton of CO₂ injected that would be used in part to administer post-closure responsibilities, so the responsibility does not fall on the public. The other part of this fund could be used to address claims by communities, businesses,

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and residents who are harmed from CO₂ storage in their area rather than rely on individual or private insurance policies to address the loss to property or personal injury. The same program should also be run as a socialized collective insurance fund, backing up companies whose set aside funds and insurance policies are insufficient to pay claims from impacted community members and businesses. This fund should be built up through a per-ton fee.

Criteria and Toxics Monitoring

SB 905 requires that all projects include monitoring of “criteria pollutants and potential toxic air contaminants at the one or more sites within the geologic storage complex and at mobile or fixed sites within the facility, and monitoring of ambient carbon dioxide concentrations over the geologic storage complex to facilitate leak detection.”

9. What project-specific air monitoring activities are CCUS/CDR developers currently conducting or intending to conduct, if any?

SB 905 requires CARB to develop monitoring and reporting schedules for CCUS projects to ensure the efficacy, safety, and viability of the projects. The goal of monitoring is to demonstrate that carbon dioxide leakage is not a material threat to public health, safety, and the environment and to achieve California’s net zero emissions target for at least 100 years after the site’s last injection.

To appropriately monitor the safety of the storage site, CARB must establish a baseline of the onsite conditions that will be the basis of comparison. CARB should require operators to provide baseline information regarding site conditions, including air quality, temperature, pressure, local sources of drinking water, groundwater quality, and any nearby sources of surface water, and any other criteria demonstrating suitability for long-term carbon storage. CARB should develop a schedule for regular inspections of the site to ensure that the site is behaving as expected. CARB should require annual inspections until the post-closure period where site inspections could be every 5 years unless there is evidence of leakage, seismic activity in the area, or another reason to question the structural integrity of the storage site formation.

CARB should also require the operator to develop a Monitoring and Reporting Plan as part of project approval. That report should identify the criteria emissions and toxic air contaminants emitted during each phase of project operation- site preparation, injection, closure, and post-closure. There should be continuous air quality monitoring with annual reporting for those emissions until the post-closure period if there is no sign of leakage where reporting would transition to three years of monitoring. Water quality monitoring should occur on a quarterly basis during injection activities and annually until post-closure and then every five years as long as there is no evidence of leakage. CARB should coordinate with local drinking water authorities, private well owners, relevant Regional Water Quality Control Boards, and the State Water Board to ensure there are no changes in water quality in the areas of CCUS projects and take action in the event monitoring data shows there is an issue.

Regulatory agencies must establish robust inspection procedures to verify that monitoring equipment is properly calibrated, maintained, and operated according to approved plans. Furthermore, agencies need to ensure that monitoring data is independently validated and made publicly accessible in real-time, rather than relying solely on self-reporting by project operators. This oversight becomes particularly crucial given that many monitoring activities, such as underground CO₂ retention monitoring and quarterly injection reporting, involve data that may be difficult for community members to independently verify.

The purpose of the monitoring program is to determine the effectiveness of CCUS. In the event monitoring demonstrates leakage, CARB's regulations should also outline a menu of corrective action. This should include fine schedules, surrendering of emissions reductions allowances or credits, and options for repair and timeline for repairs. Monitoring results and corrective action should be posted on CARB's CCUS portal in order to ensure transparency of the program.

10. What specific criteria pollutants or toxics emissions should be prioritized for monitoring and where along the CCUS/CDR project components (i.e. capture, transport, injection/utilization) should monitoring be prioritized?

First, we are concerned with this question asking what emissions should be prioritized. SB 905 is clear, this program must ensure: (1) GHGs are reduced, (2) in-state fossil fuel production must decrease, (3) CCUS project actually need to remove the carbon they say they are, and most importantly (4) these projects MUST be safe, both for our environment and all life. WHATEVER monitoring is necessary to ensure this MUST be required, AND project operators have the associated financial responsibility. No wording in the bill, now state law, gives CARB the ability to not include any monitoring that should be required.

Capture: Criteria Pollutants

For the capture portion of projects, we believe monitoring must address both existing source emissions as well as any emissions associated with carbon capture.

Regarding existing sources, CCUS projects exist to reduce GHGs and project owners must participate in reducing in-state fossil fuel production. Rather than accepting self-reported data from project owners, criteria pollutant monitoring needs to be incorporated to guarantee the requirements of the program and confirm operator reported data.

We believe NO_x, CO, and ROG/VOC monitoring at the emissions source is the best way to accomplish this. When reported, throughput and/or operating times can also be reported along with the associated emissions for the time period in question. If continuous emissions monitoring (CEMS) is already required by their air permits for any of these pollutants, that data already exists and can be included with this program reporting. While this is the process pollution sources should be using to calculate and report their annual emissions, the above recommendation would bring transparency to annual emission calculations and help show the broader goal of decreasing GHGs and fossil fuel production.

