

EARTHJUSTICE

April 21, 2025

Clerk of the Board and Members of Board California Air Resources Board 1001 I Street Sacramento, CA 95814

Via Electronic Submittal

RE: Communities for a Better Environment and Earthjustice Comments on the Low Carbon Fuel Standard Third 15-Day Changes.

Chair Randolph and Members of the California Air Resources Board:

Communities for a Better Environment and Earthjustice submit the following comments on the Third Notice of Public Availability of Modified Text and Availability of Additional Documents and/or Information regarding amendments to the Low Carbon Fuel Standard (LCFS).¹

In response to the Office of Administrative Law's (OAL) February 25, 2025 disapproval of the LCFS amendments that the Board approved for adoption at the November 8, 2024 Hearing, staff proposes changes that significantly worsen the program in favor of polluting fuels. While we applaud the proposal to preserve the Clean Fuel Rewards program consistent with Board direction, we urge CARB to (1) reject increased subsidies for fossil-fuel derived hydrogen and to (2) boost support for electric vehicles (EVs) so that California can meet its air quality and climate goals notwithstanding federal rollbacks.

First, the proposed changes to Subsection 95482(h) in title 17 of the California Code of Regulations (CCR) would increase production of fossil hydrogen paired with carbon capture and storage (CCS), resulting in increased emissions of greenhouse gases (GHGs) and other

¹ CARB, Third Notice of Public Availability of Modified Text and Availability of Additional Documents and/or Information, Proposed Low Carbon Fuel Standard Amendments (Apr. 4, 2025) ("Third 15-Day Change"), <u>https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/3rd_15day_notice.pdf</u>.

pollutants. These significant changes are inconsistent with California's climate, air quality, and equity goals, exceed the scope of the OAL decision, and contradict Board Resolution 24-14. They also require CARB to both readopt the regulations under the California Administrative Procedure Act (APA) and to evaluate new impacts under the California Environmental Quality Act (CEQA). The OAL did not require these substantive changes to LCFS hydrogen policy, nor did the Board authorize staff to make them at this juncture. **As a result, CARB must either reject the proposed changes to Subsection(h) or readopt the regulation after conducting additional environmental review.**

Second, staff fails to propose enhanced crediting for EV charging even though it proposes increased support for hydrogen refueling. At a time when federal support for EVs is highly uncertain, **CARB must boost LCFS support for EVs so that California can meet its air quality and climate goals despite Trump administration attacks.**²

I. CARB must reject staff's proposed revision of the Board's decision to both end subsidies for fossil hydrogen by 2035 and require 80% "renewable" hydrogen by 2030.

The LCFS amendments that the CARB Board approved in November mandate that (1) starting in 2035, fossil fuel-derived hydrogen can no longer receive LCFS subsidies and that (2) 80% of hydrogen dispensed as a vehicle fuel must be "renewable" by 2030.³ The newly proposed changes would reverse course on both fronts. Specifically, they would exempt fossil hydrogen from the 2035 phase-out so long as that fossil hydrogen is paired with CCS technologies, and they would allow this fossil hydrogen paired with CCS to count toward the 80%-by-2030 requirement.⁴ CARB must reject these changes because they lack evidentiary support and will cause a wide range of environmental harms.

A. CARB staff fails to justify this significant and harmful departure from the policy that the Board adopted at its November 2024 hearing.

The OAL did not identify any issues that would require amendment of Subsection 95482(h) and CARB staff has not identified evidence to support changes that section. In the Final Statements of Reasons (FSOR), responding to comments critical of Subsection 95482(h)'s

² All cited sources are accessible by hyperlink in the footnotes to these comments. In addition, we have emailed the Clerk of the Board all cited sources that are not already in the record. All sources are thus readily accessible to CARB and thus submitted for inclusion in the record. See Pub. Res. Code § 21167.6(e)(7); *Consolidated Irrig. Dist. v. Superior Court* (2012) 205 Cal.App.4th 697. ³ CARB, Attachment A-1, Final Regulation Order

https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/fro_atta-1.pdf at 37 (Section 95482(h)).

⁴ Id. at 36-37 (changes to Section 95482(h)).

limits on fossil hydrogen, CARB states that "timing of this provision in the Proposed Amendments aligns with the current operational timeline for projects funded under the hydrogen hubs grants, which will expand the supply of renewable hydrogen in California starting in the early 2030s and aligns with mandates that 90% of electricity retail sales be renewable or zero carbon by 2035 (SB 1020 (Laird, Chapter 361, Statutes of 2022))."⁵ In the changes that CARB staff now proposes, it has not identified any new facts since publication of the FSOR that alter this rationale.

