October 24, 2022

California Air Resources Board ("CARB")
1001 "I" Street
Sacramento, CA 95814

SUBMITTED VIA ELECTRONIC SUBMISSION

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RE: Comments on the Recirculated Draft Environmental Analysis for the 2022 Draft Scoping Plan

Dear Board Members and Staff of the California Air Resources Board:

The Center for Biological Diversity, Center on Race, Poverty & the Environment, Leadership Counsel for Justice and Accountability, Center for Community Action and Environmental Justice, People Organizing to Demand Environmental and Economic Rights, Physicians for Social Responsibility-Los Angeles, Asian Pacific Environmental Network, and the California Environmental Justice Alliance appreciate this opportunity to comment on the Recirculated Draft Environmental Analysis ("RDEA") for the 2022 Draft Scoping Plan Update ("Draft Scoping Plan"). We provide a summary of our comments here:

1. CARB must release an updated Draft Scoping Plan along with an updated draft EA to ensure meaningful public participation.
2. CARB must re-do the RDEA's alternatives analysis to match the scenarios proposed under the Draft Scoping Plan and RDEA.
3. CARB must consider the Real Zero Alternative proposed by the California Environmental Justice Alliance.
4. CARB must not use carbon capture and storage ("CCS," or "CCUS") or engineered carbon dioxide removal ("CDR") on any fossil fuel infrastructure or bioenergy facilities.
5. CARB must not count bioenergy carbon capture and storage ("BECCS") toward the proposed carbon removal targets.
6. CARB must analyze and mitigate air quality and water quantity and quality impacts of CCS and BECCS. CARB must also analyze health impacts associated with the environmental impacts of CCS and BECCS.

7. CARB must conduct a separate, comprehensive environmental analysis in its future rulemaking per SB 905, and require project-level environmental impact reports for potential CCS & engineered CDR projects.
8. CARB must directly reduce emissions via an explicit plan to phase out oil and gas extraction by 2035 at the latest, and analyze the environmental impacts of this action.
9. CARB must analyze the environmental and health impacts of Cap-and-Trade.
10. CARB must exclude polluting fuels from the Low Carbon Fuel Standard ("LCFS") while increasing the standard's stringency.
11. CARB must add the action directed by the CARB Board and Environmental Justice Advisory Committee ("EJAC") to begin planning a managed phase down of oil refineries.

1. CARB must release an updated Draft Scoping Plan along with an updated draft EA to ensure meaningful public participation.

On September 9, CARB released the RDEA for public review and comment. The RDEA's project description section outlines anticipated changes to the CARB's Draft Scoping Plan, such as "the addition of offshore wind energy generation facilities" and "targets for carbon removal of 20 MMT in 2030 and 100 MMT in 2040, with focus on natural and working lands first".[1] CARB also provides an updated table on proposed actions for the Proposed Scenario in Tables 2-1 and 2-2, as well as an updated summary of reasonably foreseeable compliance responses to these proposed actions.[2] Disappointedly, CARB did not release an Updated Draft Scoping Plan nor updated modeling results based on, and to concurrently accompany, these proposed changes. We recently learned that CARB will conduct a public workshop on updated modeling results for the Scoping Plan on October 28, after these comments are due.

Public participation is an essential part of the CEQA process.[3] Commenters must have sufficient information about an agency's proposed project in order to recommend alternatives or mitigation measures to reduce significant environmental impacts that could result from the project.[4]

Yet CARB's release of the RDEA without releasing an Updated Draft Scoping Plan along with updated modeling outcomes at the same time undermines meaningful and robust public participation. Without the details on the changes that CARB has made to the Draft Scoping Plan's proposed actions, the public lacks the necessary information it needs to know what CARB is actually proposing. For instance, although CARB states in the RDEA that it intends to achieve the newly proposed carbon removal targets with a "focus on natural and

[1] Cal. Air Res. Bd, *Recirculated Draft Environmental Analysis* (Sept. 9, 2022)[hereinafter RDEA] at 11, https://ww2.arb.ca.gov/sites/default/files/2022-09/2022-draft-sp-appendix-b-draft-ea-recirc.pdf.
[2] RDEA at 17-19 (Table 2-1 & 2-2); RDEA at 20-40.
[3] Cal. Pub. Res. Code § 21000; Cal. Code Regs. tit. 14, § 15201.
[4] Cal. Code Regs. tit. 14, § 15204.

working lands [("NWLs")] first," this statement is not enough for the public to know what types of reasonably foreseeable responses CARB envisions to remove GHGs from NWLs.[5] It is also difficult to tell whether CARB is even serious about this priority. CARB only includes these targets in Table 2-1 on actions related to AB 32 GHG Inventory Sectors, but does not include them in Table 2-2 on actions related to NWL sectors.[6]

CARB must release an updated Draft Scoping Plan and modeling outcomes, along with an updated draft EA that analyzes the full environmental and health impacts of the proposed plan.

2. CARB must re-do the RDEA's alternatives analysis to match the scenarios proposed under the Draft Scoping Plan and RDEA.

Under Title 17, Section 60004.2(a) of the California Code of Regulations, the Scoping Plan's EA must contain "[a] discussion of a reasonable range of alternatives to the proposed project [that] could feasibly attain most of the project objectives but could avoid or substantially lessen any of the identified significant impacts[]."[7] Additionally, CARB must analyze a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation.[8]

Bewilderingly–and contrary to the law–the draft EA and RDEA alternatives *differ from* the scenarios in the draft Scoping Plan. This discrepancy prevents the public from having access to the necessary information to evaluate the relative environmental impacts of the proposed scenarios.[9] Despite being alerted of this error earlier in the process, CARB continues to be in violation of Section 60004.2(a)(5). Furthermore, although CARB included new proposed project objectives, project descriptions, and proposed actions, it has failed to incorporate any of these changes into its alternatives discussion in the RDEA.

In particular, CARB included three additional objectives into RDEA, Objectives 21-23, that require it to revise the alternatives analysis in order to comply with Section 60004.2(a)(5).[10] For instance, Objective 22 states that it is the goal of the Scoping Plan to describe how to equitably achieve vehicle miles traveled (VMT) reductions of 25% per capita below 1990 levels by 2030 and 30% per capita below 1990 levels by 2045.[11] Given this and other new objectives, CARB should have but completely failed to discuss whether each proposed alternative could

[5] RDEA at 11.
[6] RDEA at 18.
[7] Cal. Code Regs. tit 17, § 60004.2(a)(5) (citing Cal. Code Regs. tit. 14, § 15126.6).
[8] Cal. Code Regs. tit. 14, § 15126.6(a), (f) (lead agencies must consider a reasonable range of potentially feasible alternatives that will foster informed decision making and public participation).
[9] Cal. Env't Justice All. ("CEJA"), *Comments on Specific Sectors and Greenhouse Gas Emission Reduction Measures in the 2022 Draft Scoping Plan* (Comment 662 for Draft 2022 Climate Change Scoping Plan) (June 24, 2022), https://www.arb.ca.gov/lists/com-attach/4453-scopingplan2022-UjFQM1I5VWdRCAlt.pdf [hereinafter *CEJA June 24 Cross-Sector Comments*].
[10] RDEA at 283.
[11] RDEA at 15; 283.

feasibly attain them while avoiding or substantially lessening significant environmental impacts per Section 60004.2(a)(5).

Similarly, since CARB has otherwise substantially updated the project description, it must also update its alternatives analysis. CARB revised the project description section of the proposed scenario to include new information, including:

- "The addition of offshore wind generation facilities";
- Expansion of "reasonably foreseeable responses associated with Natural and Working Lands, including: land application of compost to rangelands and grasslands; reduced fertilizer use," among other responses; and
- "Targets for carbon removal of 20 MMT in 2030 and 1000 MMT in 2045, with focus on natural and working lands first."[12]

CARB included other substantive changes to the actions for the proposed scenario in Tables 2-1 and 2-2, such as the proposal that 20% of aviation fuel demand will be met by electricity or hydrogen in 2045 and offshore wind target of 20 gigawatts by 2045.[13]

The substantial changes CARB has made to the proposed scenario will most likely change the types and magnitude of environmental and health impacts of this scenario. Given these likely changes, CARB should have but fails to revise its discussion on the relative impacts of alternatives compared to the proposed alternative. In order to comply with CEQA, CARB must re-do the EA's alternatives analysis so that it compares the relative environmental impacts of Alternatives 1-4 as they are proposed in the Draft Scoping Plan and modified in the RDEA.

3. CARB must consider the Real Zero Alternative proposed by the California Environmental Justice Alliance.

CARB erroneously states that no comments suggested an alternative comprehensive approach to meet the State's long-term GHG emission reduction goals.[14] CARB ignores the fact that CEJA has proposed the Real Zero Alternative, a comprehensive alternative to reach California's emissions reduction goals, in its June 24 comment letter.[15] CARB failed to and must analyze the Real Zero Alternative in this EA.

[12] RDEA at 11.
[13] RDEA at 17-20.
[14] RDEA at 281.
[15] See *CEJA June 24 Cross-Sector Comments* at Attachment A: Real Zero Alternative – June 2022.

4. **CARB must not use carbon capture and storage ("CCS," or "CCUS") or engineered carbon dioxide removal ("CDR") on any fossil fuel infrastructure or bioenergy facilities.**

    a. **CARB should clarify that SB 905 and SB 1314 prohibit the use of captured CO_2 from CCS for enhanced oil recovery purposes.**

We are pleased to see CARB recognize in the RDEA that SB 905 would prohibit an operator to inject CO_2 from a carbon capture, removal, or sequestration project into a Class II injection well for enhanced oil recovery ("EOR") purposes.[16] We recommend that CARB also acknowledge in the RDEA that SB 1314, also passed and signed into law in 2022, similarly prohibits EOR using captured CO_2.