Appropriate baselines are also key. For all CCUS and engineered CDR projects, PM_{2.5} monitoring is appropriate, and it is essential that the baseline be the site prior to and without any CCUS/CDR. If a natural gas power plant, for example, adds CCUS, it will either dramatically decrease its power output or dramatically increase its PM_{2.5} to bring new power online to power the capture apparatus. The footprint of the whole facility needs to be considered as capture is brought online. What's more, given our renewable energy goals, natural gas power plants and other fossil fuel infrastructure will need to be phased out in the next decade or two. CARB must use baseline calculations that recognize that adding carbon capture to a point source is likely to delay its phaseout; in many situations, that would require attributing *all* of a point source's emissions to the capture apparatus, because absent the CCUS project, the point source would cease to create local, regional, and climate pollution altogether. For example, operations at the Chevron Kern River oil field - a site where companies plan to incorporate CCUS - typically emit criteria pollutants, PM_{2.5}/PM₁₀, and volatile organic compounds (VOCs), along with various

hazardous air pollutants (HAPs)¹² that should be identified through facility-specific Title V permits and health risk assessments. Rather than applying generic monitoring requirements, regulatory agencies should mandate site-specific assessments for each CO₂ capture location, requiring monitoring of pollutants the existing infrastructure previously emitted to ensure that CCS implementation does not result in violations of previously approved toxic emission levels.

Likewise, for a BECCS project that has been idle or nonexistent, the appropriate baseline is no pollution, so any increases in criteria and toxic pollutants must be monitored and accounted for by the BECCS project. Those emissions would likely include an array of toxic air contaminants, PM_{2.5}, PM₁₀, NO_x, SO_x, and ozone, as well as carbon emissions and potentially methane emissions if the project is producing or handling RNG. Relatedly, proper lifecycle analysis is essential; such projects *will* emit greenhouse gases and can only be counted as carbon negative by relying on modeling errors.¹³ CARB must be rigorous rather than optimistic.

The appropriate monitoring regime depends on the type of project and the materials in play. Any project relying on amine sorbents, for example, should be required to monitor for amines in the air and water.

Capture: Toxic Emissions

While the oil and gas sector is proposing CCUS projects, future projects are not limited to only this sector. Air monitoring requirements should thus be written in a manner that includes the flexibility to identify toxic emissions from all source categories that could submit a CCUS project. Then all toxics emitted over a certain level would require air monitoring. Given the variability in Reference Exposure Levels (RELs), both in time period and concentration, we would encourage CARB to set a percentage of REL requirement.

Transport

Transportation monitoring is essential. Pipelines must be carefully monitored to stop ruptures from occurring; such monitoring is probably less passive air monitoring and more frequent examination by both pipeline operators and state regulators (presumably the Fire Marshall, in this instance). The main risk *from* pipelines is carbon dioxide rupture, although the main risks *to* pipelines are contaminants, notably hydrogen sulfide and water, which can corrode the pipelines over time (water forming carbonic acid in the presence of concentrated carbon dioxide). SB 905 also requires that emissions from construction be minimized; notably, pipeline manufacture and installation can produce substantial local pollution, which must be monitored and mitigated. Trucks, rail, and barges can also be used to transport carbon. The criteria emissions from these sources are likely substantial at scale, particularly trucks, and the risks of smaller disasters, such as a truck, train, or barge collision causing a substantial local release of toxic and asphyxiating concentrated carbon dioxide, are much higher than for the typically larger scale disasters of pipeline ruptures. That is, with transportation by truck, rail, and barge, we can expect more disasters, but they will be more localized and typically less deadly, although they will release a steady stream of pollution from fuel combustion such that the risks and harms likely outweigh the benefits from a public health and climate perspective relative to pipelines. CARB should carefully regulate such emissions and limit those risks. Transportation-related pollution and risks must be included in a project's footprint and mitigated along with capture, use, and storage projects.

¹² <https://echo.epa.gov/air-pollutant-report?fid=110006825908>

¹³ <https://www.fern.org/publications-insight/six-problems-with-beccs-57/>

Transport infrastructure, such as the CTV I project's 11 miles of underground pipeline carrying pre-combustion gas from the cryogenic and fractionation natural gas plant, should primarily focus on CO₂ leak detection along with any co-transported compounds from the natural gas processing operations. At injection sites, monitoring should encompass both CO₂ concentrations and potential emissions from associated oil field operations, including the risk of blowouts or equipment failures at the six injection wells, ten monitoring wells, and six seismic monitoring wells planned for CTV I. Since these wells are not completely sealed systems, comprehensive leak monitoring becomes critical. The specific toxic compounds requiring monitoring at injection sites should be determined through review of health risk assessments typically attached to permits for oil-related power generation facilities, with priority given to toxics that approach regulatory limits and pose the greatest risk to nearby communities

Injection/Utilization

Storage sites must be monitored for criteria pollutants associated with drilling and injection, such as PM_{2.5}, PM₁₀, and ozone, as well as for volatile organic compounds, carbon dioxide leaks, hydrogen sulfide, and other toxics associated with drilling into oil and gas and other storage formations.

Plumes must also be monitored carefully underground to ensure they are behaving as expected. If plumes extend beyond the anticipated storage formation, then injection must be paused unless and until A) pore space rights are secured, B) potential risks to groundwater, surface water, and soil are studied and mitigated, and C) seismological risks are studied and found to be insignificant. If any of those conditions cannot be met, then injection must be stopped indefinitely.

For all sites, associated energy sources must be considered part of the project for monitoring and lifecycle analysis. Materials mining and production should also be included.