CARB staff states that the proposed modifications to this Subsection "would allow the LCFS to further support growing supplies of low-CI hydrogen in alignment with federal incentives and investment in carbon dioxide removal technology as well as California's 2022 Scoping Plan for Achieving Carbon Neutrality."⁶ However, the Scoping Plan cannot justify this weakening of the LCFS. Indeed, the certified Environmental Impact Analysis (EIA) for the amendments explains that excluding fossil-derived hydrogen from the LCFS will <u>align</u> the regulation with the 2022 Scoping Plan Update. In relevant part, it states:

The 2022 Scoping Plan Update identified a need for low-carbon, renewable hydrogen for the transportation sector (among other sectors) to displace fossil fuels in support of achieving the State's greenhouse gas emission reduction goals. The 2022 Scoping Plan Update scenario did not include hydrogen produced from fossil fuels, with or without carbon capture as low-carbon, renewable hydrogen.⁷

It would be illogical to encourage investments in long-lived assets to capture carbon dioxide at fossil hydrogen production facilities when the 2022 Scoping Plan Update does not foresee this equipment operating in a carbon-neutral California in 2045. Thus, the proposal would encourage investment in stranded fossil fuel infrastructure, in direct conflict with the 2022 Scoping Plan Update.

CARB staff's other stated rationales for the proposed changes are equally unpersuasive. Subsection 95482(h) already aligns with federal incentives because it provides a market for renewable hydrogen that the federal government is incentivizing with a generous \$3/kg production tax credit.⁸ Even if the federal government also provides incentives for fossil hydrogen, that federal policy does not justify weakening California's rules to accommodate fossil

⁵ CARB, Final Statement of Reasons (FSOR) at 358

- https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/fsor_appa.pdf. ⁶ CARB, Third 15-Day Notice,
- https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/3rd_15day_notice.pdf. ⁷ CARB, Final EIA at 19

https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/lcfs_final_eia.pdf/ ⁸ 26 U.S.C. § 45V.

fuels that are inconsistent with the State's plan for achieving its climate goals. Also, it is unclear what the proposed change to Subsection 95482(h) has to do with "investment in carbon dioxide removal technology," which are strategies for taking carbon out of the atmosphere—not abating a specific facility's emissions.⁹

B. Expanding California subsidies for fossil-fuel derived hydrogen paired with CCS poses numerous risks to the environment and human health.

Fossil hydrogen production with CCS creates significant impacts upstream throughout the fossil gas supply chain, harms the communities closest to the production facilities, and imposes downstream risks associated with the transportation and storage of carbon dioxide. CARB does not address any of these risks or impacts in its proposal to weaken Subsection 95482(h). As detailed below in Section III, these impacts are potentially significant and have not been evaluated in the EIA.

Producing hydrogen from fossil gas induces more production of fossil fuels, with concomitant harms to public health and the environment. Adding CCS to the process increases the demand for fossil gas because CCS equipment requires a significant amount of energy to operate.¹⁰ One reason that the hydrogen industry's demand for fossil gas threatens public health is that many kinds of equipment throughout the fossil gas supply chain emit hazardous and carcinogenic air pollution.¹¹ This upstream activity also destabilizes the climate by emitting methane. Indeed, the high methane emissions observed in the fossil gas supply chain are a key reason why one recent study found that hydrogen produced from fossil gas with CCS is an even more greenhouse gas-intensive source of heat than fossil gas or coal.¹²

In implementing the LCFS, CARB fails to properly account for these upstream methane emissions because they rely on a version of the GREET model that improperly assumes an

<u>https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf</u> (distinguishing Carbon Capture and Storage "from a facility" from Carbon Dioxide Removal "from ambient air").

¹⁰ Robert W. Howarth & Mark Z. Jacobson, *How green is blue hydrogen?*, at 1681, Energy Sci. & Eng'g (2021) 2021;9:1676–1687 ("Howarth & Jacobson"),

https://onlinelibrary.wiley.com/doi/epdf/10.1002/ese3.956 (estimating that "upstream emissions of unburned methane from the energy used to drive carbon capture are between 9.5 g CO2eq per MJ if only the SMR carbon is captured and 18 g CO2eq per MJ if the flue-gas emissions are also captured"). ¹¹ Clean Air Task Force, Fossil Fumes (2022 Update) at 5, https://cdn.catf.us/wp-

content/uploads/2016/06/14175846/fossil-fumes-report-2022.pdf.