The RDEA discusses the possibility of EOR in conjunction with CCS projects in existing oil fields.[17] Since SB 905 and SB 1314 are now law, CARB should remove the outdated language on the possibility of performing EOR using CCS and CDR, and clarify that such actions are prohibited per these two bills. We also recommend that CARB clarify that it will not study the environmental impacts of using CCS or engineered CDR for EOR since it is not a reasonably foreseeable compliance response to the Scoping Plan.

    b. **CCS must not be used on other fossil fuel infrastructure, including refineries and power plants, or on bioenergy facilities.**

Proposed CCS projects for California include (1) post-combustion CCS for refineries and gas-fired power plants, (2) pre-combustion CCS for IGCC power plants including BECCS plants, and (3) oxy-combustion CCS for bioenergy facilities. As our organizations have previously commented, CARB must not use CCS on any fossil fuel infrastructure, such as refineries and power plants. CCS must not be used to extend the life of California's fossil fuel infrastructure. In particular, our organizations have demonstrated the infeasibility and high costs of installing CCS technology on refineries in California.[18] CCS may only be appropriate to consider for processes and end uses that cannot be served by non-emitting alternatives.

Therefore, we are deeply concerned that CARB now proposes to rely on "dispatchable zero-carbon resources such as Allam-Cycle CCS technology," as well as categorize this technology as a renewable energy source.[19] CARB's proposal to count Allam-Cycle CCS

[16] RDEA at 152.
[17] RDEA at 152.
[18] *See* Cal. Env't Justice All. ("CEJA"), *Comments on Specific Sectors and Greenhouse Gas Emission Reduction Measures in the 2022 Draft Scoping Plan* (Comment 668 for Draft 2022 Climate Change Scoping Plan) (June 24, 2022), at 20-29, https://www.arb.ca.gov/lists/com-attach/4459-scopingplan2022-UDMAY1Y9V2VQCQBk.pdf.
[19] RDEA at 20-21.

technology as renewable energy is completely unsupported and in error. Promotional materials, scientific analyses and the technology's manufacturer itself all assert that the Allam-Cycle is a "**novel natural gas power plant** design that can theoretically capture 100 percent of emissions."[20] On its face, Allam-cycle is not a "zero-carbon" resource, as it does not account for methane leakage into the atmosphere during the production and transporting of natural gas to the power plant or the potential leakage of stored carbon after it has been captured.[21] Additionally, there is only one plant, a 50 MW test facility in Texas, that has currently operated using Allam-Cycle, so whether it can capture 100% of on-site emissions at a larger scale remains unknown.[22]

Furthermore, Allam-Cycle is a design for new power plants, not for modification of existing facilities. According to its manufacturer, it involves an innovative technique of "burning natural gas with pure oxygen" (oxy-combustion), fed through a high-pressure system to a new, specially-sized turbine, and equipped with both a recuperative process and a CO_2 disposal method.[23] Because it is an entirely new design, it requires the construction of new, complex gas-fired power plants and cannot be retrofitted onto existing power plants.[24]

In sum, CARB should delete any reference to the Allam-Cycle in the RDEA. This CCS technology is not "zero-carbon" and its use would require the construction of new gas-fired generation in order to "theoretically" capture carbon, an unproven contention at the utility-scale.

Additionally, CARB must not use CCS on bioenergy facilities, as they pose significant environmental, public health, and climate risks and impacts. See additional discussions in Sections 5 and 6.[25]

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[20] David Yellen, *Carbon Capture and the Allam Cycle: The future of electricity or a carbon pipe(line) dream?*, Atlantic Council (May 21, 2020) [hereinafter Yellen 2020], https://www.atlanticcouncil.org/blogs/energysource/carbon-capture-and-the-allam-cycle-the-future-of-electricity-or-a-carbon-pipeline-dream/; see also NET Power, *The Four Steps to Advanced Clean Energy: How NET Power Technology Works* (2021)[hereinafter *NET Power, The Four Steps to Advanced Clean Energy*], https://netpower.com/technology/.

[21] *See* Raghav Chaturvedi et al., *CO2 Sequestration by Allam* Cycle, Senior Design Reports, University of Pennsylvania 123 (April 20, 2021), https://repository.upenn.edu/cgi/viewcontent.cgi?article=1135&context=cbe_sdr.

[22] *See* Yellen 2020.

[23] *See NET Power, The Four Steps to Advanced Clean Energy*.

[24] Karl M. Bandilla, *Future Energy (Third Edition) – Improved, Sustainable and Clean Options for Our Planet.* Chapter 31 – Carbon Capture and Storage, 669, 688 (2020) https://www.sciencedirect.com/science/article/pii/B9780081028865000311?via%3Dihub.

[25] This letter incorporates by reference the comment submitted by the Center for Biological Diversity to Liane M. Randolph. Ctr. for Biological Diversity, *Re: Center for Biological Diversity Comments on Draft 2022 Scoping Plan Update* (June 24, 2022), https://www.arb.ca.gov/lists/com-attach/4347-scopingplan2022-U2FTZwZYVTYBMVIN.pdf. Pages 24-34 refer specifically to CCS and BECCS.

5. CARB must not count bioenergy carbon capture and storage ("BECCS") toward the proposed carbon removal targets.

CARB briefly states in the RDEA that it is setting new targets for carbon removal of 20 MMT in 2030 and 100 MMT in 2040 in the revised Scoping Plan, "with focus on natural and working lands first."[26] However, as described above, the RDEA does not provide the necessary information on how CARB will achieve these ambitious carbon removal targets. This is problematic because the Draft Scoping Plan indicates that the potential for carbon dioxide removal ("CDR") is limited, equating to ~1-2 MMT CO_2e in 2030,[27] compared to the proposed target to remove 20 MMT by 2030. Furthermore, CDR that is achieved through "natural" versus "engineered" methods have significantly different risks and impacts. It is imperative that CARB in the RDEA addresses how CDR targets will be met and assess the differential impacts of natural and engineered CDR methods.

For example, CDR through "natural carbon sequestration" occurs via CO_2 uptake and storage by vegetation and soils in ecosystems and other NWLs. Key "natural" CDR methods include the protection of forests, shrublands, wetlands, and other ecosystems that act as enormous carbon storehouses that pull CO_2 out of the air, in addition to providing many other benefits such as wildlife habitat, recreation, flood and erosion control, and clean air and water.[28]

On the other hand, "engineered" CDR are CO_2 removal methods using machinery and chemicals, such as direct air capture with CCS ("DACCS") which is in its infancy, very energy-intensive, and costly. The Draft Scoping Plan also includes BECCS as a CDR method,[29] although BECCS has not proven to be carbon negative and poses significant risks to public health, safety, ecosystems, and the climate.

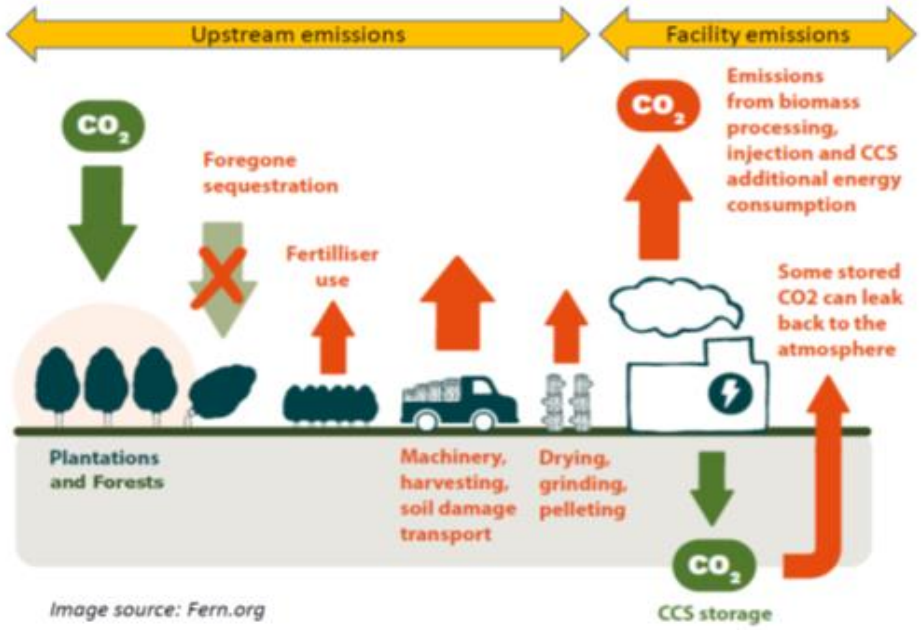
In particular, we caution that CARB must not count BECCS as a means of achieving CDR targets. BECCS is often incorrectly promoted as being carbon negative, meaning that proponents claim it will remove CO_2 from the atmosphere. This claim is often based on the inaccurate belief that biomass energy is carbon neutral, though this belief has been thoroughly debunked.[30] Substantial CO_2 emissions and co-pollutants are emitted throughout the BECCS

[26] RDEA at 11.
[27] Cal. Air Res. Bd, *Draft 2022 Scoping Plan Update* (May 10, 2022) [hereinafter Scoping Plan] at 75, https://ww2.arb.ca.gov/sites/default/files/2022-05/2022-draft-sp.pdf, .
[28] William R. Moomaw et al., *Intact forests in the United States: Proforestation mitigates climate change and serves the greatest good*, 2 Frontiers in Forests and Global Change 27 (2019), https://doi.org/10.3389/ffgc.2019.00027; Beverly E. Law et al., *Creating strategic reserves to protect forest carbon and reduce biodiversity losses in the United States*, 11 Land 721 (2022), https://doi.org/10.3390/land11050721.
[29] Scoping Plan at 75.
[30] Climate Action Network Int'l, *Position: Carbon Capture, Storage, and Utilisation* (January 2021), https://climatenetwork.org/resource/can-position-carbon-capture-storage-and-utilisation/; John Sterman 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; Fern, *Six problems with BECCS* (2022),

lifecycle, as shown in Figure 1. Upstream emissions are released from cutting trees and other vegetation which ends their carbon storage and sequestration; use of fertilizers and pesticides after cutting; transporting biomass in trucks; and processing biomass through chipping and drying. As detailed elsewhere in these comments, incinerating biomass is highly polluting and only some CO_2 and co-pollutants would be diverted from the smokestack through CCS, leading to a net increase in pollution, in addition to the substantial risks of leakage back to the atmosphere.