11. How long should criteria or toxics monitoring be conducted for?

At storage sites, monitoring must continue at least 100 years after the last injection. Monitoring must not be confined merely to the wellhead, but rather must be done across the storage formation, especially at known or suspected leak pathways such as abandoned oil and gas wells, water wells, and seismological faults.

At capture sites, monitoring must continue until the capture site is no longer active and the site is decommissioned. The same goes for pipelines. Transportation by truck, rail, or barge must be monitored until carbon is no longer being transported by a given means.

12. Are there examples of existing regulatory monitoring efforts being conducted in other sectors/sources that may be instructive for SB 905?

We highly recommend this 2023 study of monitoring at Norway's Sleipnir and Snohvit sites by the Institute of Energy Economics and Financial Analysis: "Norway's Sleipner and Snohvit CCS: Industry models or cautionary tales?"¹⁴ This report examined decades of monitoring of Sleipnir and Snohvit, often held up as shining examples of the promise of CCUS. Key findings of the report include: "Sleipnir and Snohvit demonstrate carbon capture and storage is not without material ongoing risks that may ultimately negate some or all the benefits it seeks to create...Every project site has unique geology, so field operators must expect the unexpected,

¹⁴ <https://ieefa.org/resources/norways-sleipner-and-snohvit-ccs-industry-models-or-cautionary-tales>

make detailed plans, update the plans and prepare for contingencies...Ensuring storage is securely maintained implies a high level of proactive regulatory oversight, activities for which governments may not be adequately equipped...Sleipnir and Snohvit 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.” While those projects are offshore, the lessons of the aggressively monitored and studied projects provide many applicable lessons for any geologic storage plans.

CARB also commissioned a study from Lawrence Berkeley National Lab (LBNL) back in 2018 that offered good suggestions for best practices. In geological carbon storage (GCS), LBNL suggested the first quantification methodology (QM) be an effective seal that contains injected CO₂. A secondary requirement is that the CO₂ be validated through the monitoring of injected CO₂ and its migration and trapping over time, including potential outside leakage while remaining deep in the subsurface. For QM purposes, monitoring is focused on the CO₂ plume footprint including free-phase CO₂ plume, brine or any other groundwater areas.

GCS sites will be expected to contain CO₂ for the long-term. Therefore, the monitoring focus should be on detecting, diagnosing and efficiently correcting or managing unanticipated or abnormal behavior. For the QM, one concern is surface leakage. In order to forecast potential surface leakage, reservoir and other deep location monitoring is necessary for both the injection and storage processes.

Temporal and spatial considerations must be taken when deploying monitoring equipment and efforts. Although deep, subsurface monitoring is not precise, it is a good indicator of differences in properties at any point in time. Monitoring activities need to be adjusted according to GCS operation. Standard operational monitoring should be carried out when injection is proceeding as planned. Contingency monitoring should be activated when there is indication of abnormal behavior and surface leakage detection and quantification should be deployed when surface leakage is suspected or detected. Monitoring plans for injection wells, oil and gas wells, faults and fracture networks must identify, locate and quantify leaks and potential leakage pathways.

Monitoring for well leakage failure uses the same methods and technologies as potential leakages from transmissive faults and fracture networks. The first challenge is detecting the leak. QM relevant surface leakage may involve methane (CH₄) or other reservoir gases with detection limits that are lower than CO₂. Leakage may occur at a very low rate and potentially derive from undocumented wells or faults in unknown locations. To detect this type of leak, broad aerial footprint monitoring of the free phase CO₂ plume is required. Potential examples include open-path laser infrared or other remote sensing methods.

CARB must also ensure monitoring of the storage formation relative to other geological formations. If carbon leaves the anticipated storage formation—even without leaking to the surface—it implicates pore space ownership rights. While the CNRA process to develop unitization rules has been paused, we highlight our position that forcing someone to accept toxic waste being stored on their property for thousands of years is a far more troubling proposition than removing oil and gas from a storage formation for profit, and, as such, we recommend a unitization rate of 100%.

Additionally, we strongly recommend that surface sensitive receptors are not forced to live, learn, pray, or play above billions of tons of toxic waste, so CARB must also require monitoring to ensure that storage formations do not leak into the space under sensitive receptors. Such

underground leakage raises concerning new risks regarding surface leakage, upping the stakes of such leaks substantially to include, for example, suffocation or toxic poisoning in a residential basement in which leaked carbon has pooled—a risk not present where there is no basement.

Likewise, CARB must be very careful to ensure storage formations do not leak into aquifers. If a storage formation breaks containment, then the project must be paused until A) appropriate pore space rights are attained, B) the operator can prove that no more carbon will migrate under sensitive receptors, and C) the operator can prove that no more carbon will leak into the aquifer. Strict requirements around ensuring carbon behaves as predicted will also encourage proper site characterization, which we have already seen being gamed in Mendota.¹⁵ However, such strict requirements are only meaningful when joined with likewise strict monitoring requirements and careful enforcement.

13. What frequency of monitoring and reporting should CARB consider, and should this differ by project type? Do you have estimates on costs for monitoring and reporting?