⁹ See, e.g., CARB, 2022 Scoping Plan Update at 84, Figure 2-2,

¹² Howarth and Jacobson at 1679, Table 1 (estimating the contribution of fugitive methane emissions and other emissions sources to the total carbon-intensity of different hydrogen production technologies); *id.* at 1683 (comparing carbon-intensity of hydrogen produced from fossil gas with CCS to that of other fossil fuels).

upstream leakage rate of about 1%.¹³ This flawed assumption stems from two basic methodological errors: relying on self-reported data from the oil and gas industry and using national data, when California's gas supply comes from shale fields with especially high leakage rates. According to one recent study, on average, fossil gas consumed in California has a production-stage methane leakage rate of 2.8%.¹⁴ Thus, CARB ignores about two thirds of the significant upstream climate impacts of producing hydrogen from fossil fuels with CCS for use in the LCFS.

Producing hydrogen from fossil gas with CCS is a heavy industrial activity with several potentially significant local environmental impacts. The dominant technology for producing hydrogen from fossil fuels in California and the rest of the United States is steam methane reformation (SMR). As detailed in prior comments and recent studies, SMR facilities release criteria air pollution¹⁵ and hazardous air pollution.¹⁶ Powering energy-hungry CCS equipment could further increase emissions.¹⁷ Also, CCS equipment that uses amine-based solvents could cause additional environmental and public health harms because these solvents are potential carcinogens that adversely affect aquatic life and may contribute to smog formation and contaminate drinking water.¹⁸ After the solvent is used, the degraded amine product becomes

¹³ CARB, CA-GREET3.0 Model, <u>https://www.arb.ca.gov/fuels/lcfs/ca-greet/ca-greet30-</u>

<u>corrected.xlsm?_ga=2.176366309.1181395569.1744834010-466423198.1662166685</u> (Table 4.3 in the "Inputs" tab lists 1.14% as the total CH4 leakage rate for conventional natural gas production and 1.21% as the leakage rate for shale gas production).

¹⁴ Diana Burns & Emily Grubert, *Attribution of production-stage methane emissions to assess spatial variability in the climate intensity of US natural gas consumption*, at 6, 16 Environmental Research Letters 4 (2021), https://iopscience.iop.org/article/10.1088/1748-9326/abef33.

¹⁵ Sun et al., *Criteria air pollutants and greenhouse gas emissions from hydrogen production in U.S. steam methane reforming facilities*, 53 Env. Sci. Tech. 7103-7113 (2019), https://pubs.acs.org/doi/10.1021/acs.est.8b06197.

¹⁶ An air toxics health risk assessment completed for the Air Liquide El Segundo Hydrogen plant found maximum "offsite" cancer risks of 7.1 per million for a 30-year exposure, with diesel particulate matter from internal combustion engines and hexavalent chromium from the reformer heater identified as the primary cancer risk drivers. Davenport Engineering, Inc., *Health Risk Assessment RY 2016*, prepared for Air Liquide El Segundo Hydrogen Plant, (July 30, 2020) at PDF 10, <u>https://www.aqmd.gov/docs/default-source/planning/risk-assessment/air-liquide/air-liquide-el-segundo-2016-hra-(id148236).pdf</u>.

¹⁷ For instance, the most recent annual reporting for Shell's Quest CCS project at an SMR facility in Alberta Canada states that it incurred an energy penalty of .67 MJ_e/kg from electricity usage to capture, transport and store carbon dioxide and a net energy penalty of 2.02 MJ_{th}/kg, primarily due to the thermal energy required to produce steam for carbon dioxide capture and transport. Shell, Quest GHG and Energy Report for 2023 (Feb. 2024), Table 1, <u>https://open.alberta.ca/dataset/e90a4e6e-2c11-44ee-b198-de244261c585/resource/8c471776-1700-457b-a58b-6c9da68c1962/download/quest-annual-status-report-2023-ghg-energy-report-2023.pdf.</u>

¹⁸ Yukyan Lam et al., Environmental Justice Concerns with Carbon Capture and Hydrogen Co-Firing in the Power Sector, The New Sch. Tishman Env't and Design Ctr. (June 2024), at 16, <u>https://njeja.org/wp-content/uploads/2024/07/CCS-EJ-White-Paper.pdf</u>; *see also* sources cited as references in Yukyan Lam et al. at 42-61 (citations omitted here and submitted attached to these comments).