The IPCC has also concluded that BECCS is not necessary to meet the 1.5°C Paris Agreement climate target. Instead, pathways with the best chance of limiting heating to 1.5°C require a rapid phaseout of fossil fuels along with limited CDR by *natural* sources such as reforestation and enhanced soil remediation. These pathways make no use of CCS.[31]

Figure 1: CO_2 and co-pollutant emissions from the BECCS life cycle. *Source: Fern 2022.*



https://www.fern.org/fileadmin/uploads/fern/Documents/2022/Six_problems_with_BECCS_-_2022.pdf [hereinafter Fern 2022].

[31] *See* Low Demand (LD) Pathway in IPCC Sixth Assessment Report at Figure 3.7 (IPCC, *Climate Change 2022: Mitigation of Climate Change, Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (2022), doi: 10.1017/9781009157926); *see also* Pathway 1 in IPCC Global Warming of 1.5°C Report at 14, Figure SPM 3b (IPCC, *Global Warming of 1.5°: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty* (2018)).

6. CARB must analyze and mitigate air quality and water quantity and quality impacts of CCS and BECCS. CARB must also analyze health impacts associated with the environmental impacts of CCS and BECCS.

CARB has not analyzed the short-term and long-term impacts of CCS, including BECCS, on air quality and the related health impacts. Understanding and analyzing air pollution impacts is critical, particularly because CCS projects in California are being proposed in vulnerable communities already overburdened with some of the worst air pollution in the country,[32] causing chronic health harms.

a. CARB must evaluate air pollution impacts across the CCS lifecycle.

CARB must evaluate air pollution impacts across the lifecycle of CCS systems, including emissions during the construction of new CCS infrastructure, the modification of existing infrastructure, and the operation and maintenance of CCS equipment. Air pollution across the CCS life cycle comes from several main sources, all of which must be evaluated: (1) the industrial facility, (2) the site of CO_2 injection, (3) upstream, and (4) CO_2 transport. At the industrial facility, CCS operations emit air pollution during the energy-intensive capture and compression of CO_2. At the site of injection, air pollution is emitted during the process of pumping the CO_2 underground for storage and other purposes. Upstream pollution comes from the extraction, processing, and transport of the additional fuel needed to power the CCS equipment, which can be considerable.

CARB must also analyze the air pollution that will be emitted from the transport of CO_2 between industrial facilities where CO_2 is captured and injection sites. CO_2 transport by trucks, rail or barge could significantly increase air pollution, especially when there are large distances between industrial facilities which are spread across the state, and injection sites which are targeted for the Central Valley. CO_2 transport by pipeline also poses significant air pollution risks due to inevitable pipeline leaks and blow-outs that would release co-injected air pollutants like hydrogen sulfide.[33]

Given the evidence presented below and real-world consequences for vulnerable communities across the state, CARB must conduct a comprehensive, rigorous analysis of the short-term and long-term impacts of CCS on air pollution and related health harms, which are likely to be substantial.

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[32] *See* Ctr. for Biological Diversity, Carbon Capture and Storage Projects, https://center.maps.arcgis.com/apps/View/index.html?appid=07a2bc0121e54b4f8893bf53eccf74ea (July 5, 2022).
[33] Cong. Rsch Serv., *Carbon dioxide pipelines: Safety issues* (2022), https://crsreports.congress.gov/product/pdf/IN/IN11944; Pipeline Safety Trust, *Accufacts' Perspectives on the State of Federal Carbon Dioxide Transmission Pipeline Safety Regulations as it Relates to Carbon Capture, Utilization, and Sequestration within the U.S.* (2022), https://pstrust.org/wp-content/uploads/2022/03/3-23-22-Final-Accufacts-CO2-Pipeline-Report2.pdf.

b. CARB must analyze the key factors that determine the types and amounts of air pollution emitted by CCS operations.

CCS operations can emit a wide array of criteria air pollutants and hazardous air pollutants, all of which should be evaluated by CARB due to their public health harms. CARB must analyze key factors that determine the types and amounts of air pollution emitted by CCS operations, including: (1) the type of CCS (e.g., post-combustion, pre-combustion, oxy-combustion); (2) the type of facility (e.g., refinery, bioenergy power plant, gas-fired power plant, oil and gas operation, cement plant); (3) the energy penalty of CCS; (4) the percentage of facility emissions covered by CCS; (5) the pollution control equipment being proposed; and (6) the real-world performance of CCS equipment and pollution control equipment.

c. The energy penalty of CCS is a key factor that can significantly increase air pollution at the facility, at the site of CO_2 injection, and upstream.

CCS operations are energy-intensive because they require large amounts of energy to capture, compress, transport, and inject carbon underground. CCS uses an estimated 15% to 25% more energy to produce the same amount of power as a conventional plant, called the "energy penalty."[34] Because CCS uses more energy, CCS facilities emit *more* non-CO_2 air pollutants and cause higher upstream pollution from the extraction, processing, and transport of the additional fuel that is needed than non-CCS projects. This results in more fine particulate matter, NOx, SOx, ammonia, hazardous volatile organic compounds (VOCs), and other toxic pollutants that threaten the health of nearby communities. For example, a Stanford study that examined the total lifecycle costs of carbon capture from a coal plus CCS power plant, including emissions resulting from the energy penalty, found that CCS "reduces only a small fraction of carbon emissions, and it usually increases air pollution."[35]

d. The percentage of facility emissions covered by CCS is important.

Industrial facilities have numerous sources of air pollution, only some of which may be covered by CCS equipment, meaning that a large percentage of facility emissions may not be covered. For example, for petroleum refineries, catalytic cracking units are often proposed for CCS retrofits, while other significant emissions sources are not (e.g., power stations, atmospheric distillation units, and steam methane reformers for hydrogen production). In addition, refineries have many smaller emissions sources such as boilers, heaters, and flares that cumulatively contribute significant emissions but which are considered infeasible or impractical to retrofit

[34] Climate Action Network Int'l, *CAN Position: Carbon Capture, Storage, and Utilisation* at 9 (2021), https://climatenetwork.org/resource/can-position-carbon-capture-storage-and-utilisation/.
[35] Taylor Kubota, *Stanford Study casts Doubt on Carbon Capture,* Stanford News, Oct. 25, 2019, https://news.stanford.edu/2019/10/25/study-casts-doubt-carbon-capture/, citing Mark Z. Jacobson, *The health and climate impacts of carbon capture and direct air capture*, 12 Energy Env't Sci. 3567 (2019), https://doi.org/10.1039/C9EE02709B.

with CCS.[36] The treatment of flared gases using CCS is also considered impractical, mainly because of the uncertainty in unplanned flaring (e.g., equipment failures, blow downs, or emergency shutdowns). As noted by one recent study, "[t]here is an issue of scale and diminishing returns for carbon capture, where including more sources of emissions within the refinery in the capture system increases the energy penalty for operating the system and decreases the concentration of the CO_2 in the emissions stream. This means that each additional unit of CO_2 captured costs more, in terms of both money and energy, than its predecessor."[37]

e. CCS equipment and pollution control equipment do not perform in an idealized way in the real world, which can significantly increase air pollution.

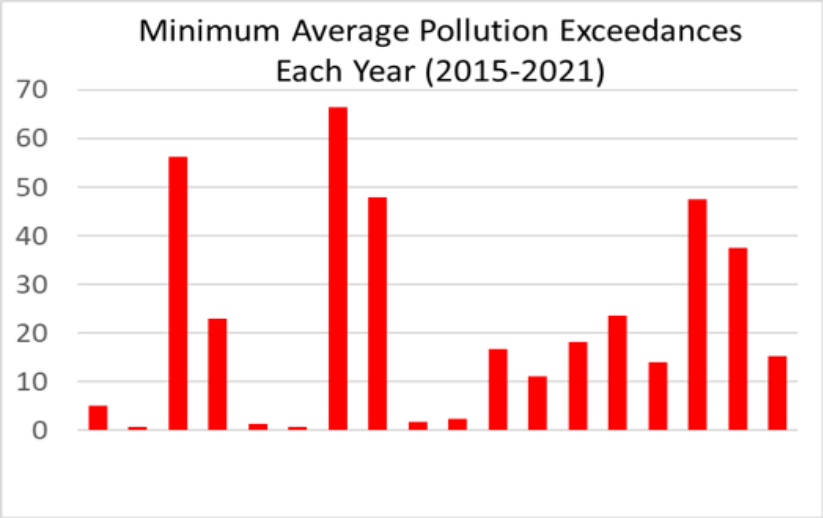
Pollution modeling that assumes that CCS equipment and pollution control equipment will operate according to idealized specifications ignores the reality of chronic equipment malfunctions, flaring and venting, and shutdowns that increase pollution. Real-world examples show that CCS projects have consistently over-promised and under-performed on capturing emissions.