For air monitoring, CARB should require constant monitoring and quarterly reports, and reports should be publicly accessible on the project database. Project operators should also be required to check equipment, and regulators should do site inspections. The frequency of those checks varies not just by project type but also by piece of equipment. We encourage frequent checks and inspections, however, particularly for capture apparatus and materials, associated scrubbers and capture-site piping, and injection well integrity.

All monitoring and reporting should be digital, enter into real-time, cloud based databases, and publicly and/or governmentally accessible at all times. This fully transparent methodology ensures accurate, truthful reporting. Allowing records to be retained online until annual or semi-annual report time periods hides information, delays the identification of problems, and encourages owners and operators to adjust or manipulate data if it benefits them. It is 2025; this is a digital world. All monitoring and reporting should likewise be digital.

When it comes to subsurface monitoring of carbon plumes, a documented, risk-based approach should be put in place. Constant and intensive monitoring should commence at the start of injection to detect any unexpected outcomes early. For testing frequency, the focus should be on monitoring targets. When these demonstrate changes in testing parameters, higher frequency monitoring should be activated-- this during the 100 year period after the last injection.

Cost considerations must not influence air monitoring requirements for CCUS projects. SB 905 clearly mandates that CCUS projects demonstrate both greenhouse gas reduction efficacy and operational safety. Air monitoring is not a discretionary measure but a fundamental regulatory requirement. Therefore, whatever the cost, the project owner and operators are required to pay for them.

The entities currently pursuing CCUS projects are some of the worst environmental actors in the state. Oil and gas sector rules and requirements are overloaded with exemptions, loopholes, and leak allowances that these operators have consistently leveraged to avoid comprehensive environmental oversight. Given this track record, the CCUS state program must be very intentional and specific to not allow owners, operators, or local air districts to navigate around

¹⁵ Clean Energy Systems' application for their BECCS site in Mendota was found administratively incomplete because they could not justify why they thought the plume would travel to the northeast—with the town conveniently located to the southwest of the project.

requirements and protections. Any inclusion of terms as “cost effective” or similar qualifying language will inevitably justify inadequate monitoring or seek waivers from protective measures.

14. Should CARB consider different monitoring requirements at carbon capture sites versus carbon removals utilizing natural systems?

Yes. Nature-based carbon removal includes a wide variety of practices that need a different approach, but they still must be monitored and regulated. For example, we strongly support composting as part of a healthy soils program of natural carbon sequestration, yet composting itself must be done appropriately or it risks substantial local externalities, including air water pollution, noxious smells, and worker accidents and fatalities.

Minimizing local water and air quality impacts

SB 905 calls for strategies to ensure that carbon dioxide capture, removal, or storage projects minimize, to the maximum extent technologically feasible, local water pollution or air pollution from construction- and transportation-related impacts from the projects in communities adjacent to carbon dioxide capture removal, or storage projects, including a geologic storage complex.

15. What types of strategies are in use in other regulatory or voluntary programs that could be adapted to meet the statutory requirements?

A full Environmental Impact Report (EIR) must be required for all proposed capture, transport, and storage projects. Each capture project, pipeline, and sequestration site must have its own EIR, and each EIR must also consider the upstream and downstream impacts from the project. An EIR cannot tier off of local EIRs for approval; it must be a specific, targeted review for each individual project. No CCUS project should receive a California Environmental Quality Act (CEQA) exemption.

16. Are there other guardrails that should be considered beyond existing local, state, and federal regulations to minimize impacts? For example, many projects will have to meet the requirements of the California Environmental Quality Act (CEQA), what other requirements should be included and why? If proposing other requirements, please also provide any cost and time estimates for implementation.

A full Environmental Impact Report (EIR) must be required for all proposed capture, transport, and storage projects. No CCUS project should receive a California Environmental Quality Act (CEQA) exemption. As mentioned previously, cost considerations must not influence requirements for CCUS projects. SB 905 clearly mandates that CCUS projects demonstrate both greenhouse gas reduction efficacy and operational safety. Air monitoring is not a discretionary measure but a fundamental regulatory requirement. Therefore, whatever the cost, the project owner and operators are required to pay for them.

CCUS projects cannot proceed if they threaten groundwater and drinking water supplies or threaten to increase water pollution, soil pollution, truck or barge traffic, light pollution, noise pollution, or other nuisances to the community, defined as within a community designated radius from the project location. Any CCUS project cannot proceed if it threatens to negatively impact a source of drinking water by either degrading water quality or depleting surface water or groundwater supplies. Any CCUS project cannot proceed if it threatens to increase any local or regional criteria air pollutant or toxic air contaminant. Projects must include both baseline and fence-line monitoring for air pollution, and must have a pollution reduction plan to actually reduce local air pollution. All projects must demonstrate before construction and during the environmental analysis and review process that they will not increase pollution, and they must have a pollution reduction plan before the project proceeds.

As such many applications of CCUS should be prohibited altogether, as discussed above. We'd also like to highlight yet more concerns about BECCS. We strongly urge the Board to develop Program permitting rules that prohibit the use of CCUS for BECCS. BECCS projects emit climate pollution and air pollution across their lifecycle, harming the climate, public health, and environmental justice communities where BECCS facilities are typically sited, while also depleting forest ecosystems by incentivizing logging. Woody bioenergy projects convert trees and agricultural materials to electricity, hydrogen, methane, and other products using combustion, gasification, and pyrolysis. These processes release large amounts of climate-heating CO₂ and health-harming pollutants like particulate matter, NO_x, SO_x, and benzene.¹⁶ BECCS proponents incorrectly claim that putting CCS equipment on bioenergy facilities will make them "carbon negative" (i.e., leading to a net removal of CO₂ from the atmosphere). Because bioenergy production is not "carbon neutral,"¹⁷ adding CCS will not make these projects carbon negative.¹⁸ Instead BECCS projects release climate and air pollution at every stage by cutting carbon-storing forests, trucking and processing biomass, and converting trees to CO₂ and air pollutants which are not effectively captured by CCS.

When choosing carbon capture and storage sites, a risk-based selection process should be put in place. This, taking into consideration factors such as sensitive areas such as residential zones, hospitals, schools, community meeting spaces, such as parks as well as pollution-burdened communities.

When it comes to geologic considerations, it's imperative to understand that geologic materials pertaining to GCS vary widely-- even within short distances. A risk-assessment "failure scenario" approach should be taken. This approach considers likelihood and consequences of hypothetical events. For example, wells and boreholes are widely considered likely leakage sources. Based upon well saturation, construction and/or abandonment, estimates on leakage probability can be referenced.

CCUS infrastructure should not be sited in or near overburdened EJ communities. We recommend a minimum buffer distance of 10 miles from all capture, storage, and pipelines,

¹⁶ Booth, Mary S, Not carbon neutral: Assessing the net emissions impact of residues burned for bioenergy, 13 Env't Rsch. Letters 035001 (2018), <https://doi.org/10.1088/1748-9326/aaac88> Sterman, John et al., Does wood bioenergy help or harm the climate?, 78 Bulletin of the Atomic Scientists 128 (2022), <https://doi.org/10.1080/00963402.2022.2062933>; Center for Biological Diversity, Don't Be Fooled by Biomass Energy (2024), https://biologicaldiversity.org/programs/climate_law_institute/energy_and_global_warming/pdfs/Don't-Be-Fooled-by-Biomass-False-Solutions-fact-sheet-CBD.pdf

¹⁷ Mackey, B.G. et al., Burning forest biomass is not an effective climate mitigation response and conflicts with biodiversity adaptation, 4 Climate Resilience and Sustainability e70015 (2025), <https://doi.org/10.1002/cli2.70015>

¹⁸ A Statement by Scientists and Economists on BECCS From Forest Biomass (2021), <https://www.biofuelwatch.org.uk/wp-content/uploads/BECCS-letter-by-scientists-and-economists-1.pdf>; NRDC, A Bad Biomass Bet: Why the Leading Approach to Biomass Energy With Carbon Capture and Storage Isn't Carbon Negative (2021), <https://www.nrdc.org/sites/default/files/bad-biomass-bet-beccs-ib.pdf>; FERN, Six Problems with BECCS (2022), https://www.fern.org/fileadmin/uploads/fern/Documents/2022/Six_problems_with_BECCS_-_2022.pdf; Booth, Mary, Once you see it, you can't unsee it: "negative emissions" from BECCS is a scam, Partnership for Policy Integrity (2025), <https://www.pfpi.net/2025/07/once-you-see-it-you-cant-unsee-it-negative-emissions-from-beccs-is-a-scaml/>

unless a further distance is shown by scientific modeling to be necessary to conform with the prohibition on pollution articulated in the previous point. Ruptures of pipelines carrying compressed carbon dioxide can lead to severe short- and long-term health impacts to surrounding communities. The 2020 pipeline rupture in Satartia, Mississippi, is a clear example of the dangers of living near carbon dioxide pipelines. Further, carbon dioxide from the Cameroon Lake Nyos incident suffocated 1,746 people up to 15 miles away. Carbon storage can threaten groundwater and drinking water sources for communities. Carbon storage sites should not be situated near any overburdened EJ community or a drinking water source of any overburdened EJ community. Carbon capture risks extending the life of polluting sources and exacerbating local pollution. Carbon capture equipment should not be added to any facility near an overburdened EJ community.

CCUS projects must be powered by excess clean, renewable energy. Energy sources such as biomethane or hydrogen that aren't truly clean and renewable must not be allowed to power CCUS projects. Electrolytic hydrogen powered by wind and solar is clean and renewable, but it should be reserved for those rare circumstances where wind and solar with storage are not suitable to avoid the significant efficiency loss from using hydrogen. Relatedly, hydrogen should only ever be generated by electrolysis powered by clean, renewable energy, never from fossil fuels or biomethane. Additionally, CCUS should not be used as a mechanism to reduce potential hydrogen project CO₂ emissions.

The state must require research on potential adverse impacts, informed by impacted communities and community-based organizations, including worst-case scenario modeling, at local and statewide scales. Potential impacts should be studied at all stages, from capture and transportation to utilization and storage, and include impacts to air, water, soil, and public health. The California Geological Survey must complete a study on maximum sequestration potential in the state before storage projects can be allowed to proceed. As part of this study, CGS must determine not just the available volume of our formations suitable for storage, but also the maximum amount that can be safely stored over time and the maximum safe storage rate. For any formations that will be used for carbon storage, CGS must find that the formations will store the carbon for at least 1,000 years. This study should be conducted statewide but broken down to individual fields and suitable subdivisions (e.g., for oil and gas formations, pools). Once that study is complete, the state can allow carbon storage to be deployed in a manner that prioritizes safety and equity, avoids siting near disadvantaged communities, minimizes risks of leakage and seismicity, and remains suitably distant from all sensitive receptors.