For example, seven large-scale CCS projects have been attempted at U.S. power plants, each with hundreds of millions of dollars of government subsidies, but all of these projects were canceled before completion or shuttered due to technical problems, cost overruns, and failure to meet capture targets.[38]

In California, Public Records Act documents reveal that pollution control equipment frequently fails at bioenergy facilities, many of which are located in vulnerable communities. Data reported for 18 bioenergy facilities from 2015-2021 (Figure 2) shows that all facilities exceeded their permitted pollution levels—with many facilities having dozens of pollution exceedances each year—where a single exceedance can last hours or multiple days.[39]

[36] Ben Young et al., *Comparative life cycle assessment of carbon capture for petroleum refining, ammonia production and thermoelectric power generation in the United States*, 91 Int'l J. of Greenhouse Gas Control 102821 (2019), https://doi.org/10.1016/j.ijggc.2019.102821.
[37] Young et al. 2019 at 4.
[38] Cong. Rsch Serv., *Carbon Capture and Sequestration in the United States* (2022), https://sgp.fas.org/crs/misc/R44902.pdf; for example, the utility Southern Company went $5 billion dollars over budget and three years behind schedule in building a carbon capture facility for a coal-fired power plant in Kemper County, Mississippi, before abandoning the project in 2017, after passing along many costs to its ratepayers, mostly low-income Black residents.
[39] This information is based on the records reported by biomass plants and obtained from air districts for the period of 2015-2021. The records for many plants appeared incomplete and do not provide a complete picture of excess emissions.

Figure 2. Minimum average number of air pollution exceedances per year for 18 bioenergy facilities in California from 2015-2021. *Source: Public Records Act documents obtained by the Center for Biological Diversity.*



f. Studies on air pollution from CCS types proposed for California show that pollution can increase when CCS is added to industrial facilities.

Proposed CCS projects for California include (1) post-combustion CCS for refineries and gas-fired power plants, (2) pre-combustion CCS for Integrated Gasification Combined Cycle ("IGCC") power plants, including BECCS plants, and (3) oxy-combustion CCS for bioenergy facilities. Although there are significant data gaps on air pollution from CCS, current studies indicate that pollution can increase when CCS is added to industrial facilities, as detailed below.

i. Post-combustion CCS on refineries and gas-fired power plants creates pollution increases.

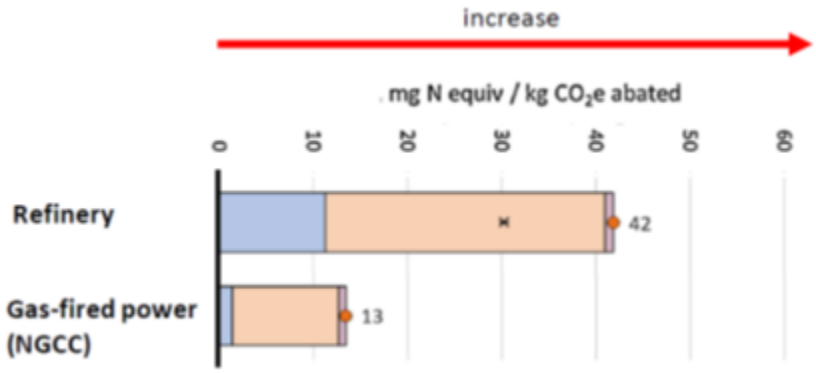
Post-combustion CCS is being proposed in California, particularly to retrofit refineries and gas-fired power plants. A 2019 study examined the cradle-to-gate life cycle environmental impacts of amine-solvent-based post-combustion carbon capture systems on U.S. petroleum refineries and gas combined cycle power plants.[40] Importantly, for refineries, the study concluded that NOx, SO_2, and fine particulate matter pollution *increase* at the refinery facility, upstream, and at the site of CO_2 injection *when CCS is added*, as shown in Figure 3 below. For gas-fired power plants, NOx *increases* at the facility, upstream, and at the site of CO_2 injection, while SO_2 and fine particulate matter *increase* upstream and at the site of CO_2 injection *when CCS is added*.

[40] Young et al. 2019. The study also looked at CCS on coal-fired power plants and ammonia plants which are not currently being proposed for California.

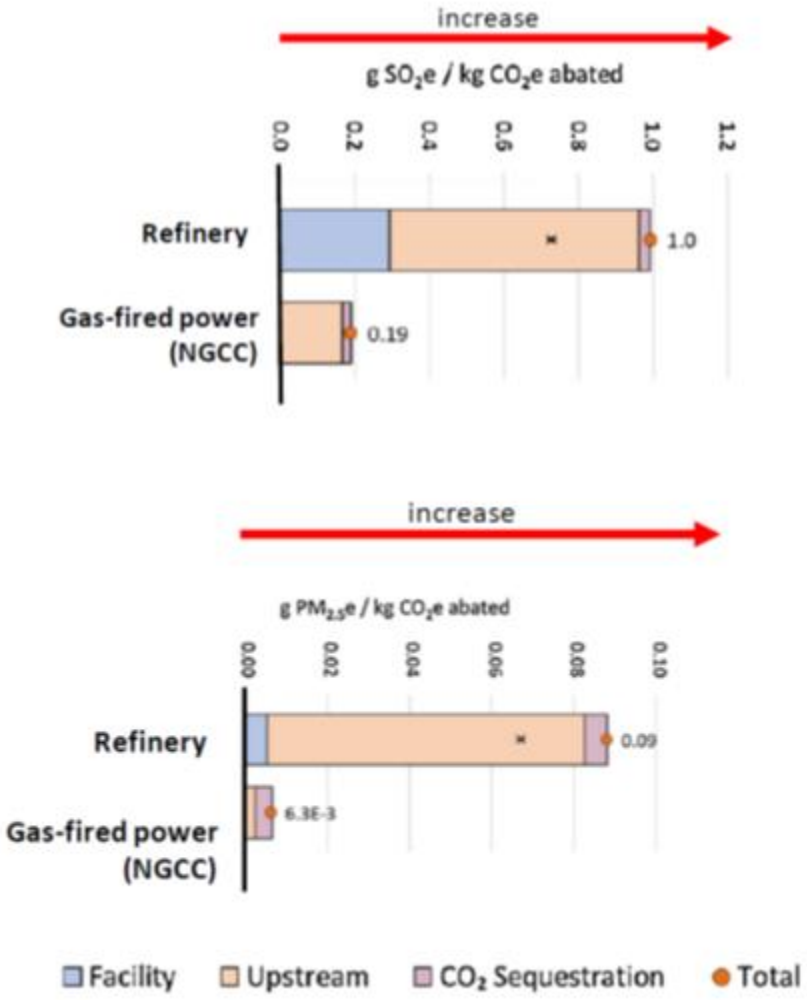
These increases in air pollutants occur even after factoring in the reductions in SO_2 and NOx in the flue gas that must occur before the gas is sent to the carbon capture equipment to avoid contamination of the capture solvent. For example, the study explains that NOx shows a net increase at the facility for refineries and gas-fired power plants, even though NOx is reduced in the flue gas, because of the increased NOx emissions from the combustion of fuels to operate the capture system.[41]

In addition, there are significant upstream NOx emissions from gas processing for facilities that use fossil gas to provide heat for carbon capture. The study notes that petroleum refineries with CCS have the highest life cycle impacts with NOx: "Higher NOx emissions from combustion, a smaller life cycle impact from reduced NOx scrubbing at the capture unit, and a heavy reliance on natural gas fuel result in the highest life cycle impacts at the petroleum refinery."[42] The study also highlights that ammonia air emissions can increase at post-combustion CCS facilities due to the degradation of the amine solvents.[43]

Figure 3. Changes in emissions of air pollutants for CCS facilities compared to no CCS, per kg CO_2e abated. *Source: Young et al. 2019, at Figure 3.*



[41] Young et al. 2019 at 7-8.
[42] Young et al. 2019 at 7.
[43] Young et al. 2019 at 7.



ii. Pre-combustion CCS on IGCC power plants (including at BECCS plants) could increase pollution.

Pre-combustion CCS is being proposed for IGCC power plants including BECCS facilities. One review concluded that pollution from IGCC power plants with pre-combustion CCS is uncertain and not well-studied: SOx, PM, and NOx could increase or decrease with the addition of CCS.[44] A 2022 study that modeled bioenergy IGCC plants with pre-combustion CCS (i.e., Bio-IGCC-CCS) in California found that PM 2.5 and SOx emissions would increase, leading to more pollution-related health harms and mortality.[45] Specifically, the study noted that "PM2.5 emission increase (+2.5%) suggest[s] potential air quality disbenefit associated with the

[44] Joris Koornneef et al., *The impact of CO2 capture in the power and heat sector on the emission of SO2, NOx, particulate matter, volatile organic compounds and NH3 in the European Union*, 44 Atmospheric Env't 1369 (2010), https://doi.org/10.1016/j.atmosenv.2010.01.022.
[45] Yin Li et al., *Future emissions of particles and gases that cause regional air pollution in California under different greenhouse gas mitigation strategies*, 237 Atmospheric Env't 118960 (2022), https://doi.org/10.1016/j.atmosenv.2022.118960.

CCS future especially around the Bio-IGCC-CCS power plant locations." Further, "SOx emissions increase in the CCS scenario because the Bio-IGCC plants emit more SOx than other electricity generation processes even though the accompanying CCS section removes more than half of the increased SOx."[46]

iii. Oxy-combustion CCS for bioenergy facilities have a high energy penalty and cannot be said to reduce pollution.

"Oxyfuel combustion" or "oxy-combustion" CCS is being proposed as a retrofit for several idled bioenergy facilities in the Central Valley. A review of oxyfuel combustion concluded that criteria and hazardous air pollutants have not been well studied and there is a "lack of attention to potential health effects."[47] The limited data that is available is from "pilot-scale studies that reflect only limited conditions and do not encompass the variability in conditions that would be encountered at commercial scale."[48] The study further found that air pollution control devices may not perform the same in oxy-fired systems as they do in air-fired systems, little is known about the formation of hazardous air pollutants in oxy-combustion boilers, and "[c]ombustion under oxyfuel conditions could produce emissions posing different risks than those currently being managed by the power industry."[49] On top of air pollution, these systems generate solid and liquid waste streams that may pose health and environmental hazards.

Importantly, the study also highlighted that oxyfuel combustion has a high energy penalty because large amounts of oxygen must be separated from ambient air.[50] The auxiliary power requirements for oxyfuel combustion may be almost 6 times higher than for conventional air-fired combustion. This high energy penalty could significantly increase the air pollution from oxyfuel combustion CCS.

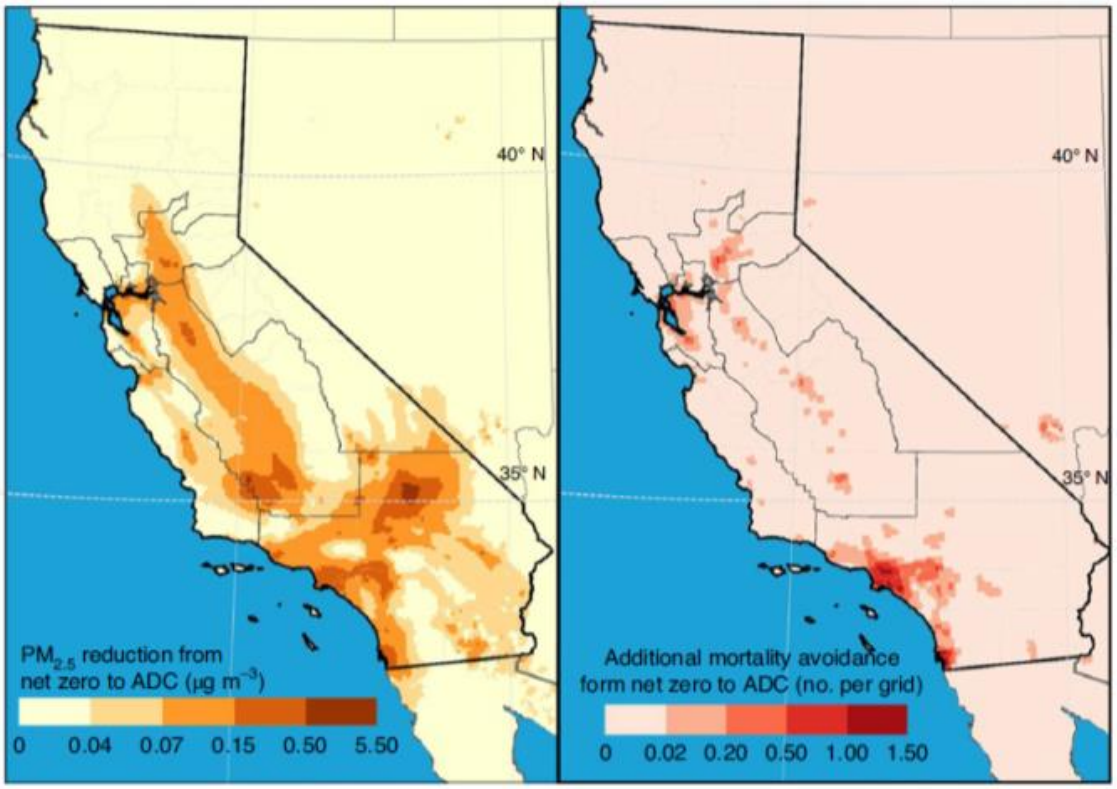
iv. BECCS can lead to significant pollution.

As noted elsewhere, there are at least eight proposed BECCS projects in California. A 2020 study that modeled pathways to achieve net-zero emissions in California by 2050 concluded that the deployment of BECCS would lead to significant air pollution, health harms, and pollution-related mortalities in the state, even when BECCS facilities use emission control devices that meet California emission standards.[51] The study noted that "in the context of air quality co-benefits, biomass combustion emits relatively high levels of air pollutants, even though all BECCS plants in the scenario are projected to install emission control devices and will

[46] Li et al. 2022 at 4.
[47] Constance Senior et al., *Emissions and risks associated with oxyfuel combustion: State of the science and critical data gaps*, 63 J. of the Air & Waste Mgmt. Ass'n 832 (2013), https://doi.org/10.1080/10962247.2013.791892.
[48] Senior et al. 2013 at 841.
[49] Senior et al. 2013 at 832.
[50] Senior et al. 2013.
[51] Tianyang Wang et al., *Health co-benefits of achieving sustainable net-zero greenhouse gas emissions in California*, 3 Nature Sustainability 597 (2020), https://doi.org/10.1038/s41893-020-0520-y

meet the emission standards in California."[52] The study concluded that BECCS "comes at a price as it would emit a considerable amount of air pollutants and reduce health co-benefits by 4 billion dollars."[53] Importantly, the study found that replacing BECCS facilities with wind and solar would significantly reduce air pollution and avoid 370 PM2.5-related mortalities, as shown in Figure 4 below.

Figure 4. Particulate matter (PM 2.5) reductions from replacing BECCS with solar and wind (left panel); pollution-related deaths avoided from replacing BECCS with solar and wind (right panel). *Source: Wang et al. 2020, at Figure 4 (where the net zero scenario utilizes BECCS and the ADC scenario replaces BECCS with solar and wind).*



g. Water quantity and quality impacts of CCS and DAC.

The RDEA is silent on the impacts to water use and quality from CCS and DAC.[54] This is a serious flaw and must be corrected before CARB issues the final EA.

[52] Wang et al. 2020 at 600.
[53] Wang et al. 2020 at 597.
[54] RDEA at 176.

In addition to being a costly and energy intensive process, CCS is also water intensive.[55] With the addition of CCS, power plant water usage is expected to increase by 33-90% for absolute and per net MW basis due to the additional demand for cooling and the carbon capture process itself.[56] Another study shows that carbon capture through amine absorption, a common method, would nearly double the water consumption intensity, thereby posing a potentially unsustainable strain on water resources.[57] DAC poses an additional threat to water supply because it most often uses "blue water," i.e., freshwater, so it competes with other necessary uses of water.[58]

CCS may further impact water availability through the risk of groundwater contamination. When CO_2 is pumped underground, only a small amount can be absorbed by the present water given the fact that CO_2 is only soluble in water to a limited degree.[59] What this means is that instead of water absorbing the CO_2, it will be displaced by the CO_2. The displaced water will then be forced to travel either vertically or horizontally, eventually impacting overlying freshwater aquifers. Additionally, studies have uncovered several potential impacts from the injection of CO_2 underground including storage leakage, brine displacement, and pH depression.[60] Leakage of CO_2-rich fluids into groundwater also could mobilize hazardous inorganic constituents or trace metals.[61]

The RDEA cannot ignore these potentially significant impacts on water quality and quantity from promoting CCS and DAC as "solutions" to California's emissions reductions goals. Excluding this critical area of likely impacts renders the RDEA a failed informational document. CARB must issue an updated draft EA that adequately discloses and mitigates the potentially significant water use and quality impacts of CCS and DAC.

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[55] Lorenzo Rosa et al., *Hydrological limits to carbon capture and storage*, 3 Nature Sustainability 658 (2020), https://doi.org/10.1038/s41893-020-0532-7.
[56] EPRI, *Cooling Requirements and Water Use Impacts of Advanced Coal-fired Power Plants with CO2 Capture and Storage* (2011), https://www.epri.com/research/products/1024495.
[57] Haibo Zhai et al., *Water use at pulverized coal power plants with post-combustion carbon capture and storage*, 45 Env't Sci. & Tech. 2479 (2011), dx.doi.org/10.1021/es1034443.
[58] Lorenzo Rosa et al., *The water footprint of carbon capture and storage technologies*, 138 Renewable and Sustainable Energy Revs. 110511 (2021), https://doi.org/10.1016/j.rser.2020.110511.
[59] V. Kennedy, *This sounds like an eco-friendly solution, but it's really a bad idea,* Modesto Bee, July 31, 2022, https://www.modbee.com/article263904387.html#storylink=cpy.
[60] Robert L. Newmark et al., *Water challenges for geologic carbon capture and sequestration*, 45 Env't Mgmt. 651 (2010), https://doi.org/10.1007/s00267-010-9434-1; Elizabeth H. Keating et al., *The challenge of predicting groundwater quality impacts in a CO2 leakage scenario: Results from field, laboratory, and modeling studies at a natural analog site in New Mexico, U.S.A.*, 4 Energy Procedia 3239 (2011), https://doi.org/10.1016/j.egypro.2011.02.242.
[61] *Keating 2011.*

h. CARB fails to analyze the environmental impacts of BECCS.