Storage project operators must assess and prove stable geology where projects are to be sited and ensure no risk of leakage, and they must prove that projects will not increase geological risks. Before projects can proceed, the State Geologist must certify that proposed projects are in geologically stable areas and that the proposed project will not increase seismicity.

CARB must ensure that any carbon stored underground will be permanently stored for at least 1,000 years. While SB 905 requires CARB to identify formations capable of such permanent storage, the statute is curiously silent on requiring that only such formations be used for storage, and this loophole must be fixed in this rulemaking.

CARB must also ensure proper site characterization. Before being permitted to sequester carbon, an operator must properly characterize the storage site and demonstrate conclusively that the carbon will be stored where they say it will be stored. A mere assertion of expected behavior is insufficient. The Clean Energy Systems (CES) BECCS facility being planned for Mendota is a good illustration of this concern. In its permit application to the U.S. EPA, CES

stated that the plume would move Northeast without providing evidence, let alone proof. Incidentally, many people reside to the Southwest, which, if the plume traveled in that direction, would presumably involve more property owners and thus more issues with property rights, as well as more potential opposition by community members who don't want millions of tons of a deadly asphyxiant stored under their homes. The state cannot rely on such opportunistic assertions.

Relatedly, CARB must require and verify monitoring of carbon storage to ensure that the carbon is behaving as expected underground. Plume monitoring must be extensive enough to ensure that carbon is not moving beyond where project operators have projected. If the plume does extend beyond the projected storage area, CARB must pause storage injections until appropriate storage rights are attained and all applicable laws are met for the new storage area, including new plume monitoring as needed.

For a sequestration project to proceed, the State Geologist must certify that the project is unlikely to harm groundwater supplies. Specifically, the Geologist must find that the project will not cause groundwater acidification from carbonic acid, that the project will not result in acids carrying heavy metals into groundwater, and that the project will not create enough pressure to force formation of saltwater into groundwater supplies.

In addition to requiring a full EIR under CEQA, CARB must require additional notification. Specifically, the state must require notification for any residents or schools within the set buffer distance near a planned site for any CCUS at least 6 months before a permit application. Notification must occur by direct mailing to owners and occupants. The agency or agencies coordinating the public process should connect with and compensate community based organizations to develop a comprehensive, transparent approach tailored to the community involved. Notification must be multilingual.

Once notification occurs, there must be at least 3 workshops or community meetings with the opportunity for residents to raise concerns with the project moving forward and require community benefits as a condition of the project proceeding. The public must be involved in the review of the project with workshops or community meetings at accessible times and locations, with interpretation services and translated materials provided, for residents to learn about the project, raise concerns, reject any project from moving forward, and require conditions providing community benefits before any project proceeds.

17. Is there any information from existing studies or projects to inform a CEQA analysis for the rulemaking?

For storage projects, we highly recommend this 2023 study of Norway's Sleipnir and Snohvit sites by the Institute of Energy Economics and Financial Analysis: "Norway's Sleipner and Snohvit CCS: Industry models or cautionary tales?"¹⁹ This report examined decades of monitoring of Sleipnir and Snohvit, often held up as shining examples of the promise of CCS. Key findings of the report include: "Sleipnir and Snohvit demonstrate carbon capture and storage is not without material ongoing risks that may ultimately negate some or all the benefits it seeks to create...Every project site has unique geology, so field operators must expect the unexpected, make detailed plans, update the plans and prepare for contingencies...Ensuring storage is securely maintained implies a high level of proactive regulatory oversight, activities for which governments may not be adequately equipped...Sleipnir and Snohvit cast doubt on whether the world has the technical prowess, strength of regulatory oversight, and unwavering

¹⁹ <https://ieefa.org/resources/norways-sleipner-and-snohvit-ccs-industry-models-or-cautionary-theses>

multi-decade commitment of capital and resources needed to keep carbon dioxide sequestered below the sea—as the Earth needs—permanently.” While those projects are offshore, the lessons of the aggressively monitored and studied projects provide many applicable lessons for any geologic storage plans.

Permit and Project Portal

SB 905 requires that CARB adopt regulations for a unified permit application for the construction and operation of carbon dioxide capture, removal, or sequestration projects to expedite the issuance of permits or other authorizations for the construction and operation of those projects. Project developers and non-state agency use of a streamlined permit application is voluntary. CARB is also developing a data and information portal to assist project developers through the permitting process. This portal will also support the implementation of the unified permit application.

NOTE: SB 905 does not call for CARB to issue permits for the construction or operation of CCUS or CDR projects

18. What key issues should CARB address when developing the unified permit application?

CARB must follow the direction from SB 905, HSC section 39741.2(c) and (d) - emphasis added:

(c) The unified permit application developed by the state board pursuant to subdivision (a) ***shall not impair, abridge, or alter any rights or obligations under the California Environmental Quality Act*** (Division 13 (commencing with Section 21000) of the Public Resources Code), or its implementing regulations, with respect to the review or approval of a carbon dioxide capture, removal, or sequestration project.