CARB recognizes in the RDEA that a "reasonably foreseeable consequence" of the Scoping Plan is "construction of new facilities and modifications to existing facilities," including "biomass processing and bioenergy facilities." However, CARB makes a serious omission by failing to analyze—and subsequently mitigate—the environmental and health impacts of BECCS. At the time of this letter, eight of the 13 known, proposed CCS projects are BECCS. (*See* Figure 5, below.)[62] For the RDEA not to include bioenergy and BECCS renders the RDEA a failed informational document that does not provide an accurate picture of either the State's current or possible future GHG emissions. And because all eight of the proposed BECCS projects are located in California's Central Valley—many adjacent to environmental justice communities—the RDEA fails its role to identify substantial adverse impacts and to recommend mitigation measures.

While CARB alludes to BECCS, this roundabout reference is simply not enough.[63] In considering the bioenergy industry broadly, CARB acknowledges that "proposed actions under this measure could also result in the siting and development of new, or the expansion of existing, regional facilities to process increased volumes of compost or biomass feedstock."[64] But the RDEA does not put these pieces together in recognition of the substantial proposed BECCS build-out in the State.

As a foundational matter, it is important to note that electricity from bioenergy is wrongly considered "clean" or "renewable." Making electricity and fuels from cutting and incinerating trees and other biomass is highly polluting for the climate, harmful to public health, damaging to wildlife and forest ecosystems, and expensive.

In particular, burning wood to generate electricity emits more CO_2 per kilowatt-hour than what is generated from fossil fuels, including coal.[65] As a result, biomass power plants are *much more climate polluting* than other electricity sources in California. According to CARB's own data from 2018, the GHG emissions for California's biomass facilities range from around 2,500 to over 19,000 lbs CO_2e per net MWh, and average 3,500 pounds CO_2e/MWh for non-cogeneration facilities (*See* Figure 6, below.)[66]

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[62] *See* Ctr. for Biological Diversity, Carbon Capture and Storage Projects, https://center.maps.arcgis.com/apps/View/index.html?appid=07a2bc0121e54b4f8893bf53eccf74ea (July 5, 2022)
[63] *See* RDEA at 21, footnote 4: "[F]irm dispatchable resources could include Allam-Fetvedt Cycle (AFC) CCS, which burns a gaseous carbon-based fuel (e.g., natural gas, gasified solid fuels such as biomass) and pure oxygen in a combustor, along with use of recycled supercritical CO_2 that is heated in the oxyfuel combustor . . . . Some CO_2 is recycled back to the heat exchanger for heating and entering back into the combustor; the remaining high-purity CO_2 can be transported for use or subsurface storage."
[64] RDEA at 31.
[65] Sterman et al. 2022.
[66] Total CO_2e emissions for each facility in 2018 come from California Air Resources Board Mandatory GHG Reporting Emissions data, available at, https://ww2.arb.ca.gov/mrr-data. Data on net MWh produced by each facility

Biomass energy generation in California emits more than 1.5 times the carbon pollution compared to coal-fired power per unit of electricity—and almost four times the carbon pollution of gas-generated power.[67] (*See* Figure 6.) This is because incinerating trees is a remarkably inefficient way to generate electricity, resulting in high carbon emissions and high costs of production.[68] In contrast, solar and wind energy provide virtually carbon free sources of power production.

Despite the substantial carbon pollution from biomass power, proponents erroneously claim that cutting and incinerating trees is inherently "carbon neutral"—that it does not cause net GHG emissions.[69] Published scientific research has thoroughly debunked this false claim. Cutting and burning trees for bioenergy releases their stored carbon to the atmosphere, immediately increasing CO_2 emissions and ending trees' future carbon sequestration, creating a "carbon debt."[70]

BECCS takes the harms of bioenergy and adds unproven and dangerous CCS technologies. Proponents claim that these projects are carbon neutral or carbon negative, but this is false. BECCS projects have failed to show that they are carbon neutral or negative. Instead, substantial emissions are produced throughout the process—from cutting trees and other biomass with machinery to transporting the biomass in trucks to drying and processing it. On top of that, there are smokestack emissions from biomass incineration, only some of which may be diverted by CCUS. Research has concluded that BECCS can have negative impacts on the climate, food security, biodiversity, forest ecosystems, water use, and land use rights.[71] The IPCC concluded

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in 2018 come from the California Energy Commission California Biomass and Waste-To-Energy Statistics and Data, available at https://ww2.energy.ca.gov/almanac/renewables_data/biomass/index_cms.php. Total CO_2e produced by the 9 electricity only, non-cogeneration active woody and agricultural biomass facilities with available data totaled 2,127,693 metric tons, and net MWh in 2018 from these 9 facilities totaled 1,334,346 MWh, for an average of 1.59 metric tons CO_2e per net MWh, equal to 3,515 pounds CO_2e per net MWh. The average of 3,515 pounds CO_2e per MWh includes electricity-only plants; cogeneration plants are excluded because some of their CO_2 emissions are from heat-related fuel consumption. The high CO_2e rate-per-MWh is similar for biomass facilities without cogeneration. Of note, California's Emission Performance Standards (SB 1368 (Perata 2006), codified at Division 4.1 Cal. Pub. Util. Code § 8341(a) and CPUC, "Order Instituting Rulemaking to Implement the Commission's Procurement Incentive Framework and to Examine the Integration of Greenhouse Gas Emissions Standards into Procurement Policies," at § 5, Decision 07-01-039 (Jan. 25, 2007)) sets the ceiling of GHG emissions for electricity producers at 1,100 lbs per MWh—meaning far below what biomass facilities emit. The EPS, however, in a bizarre exemption, does not require that most of the bioenergy facility's provide information on their GHG emissions in order to sell electricity.

[67] Overall average GHG Intensity of electricity generation in California comes from California Air Resources Board, 2000- 2018 Emissions Trends Report Data (2020 Edition), https://ww3.arb.ca.gov/cc/inventory/pubs/reports/2000_2018/2000_2018_ghg_inventory_trends_figures.xlsx; average CO_2 emissions per MWh for gas and coal in the United States in 2019 are from U.S. Energy Information Administration, "How much carbon dioxide is produced per kilowatt hour of U.S. electricity generation?", https://www.eia.gov/tools/faqs/faq.php?id=74&t=11.

[68] Sterman et al. 2022.

[69] Sterman et al. 2022.

[70] Sterman et al. 2022.

[71] Vera Heck et al., *Biomass-based negative emissions difficult to reconcile with planetary boundaries*, 8 Nature Climate Change 151 (2018), https://doi.org/10.1038/s41558-017-0064-y; Yoshiki Yamagata et al., *Estimating*

that BECCS poses risks to air quality, water, soil, resilience, livelihoods, food security, and biodiversity.[72]

The proposed BECCS projects are not necessary to aid in California's energy generation, nor are they part of the path for the State to reduce its GHG emissions. Further, all eight proposed BECCS projects are proposed for California's Central Valley. Many of these projects would be located adjacent to or near communities already overburdened by pollution. This is the wrong direction for California, and entirely ignored in the RDEA.

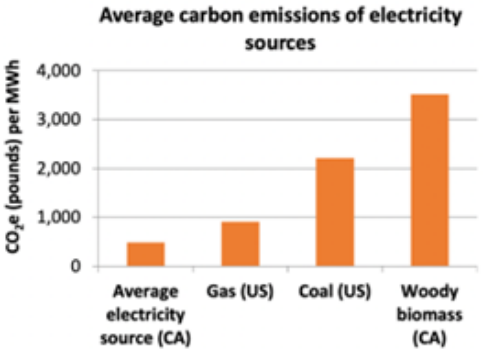
Figure 5. Map of proposed carbon capture and storage projects (including BECCS) in California. Source: Center for Biological Diversity, informed by company press releases, FOIA and PRA documents, and information provided by EPA Region 9. *Source*: biologicaldiversity.org/ca_ccs_map.

water-food-ecosystem trade-offs for the global negative emission scenario (IPCC-RCP 2.6), 13 Sustainability Science 301 (2018), https://doi.org/10.1007/s11625-017-0522-5.

[72] IPCC, *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (P.R. Shukla et al. eds. 2022) at 5-8, Figure 7.11.

Figure 6. Biomass power plant emissions and average carbon emissions of California electricity sources. *Source: Center for Biological Diversity* (*see data sources in Footnotes 66 & 67).*

Biomass power plant emissions in 2018	Capacity (MW)	Total CO_2e (pounds) per net MWh
Ampersand Chowchilla Biomass Power	12.5	2,996
Burney Forest Products (BioRAM) (cogen)	31	3,768
Collins Pine Biomass Power (cogen)	12	19,120
DG Fairhaven	15	3,877
DTE Stockton Biomass Power (cogen)	50	3,298
HL Power (BioRAM)	35.5	2,980
Humboldt Sawmill Company (cogen)	32.5	5,016
Merced Power	12.5	3,220
Mt. Poso Cogeneration (cogen)	63.6	2,507
Pacific Ultrapower Chinese Station (BioRAM)	25.7	4,418
Rio Bravo Fresno Biomass Power (BioRAM)	27.8	3,150
Rio Bravo Rocklin Biomass Power (BioRAM)	27.8	3,435
Roseburg Forest Products (cogen)	13.4	4,967
SPI Anderson Biomass Power II (cogen)	30.1	4,480
SPI Burney Biomass Power (cogen)	20	4,736
SPI Lincoln Biomass Power (cogen)	19.2	5,314
SPI Quincy Biomass Power (cogen)	35.3	6,215
SPI Sonora Standard Biomass Power (cogen)	7.5	11,540
Wheelabrator Shasta Energy (BioRAM)	62.8	3,900
Woodland Biomass Power	28	3,464
Average for non-cogeneration plants		**3,515**



7. CARB must conduct a separate, comprehensive environmental analysis in its future rulemaking per SB 905, and require project-level environmental impact reports for potential CCS & engineered CDR projects.