(d) The unified permit application developed by the state board pursuant to subdivision (a) is for the purpose of efficiency but ***shall not displace the role of individual permitting agencies and shall not eliminate, abridge, or reduce the review or issuance of the individual permits covered by the application by the respective agencies***. As part of the unified permit application, the state board shall, where possible, streamline duplicative administrative requirements or permit application questions.

CARB may and should, however—in its discretion under 39741.1(a)(3) to “ensure” that projects minimize pollution, include monitoring, and meet BACT requirements—introduce a new CARB permit to ensure that projects meet all CARB regulations. CARB staff have argued that they don’t have permitting authority; that is not true. Rather, they don’t have a separate permit requirement *yet*, but they certainly could. (See, e.g., the statutory basis for the Low Carbon Fuel Standard.) Introducing a CARB permit would be helpful and perhaps even essential to enacting 39741.1(a)(3), and it is permissible under the rulemaking authority granted under 39741.1(c). A CARB permit would be in addition to the unified permit application; that is, the voluntary unified permit application would include the CARB permit, but an operator could still opt out of the unified application and instead need to apply separately for the CARB permit, among others.

19. Considering the data and information portal will be voluntary to use, what features of the permit portal would increase the likelihood the portal is used by both project developers and permitting agencies?

We suggest collapsing the CCUS project database into the data and information portal to ease in promoting transparency. Combining the two systems would also be helpful in encouraging

uptake of the voluntary system since project operators will already be required to upload information to the public database, and ideally, they are largely coextensive.

20. Are there examples of existing similar systems (e.g. CEQAnet) that CARB should look to when developing the permit portal?

We do not have an answer to this question.

21. Are there examples of existing public CCUS project databases that we should look to and/or emulate for public reporting on project deployment?

We do not have an answer to this question.

Integration with Existing State Programs and Potential New Policy Support

Projects developed under SB 905 have the potential to be used for compliance or reporting under several state climate efforts and programs. Those programs include the following:

- Reducing the Cap-and-Trade compliance obligation for capturing and storing carbon from the state's largest greenhouse gas facilities such as power plants and manufacturing and offsets for ambient air carbon dioxide removal.
- The Low Carbon Fuel Standard to reduce transportation fuel carbon intensity or generate direct air capture credits.
- Reporting under the Corporate Greenhouse Gas Reporting and Climate Risk Financial Disclosure Programs
- Reducing the carbon intensity of products included in the program for Embodied Carbon in Buildings
- The Net Zero Emissions Strategy for the Cement Sector

22. What role could projects developed under SB 905 play in these programs and are there other programs or policies in which carbon capture removal, storage, and utilization could play a role for compliance?

AB 32 outlines several requirements for California's climate programs; specifically, HSC Section 38562(d)(1) states: "The greenhouse gas emission reductions achieved are real, permanent, quantifiable, verifiable, and enforceable by the state board." There are additional requirements about cost effectiveness, addressing air pollution, and ensuring no disproportionate harm to environmental justice communities.

With that guideline in mind, there is no case to be made that including projects developed under SB 905 fulfill the letter or promise of the law. These projects are expensive, hard to verify and monitor, and will disproportionately impact environmental justice communities. To the extent harmful projects or technologies are allowed to proceed, California should at a minimum refrain from incentivizing them through our climate programs.

We oppose including CCUS (including BECCS and DACCS) in Cap-and-Trade and the LCFS. In Cap-and-Trade, any CDR operates as a moral hazard, directly facilitating continued direct emissions rather than reducing and eliminating them. We oppose all offsets, and we certainly oppose adding more offsets and more types of offsets, especially when claims about DACCS and BECCS are overblown. BECCS is particularly vexing because, as discussed above, it is infeasible that there will ever be carbon-negative BECCS. DACCS *could* be carbon negative, but its opportunity cost is exceptional. Both technologies (or really, sets of technologies) are exceptionally expensive and inefficient. While we think BECCS should be prohibited outright, for DACCS, we simply oppose public subsidies, which, if we're honest, is functionally the same given the limited private offset market as the main alternative. The problem is that DACCS is

unlikely to benefit from economies of scale or to substantially reduce in price. As such, pouring trillions of dollars into the program—the level of spending needed to achieve even modest climate benefits, is at best a poor use of the public fisc and at worst a boondoggle. What better and more efficient climate spending could we use those trillions for?

Moreover, DACCS carries inherent harms and risks. How are the projects powered? What harms accrue from those power systems? Assuming the projects use renewable energy, what fossil fuels would have been displaced had those renewable resources been brought to the grid? (DACCS using fossil fuels is on its face counter-productive.) How can the Cap-and-Trade program account for these systemic harms? As far as we can tell, it can't do so effectively. Further, geological carbon storage carries inherent risks, irrespective of from where the carbon is sourced.

Our concerns with including these technologies in the LCFS are similar but even more acute. We are including an excerpt from our February 20, 2024, letter regarding the LCFS rulemaking last year. The staff proposal on direct air capture was adopted largely unchanged. Several of these concerns apply equally to Cap-and-Trade, while some are unique to the LCFS program.

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.²⁰ 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

²⁰ Captured CO₂ can also be used. The only use for CO₂ proven at scale is for EOR, discussed further below.