SB 905 requires CARB to create a Carbon Capture, Remove, Utilization, and Storage Program to evaluate the efficacy, safety, and viability of CCS and engineered CDR projects, as well as to ensure that these projects minimize air, water, and noise pollution, and gas leakage impacts, among others.[73] SB 905 also requires CARB to adopt a unified permit application for the construction and operation of CCS and CDR to expedite the issuance of these permits.[74]

We expect CARB to conduct a future rulemaking process on CCS and CDR that includes a comprehensive analysis of the environmental impacts of implementing these technologies. CARB must also not allow project proponents to tier from any program EA by CARB, and instead require project-level environmental impact reports for potential CCS and CDR projects. Each potential project presents a unique technological, geological, environmental, and socioeconomic context. The public and relevant agencies can only gain an accurate and full extent of the environmental and health impacts of a project, and be able to provide meaningful participation and decision-making through individual environmental review and public process.

[73] Cal. Pub. Res. Code § 39741.1.
[74] Cal. Pub. Res. Code § 39741.2.

8. CARB must directly reduce emissions via an explicit plan to phase out oil and gas extraction by 2035 at the latest, and analyze the environmental impacts of this action.

CARB, in the RDEA, relies upon the assumption that oil and gas extraction will decline accordingly with a reduction in petroleum demand, without support.[75] As we discuss further below, oil and gas extraction could continue at the same or higher levels for export, even if in-state demand for petroleum decreases. In order to truly reduce petroleum production, CARB must propose a policy to phase out extraction by 2035 in an updated Draft Scoping Plan, and analyze the environmental impacts of this action.

a. CARB's assumption that demand-side reduction measures will result in oil and gas extraction reduction is unsupported.

CARB states in the RDEA that actions for the proposed AB 32 GHG Inventory Sectors include reducing oil and gas extraction operations "in-line with petroleum demand."[76] However, CARB has not provided any support for its claim that oil and gas extraction is going to decline in-line with demand.

CARB proposes to increase renewable energy actions, which they assert will decrease the use of oil and gas in California.[77] CARB also appears to assume that a decrease in oil and gas use means a reduction in oil and gas extraction in California. However, CARB does not and must provide evidence on how an increase in renewable energy actions would result in oil and gas extraction reduction.[78] CARB should also explain *how much* oil and gas extraction is expected to decrease as a result of an increase in renewable energy and other proposed actions. CARB's current failure to do so in the RDEA prevents informed decision-making and meaningful public participation.

b. CARB fails to consider steady exports that could perpetuate oil and gas extraction despite demand reduction efforts.

As discussed, CARB relies on market forces and an increase in renewable energy actions to theoretically reduce oil and gas extraction, without explaining how this could actually occur. Even if in-state demand is reduced, CARB ignores the fact that fossil fuel extraction could continue at current levels due to demand for exports from refineries. Indeed, exports of finished

[75] RDEA at 17, 21.
[76] RDEA at 17.
[77] RDEA at 20-21; RDEA at 120 ("[R]enewable energy actions include operation of new facilities, including wind, solar thermal, solar PV, geothermal, solid-fuel biomass, biogas, solar thermal steam production, hydrogen, pumped storage, battery storage, and small hydroelectric systems. The operation of wind, solar thermal, and solar PV energy systems would occur over large acreages of land. The reduction in oil and gas extraction could result in equipment being decommissioned.").
[78] RDEA at 120.

fuels remained relatively steady over the last 15 years.[79] Given this reality, CARB must not assume that oil and gas extraction will be reduced in-line with demand, and must instead propose an action to phase out extraction.

c. CARB must propose an action to phase out oil and gas extraction by 2035 at the latest, and analyze the environmental impacts of this action.

In order to ensure California meets its GHG emission goals and minimize harm to environmental justice communities, CARB must propose a proactive policy to phase out oil and gas extraction by 2035 at the latest, as we have discussed in previous letters.[80] CARB must take leadership in directly reducing emissions from oil and gas extraction to effectively address climate change and create a safer and healthier future for California.

d. CARB must analyze the environmental and health impacts of continuing oil and gas extraction as CARB currently proposes in the RDEA.

As discussed above, CARB proposes in the RDEA that oil and gas extraction and operations would "decline in-line with petroleum demand".[81] CARB does not and must analyze the environmental and health impacts of proposing to allow oil and gas extraction, even at theoretically reduced levels, under this Scoping Plan. CARB's analysis must consider California's high carbon intensity extraction and the disproportionate effects environmental justice communities face.

i. California's crude oil has a higher carbon intensity, bearing greater environmental and health impacts that CARB does not and must analyze.

First, CARB must analyze the environmental impacts of continuing oil and gas extraction in California in light of the high carbon intensity of the State's crude oil. CARB admits that California's crude oil is heavier on average than most other sources of crude oil.[82] According to the U.S. Energy Information Administration, California's average American Petroleum Institute

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[79] Olivier Deschenes et al., University of California, Santa Barbara, Synthesis Report: Carbon Neutrality and California's Transportation Fossil Fuel Supply Study, Fig. 24 on p. 39 (Oct. 2020), available at https://calepa.ca.gov/carbon-neutrality-studies-background. *See also* Communities for a Better Env't, *New Climate Threat: Will Oil Refineries make California the Gas Station of the Pacific Rim* (2019), https://www.cbecal.org/wp-content/uploads/2019/09/New-climate-threat%e2%80%93Will-oil-refineries-make-California-the-gas-station-of-the-Pacific-Rim.pdf ("West Coast production of finished petroleum products (black in the charts) increased by ≈ 350 million barrels from TY2007 to TY2018.3. Production exceeded demand here by TY2012, and this production excess grew to ≈ 470 million barrels by TY2018 as refiners made more fuel for export. Foreign exports of finished refined products from the West Coast (brown) grew by ≈ 390 million barrels, an increase of ≈ 49 %, from TY2007 to TY2018."

[80] *See* Cal. Env't Justice All. ("CEJA"), *Comments on Specific Sectors and Greenhouse Gas Emission Reduction Measures in the 2022 Draft Scoping Plan* (Comment 668 for Draft 2022 Climate Change Scoping Plan) (June 24, 2022), at 6-13, https://www.arb.ca.gov/lists/com-attach/4459-scopingplan2022-UDMAY1Y9V2VQCQBk.pdf.

[81] RDEA at 17.

[82] Draft Scoping Plan at 82.

gravity ("API") of 26.18 places it among the heaviest in the United States.[83] More energy-intensive techniques are required to extract heavier oil.[84] As such, California's heavy crude oil has higher GHG emissions per barrel than oil from other states.[85] Unfortunately, CARB fails to consider the GHG emissions, air pollution, and other impacts of continuing extraction on the environment as well as on communities and residential areas located within a close radius of oil and gas wells and facilities, the majority of which are low-income communities of color.[86]

e. CARB must analyze and address the disproportionate environmental and health impacts that oil and gas extraction has on environmental justice communities.

CARB must analyze the impacts of continuing oil and gas extraction on environmental justice communities, as well as identify mitigation measures to address such impacts.

AB 197 requires CARB to prioritize emission reduction rules and regulations that prioritize direct emissions reductions and "consider the social costs of the emissions of greenhouse gasses."[87] Similarly, AB 32 requires CARB to consider the "overall societal benefits including reductions in other air pollutants," including public health.[88] AB 32 further mandates that CARB's actions must not disproportionately impact low-income communities.[89] Current