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 an 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.

Because carbon is just 0.0421% of the atmosphere, capturing it from the ambient air is exceptionally expensive and energy intensive.²¹ Considering the challenges of quickly deploying renewable energy with storage and transmission to keep up with demand 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.²² 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.

²¹ 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>.

²² E.g., Section 95488.8(i)(1)(B)(3).

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 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.²³ 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.²⁴

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.

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.

²³ 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>.

²⁴ 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.

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.²⁵ Moreover, DAC's intended purpose is to gather and concentrate CO₂, which is a toxic waste.²⁶ 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.²⁷ 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."²⁸

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. Further, carbonic acid tends to carry heavy metals such as arsenic, which *can* spoil drinking water supplies.²⁹

²⁵ 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.

²⁶ 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.

²⁷ The oil and gas industry has studied EOR using captured carbon extensively, but as a climate tool geological carbon storage remains in its infancy.

²⁸ 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>.

²⁹ 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/>.

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.”³⁰ 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.” 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

³⁰ California Air Resources Board, *Standardized Regulatory Impact Assessment (SRIA): Proposed Amendments to the Low Carbon Fuel Standard Regulation* (Sept. 9, 2023).

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.³¹ This is deeply troubling given that an estimated 80% of global captured carbon is being used to increase oil production.³² 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.³³ 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.

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.³⁴ 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.

23. Are there other things the state could be doing to scale up deployment of projects under SB 905?

CCUS and DACCS projects are the most expensive way to address carbon issues, so we should put limited reliance on them and we should not heavily incentivize them, given the opportunity costs depriving other, cheaper, better-proven solutions that tend to have greater local benefits. That said, we support healthy soils programs, and we would like to see the state stop funding and supporting expensive climate dead ends and instead focusing on healthy soils and other nature-based solutions. We prefer to see tax revenue or revenue from a state market used to support good policy, including sustainable agriculture, rather than offsets in Cap-and-Trade or a credit market like the LCFS, where any healthy soils incentives come at the expense of reduced ambition on phasing out fossil fuels.

There are certain sectors where we take no collective position on the use of CCUS, such as cement and geothermal energy. We do not support scaling up deployment in those areas, nor

³¹ 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>.

³² Garcia Freitas, 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.

³³ 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>.

³⁴ 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/>.

do we necessarily oppose scaling them up, as long as they are A) done safely with strong regulations, and B) not used as a Trojan Horse to force through other applications that are counter to our climate and clean air goals and to justice.

24. Is there a potential role for carbon removal using climate-smart agriculture practices under the SB 905 framework?

Yes. We support climate-smart agricultural practices as a form of CDR given their multivalent benefits, exceptionally low costs (for example, composting costs about \$15/ton compared to \$500/ton for DACCS, which means DACCS is about 3,300% more expensive and achieves no local non-economic benefits, unlike healthy soils programs), and ready deployability. The statutory definition of “carbon dioxide removal project” is “a project that uses a process to remove carbon dioxide from the atmosphere.” That definition plainly encompasses agricultural processes that remove carbon from the atmosphere.

As the state looks to accelerate the deployment per the directive in SB 905’s companion bill, AB 1279 (Muratsuchi, 2022), we believe that nature-based carbon sequestration includes an essential suite of policies and practices that the state must prioritize for deployment and incentives. The relevant part of AB 1279 is as follows: “Identify and implement a variety of policies and strategies that enable carbon dioxide removal solutions and carbon capture, utilization, and storage technologies in California to complement emissions reductions and achieve the policy goals stated in subdivision (c).” Natural carbon sequestration is the only group of carbon removal practices that are mature, efficient, and ready for scaled deployment, and they offer numerous local co-benefits.³⁵

Protocols

SB 905 authorizes CARB to adopt protocols to support additional methods of utilization or storage of captured carbon dioxide.

25. Are there certain carbon capture, removal, utilization, and storage project type methodologies that should be prioritized based on existing science, existing methodologies, or implementation experience?

Nature-based solutions are proven to help permanently sequester carbon (while also promoting a sustainable food and agriculture system) and should be given priority. Soil carbon sequestration and regenerative agriculture practices, such as cover cropping, no-till farming, and improved grazing management, can store significant carbon in soils. Similarly, forestry and ecosystem restoration projects—including large-scale reforestation, afforestation, wetland restoration, and mangrove protection—can provide long-term carbon storage beyond the scope of conventional nature-based solutions.

26. Should CARB consider adopting project type specific protocols or defining more widely applicable standards, or a combination of both? If CARB were to define key standards applicable to all methodologies as opposed to individual methodologies based on specific technology or storage, what could those look like (i.e. recommendations on existing standards), and would that approach help to scale and innovate in this space faster than development of individual protocols?

We do not have an answer to this question.

³⁵ We disagree with the legislature’s charge in AB 1279 to advance CCUS, but as discussed elsewhere, we read this provision as supporting only those CCUS technologies and applications that are in the public interest, which excludes a majority of proposals for the state—but not necessarily all (e.g., we remain neutral on using CCUS for cement and geothermal energy).

Public Project Database:

27. Are there examples of existing public CCUS project databases that we should look to and/or emulate for public reporting on project deployment?

We do not have an answer to this question.