[83] API is a "commonly used index of the density of a crude oil or refined products." A higher API indicates that a product has a lower density and is therefore less energy intensive to extract. Tim Fitzgibbon, *API Gravity*, McKinsey Energy Insights, https://www.mckinseyenergyinsights.com/resources/refinery-reference-desk/api-gravity/ (last visited June 23, 2022); Emily Geary, *The API gravity of crude oil produced in the U.S. varies widely across states*, U.S. Energy Info. Admin. (Apr. 19, 2017) https://www.eia.gov/todayinenergy/detail.php?id=30852 ("California's oil is mostly heavy (more dense), and more than 90% has an API gravity of less than 30 degrees").
[84] Judith Lewis Mernit, *Why Does California Pump the Dirtiest Oil in the U.S.*, Yale Environment 360, Oct. 19, 2017, https://e360.yale.edu/features/why-does-green-california-pump-the-dirtiest-oil-in-the-u-s (describing how extracting and refining heavier California crude oil is less efficient than from comparable sources).
[85] *See* Judith Lewis Mernit, *Why Does California Pump the Dirtiest Oil in the U.S.*, Yale Environment 360, Oct. 19, 2017, https://e360.yale.edu/features/why-does-green-california-pump-the-dirtiest-oil-in-the-u-s (describing how extracting and refining heavier California crude oil is less efficient than from comparable sources); *see also* E. Allison & B. Mandler, Am. Geoscis. Inst., *Heavy Oil: Abundant but hard to work with, heavy oil has some specific environmental impacts* 11-2 (2018), https://www.americangeosciences.org/sites/default/files/AGI_PE_HeavyOil_web_final.pdf (heavy oil produced by steam injection in California's Midway Sunset field emits 725 kg CO2 lifecycle emissions, as compared to 729- 736 kg CO2 emissions for Canadian oil sands and 480 kg CO2 emissions of typical light West Texas oil); *see also* Center for Biological Diversity, *Killer Crude: How California Produces Some of the Dirtiest, Most Dangerous Oil in the World*, June 2021, https://www.biologicaldiversity.org/programs/climate_law_institute/pdfs/June-2021-Killer-Crude-Rpt.pdf.
[86] *See, e.g.* John C. Fleming et. al, *Disproportionate Impacts of Oil and Gas Extraction on Already "Disadvantaged" California Communities: How State Data Reveals Underlying Environmental Injustice* (2019), https://agu.confex.com/agu/fm19/mediafile/Handout/Paper495269/19%2012%2009%20AGU%20Poster.pdf (finding that 76% of new oil and gas extraction wells are located in communities with above-average poverty rates for CA, and 67 percent are located in communities of color between 2011-2018); Jade Wolansky, *Quiet Suffocation: California Oil and Gas Production Near Communities of Color is a Public Health Crisis*, 52 U. Pac. L. Rev. 387, 399 (2021), https://scholarlycommons.pacific.edu/uoplawreview/vol52/iss2/12/ (noting that 1.8 million people, of which 92% are people of color, live within one mile of an oil or gas well).
[87] Cal. Health & Safety Code § 38562.5; *see also* RDEA at 15 (Project Objective 20).
[88] Cal. Health & Saf. Code, § 38562, subd. (b)(6); *see also* RDEA at 14 (Project Objective 15).
[89] Cal. Health & Safety Code § 38562, , subd. (b)(2); *see also* RDEA at 14 (Project Objective 13).

studies show that communities living in close proximity to oil and gas extraction wells are associated with decreased lung capacity, respiratory health issues, increased health risk during pregnancy, and low birth weights.[90] Yet, CARB has not provided any considerations for these factors as it proposes to continue oil and gas extraction under the RDEA, which violates both these mandates. Despite the recirculated draft touting its dedication to uplifting environmental justice communities, it is mere lip service to these communities.

In sum, CARB must adequately analyze and mitigate the impacts of continuing oil and gas extraction. We urge CARB to phase out oil and gas extraction by 2035 at the latest in order to meet its GHG emission reduction goals, comply with AB 32 and AB 197, and protect the health of environmental justice communities.

9. CARB must analyze the environmental and health impacts of Cap-and-Trade.

CARB's Draft Scoping Plan and RDEA rely on the Cap-and-Trade Program to achieve its 2030 target. CARB should not rely on Cap-and-Trade, as this program has been proven to be ineffective and to result in disproportionate environmental and health impacts in disadvantaged communities. We urge CARB to adopt the Real Zero Alternative as proposed by CEJA instead of relying on Cap-and-Trade. To the extent that CARB relies on Cap-and-Trade, CARB has not and must provide a thorough analysis of its environmental and health impacts in this EA, in particular on disadvantaged communities.

a. CARB's RDEA fails to analyze the environmental and health impacts of Cap-and-Trade.

CARB, in the Draft Scoping Plan, proposes to rely on the Cap-and-Trade Program to achieve the State's 2030 GHG emissions reduction targets.[91] CARB estimates that Cap-and-Trade would be able to reduce an estimated 44 $MMTCO_2e$ of GHGs by 2030.[92] However, CARB does not explain how Cap-and-Trade will be utilized to achieve these emissions reductions.

Where CARB might provide insight into the RDEA as to how reliance on Cap-and-Trade policies would result in environmental and health impacts, particularly in environmental justice communities, CARB provides no such analysis. For instance, CARB fails to and must analyze and disclose the anticipated air pollution reductions attributed to the continued implementation of Cap-and-Trade. CARB must also research and analyze alternatives other than Cap-and-Trade

[90] *See*, e.g., Jill E.Johnston et al., *Respiratory health, pulmonary function and local engagement in urban communities near oil development*, 197 Env'l Rsch. 111088 (2021), https://www.sciencedirect.com/science/article/abs/pii/S0013935121003820?via%3Dihub ("[o]ur findings suggest that living near urban oil drilling sites is significantly associated with reduced lung function in South Los Angeles . . . [w]e observe a similar pattern among those living near the active and idle sites suggesting potential chronic impacts of exposures."); Kathy V. Tran et al., *Residential Proximity to Oil and Gas Development and Birth Outcomes in California: A Retrospective Cohort Study of 2006–2015 Births*, 128 Env'l Health Perspectives 067001 (2021), https://ehp.niehs.nih.gov/doi/full/10.1289/EHP5842.
[91] Draft Scoping Plan at 86-91.
[92] Draft Scoping Plan at 90, Table 2-4.

that could avoid the significant environmental and health impacts that result from Cap-and-Trade.

The Office of Environmental Health Hazard Assessment ("OEHHA") published a Cap-and-Trade analysis in February of 2022 and found that GHGs and PM2.5 emissions increased in the oil refining sector while air toxics increased in the oil production sector.[93] As such, research shows that Cap-and-Trade results in disproportionate environmental and health impacts on environmental justice communities.[21]

CARB's failure to analyze the potential environmental and health impacts of Cap-and-Trade on environmental justice communities is a huge oversight that counteracts CARB's commitment to environmental justice. CARB must include an analysis of the impacts of the Cap-and-Trade program in this EA.

10. CARB must exclude polluting fuels from the Low Carbon Fuel Standard ("LCFS") while increasing the standard's stringency.

CARB proposes increasing the stringency of the Low Carbon Fuel Standard ("LCFS") in the RDEA.[94] This proposal echoes proposals by CARB staff in recent workshops on the upcoming LCFS rulemaking, and appears to be in response to Governor Newsom's call for increased stringency of the LCFS.[95] We are not opposed to increased stringency in concept. However, there are likely consequences of taking this action in isolation that are deeply concerning.

Currently, the LCFS includes not only decidedly carbon neutral transportation fuels, such as electric vehicles, but also polluting fuels such as ethanol and dairy manure derived biomethane, otherwise known as factory farm gas. In fact, factory farm gas is considered the most carbon negative fuel.[96] However, the methodology that CARB uses is currently subject to significant scrutiny and skepticism due in part to an incomplete and inaccurate lifecycle analysis of factory farm gas.[97] In particular, it treats liquified manure storage, a profit-maximizing practice that results in significant greenhouse gas emissions, as the baseline. The methodology also excludes enteric emissions and post-digestion emissions from manure along with other GHG emissions associated with the production of factory farm gas. A full accounting of these

[93] Off. of Env'l Health Hazard Assessment, *Impact of Greenhouse Gas Emission Limits within Disadvantaged Communities: Progress Toward Reducing Inequities* (2022), https://oehha.ca.gov/media/downloads/environmental-justice/impactsofghgpoliciesreport020322.pdf.
[94] RDEA at 22.
[95] Letter from Governor Gavin Newsom to Chair Liane Randolph, Cal. Air Res. Bd. (July 22, 2022), https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf?emrc=1054d6.
[96] *LCFS Pathway Certified Carbon Intensities*, Cal. Air Res. Bd, https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities (last visited Oct. 20, 2022).
[97] *See* Ass'n of Irritated Residents et al., P*etition for Reconsideration of the Denial of the Petition for Rulemaking to Exclude All Fuels Derived from Biomethane from Dairy and Swine Manure from the Low Carbon Fuel Standard Program* (Mar. 2022), https://ww2.arb.ca.gov/sites/default/files/2022-04/2022-03-28%20-%20Petition%20for%20Reconsideration%20%28TOC%20Updated%29.pdf.

emissions means that the production of factory farm gas actually results in more greenhouse gas emissions. For these reasons, along with myriad negative local air and water quality impacts, dairy manure derived biomethane should be excluded from the LCFS. Similar problems plague ethanol as a purportedly low-carbon fuel, despite its carbon intensity being greater than gasoline.[98]

These methodological issues are of particular importance here because a likely outcome of increasing the stringency of the LCFS would be an increased demand for supposedly carbon negative fuels and the credits they currently generate for fossil fuel producers to purchase. Without a complete lifecycle accounting of the net carbon emissions of these fuels, or excluding these fuels altogether, increasing the stringency of the LCFS would likely have the opposite effect that it intends: an increase in carbon emissions associated with the production of transportation fuels.

11. CARB must add the action directed by the CARB Board and Environmental Justice Advisory Committee ("EJAC") to begin planning a managed phase down of oil refineries.

Finally, CARB must include in the final Scoping Plan an action to begin planning a managed phase down of oil refineries, as directed by the CARB Board and EJAC during the September 1 joint EJAC-CARB meeting.[99] We refer you to Communities for a Better Environment's comments on the RDEA for more details.

Thank you for considering our comments on the RDEA. We look forward to discussing our concerns, analyses, and recommendations with you in the coming weeks.

Sincerely,

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[98] Lark et al., *Environmental Outcomes of the US Renewable Fuel Standard*, PNAS 2022 Vol. 119 No. 9 e2101084119 (2022), https://www.pnas.org/doi/10.1073/pnas.2101084119.
[99] Video, Joint Envt'l Justice Advisory Comm. and Cal. Air Res. Bd. Meeting, Sept. 1, 2022, https://cal-span.org/meeting/carb_20220901/.

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