hazardous waste.¹⁹ Producing hydrogen from fossil fuels with CCS could also threaten local water supplies, as SMR of fossil gas with CCS requires more water than electrolytic hydrogen production.²⁰

Producing hydrogen with CCS also creates downstream impacts from transporting and storing carbon dioxide. Carbon dioxide pipelines pose various environmental and health threats. Carbon dioxide's interaction with impurities, such as water and hydrogen sulfide, can compromise pipe integrity and increase the risk of corrosion and failure, which could lead to the re-release of carbon dioxide into the atmosphere and lead to a public health emergency because carbon dioxide is an asphyxiant.²¹ Long-term carbon dioxide sequestration via saline aquifers poses various environmental threats, including potential contamination of shallow aquifer waters and leakage of carbon dioxide back into the atmosphere.²² The fossil fuel industry may use the carbon dioxide for EOR contravenes California's climate goals by stimulating oil production, yet the LCFS' carbon accounting for hydrogen produced from fossil fuels with CCS does not account for its contributions to the supply of petroleum.

Finally, the proposal to end crediting for fossil hydrogen <u>without</u> CCS in 2035 has the same practical effect as simply deleting Subsection 95482(h)'s requirement to phase out fossil hydrogen and nullifies the intent of the Board in approving the regulation. In 2035, fossil hydrogen will not have a relevant credit generation opportunity, regardless of Subsection 95482(h). Under the amendments the Board approved in November 2024, the benchmark carbon intensity for California transportation fuels would be 47.09 gCO_{2e}/MJ in 2035 unless the Automatic Acceleration Mechanism (AAM) increases the stringency of the standard.²⁴ The energy efficiency ratios for hydrogen vehicles range from 1.6–2.5.²⁵ Therefore, in the unlikely scenario that the AAM does not accelerate benchmarks by 2035, the hydrogen industry would

content/uploads/2022/03/3-23-22-Final-Accufacts-CO2-Pipeline-Report2.pdf.

¹⁹ Id. at 17.

²⁰ International Renewable Energy Agency, Water for hydrogen production (2023), Figure S1, <u>https://www.irena.org/-</u>

[/]media/Files/IRENA/Agency/Publication/2023/Dec/IRENA_Bluerisk_Water_for_hydrogen_production_2023.pdf.

²¹ Richard Kuprewicz, 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., prepared for the Pipeline Safety Trust (Mar. 23, 2022), <u>https://pstrust.org/wp-</u>

²² Hannah Klaus et al., Uncertainties and Gaps in Research on Carbon Capture and Storage in Louisiana, Ctr. for Progressive Reform (June 2023), <u>https://cpr-assets.s3.amazonaws.com/wp/uploads/2023/06/ccs-in-louisiana-rpt-june2023-final.pdf</u>.

²³ For instance, Air Products and Chemicals supplies the carbon dioxide it captures at an SMR facility in Port Arthur, Texas, for EOR. U.S. Department of Energy, APCI Port Arthur ICCS Project, https://www.energy.gov/fecm/air-products-chemicals-inc.

²⁴ 17 CCR § 95484, Table 1.

²⁵ 17 CCR § 95486.1, Table 5.

need to supply hydrogen with a CI below 117.25 gCO_{2e}/MJ to generate credits in 2035.²⁶ However, the temporary CI for hydrogen produced from fossil gas without CCS is 195 gCO_{2e}/MJ ,²⁷ suggesting that a CI of 117.25 gCO_{2e}/MJ is likely out of reach for this fuel. There is no evidence that prohibiting credit generation with hydrogen produced from fossil gas with CCS in 2035 changes the compliance options available to industry. In essence, CARB staff proposes to replace a meaningful limitation on incentives for polluting activity with an inconsequential, ineffectual one.

II. If CARB does not reject the proposed changes to Subsection 95482(h), the California Administrative Procedure Act requires it to readopt the regulation.

Under the APA, if CARB makes new, significant changes to a regulation in response to OAL's disapproval, CARB must readopt the regulation. Cal. Gov. Code § 11349.4 (a). In relevant part, Subsection 11349(a) of the California Government Code provides that "[i]f the regulation has been significantly changed... the agency shall comply with Article 5 (commencing with Section 11346) and readopt the regulation." Id.

First, the proposed changes to Subsection 95482(h) are significant within the meaning of Subsection 11349.4 (a) because they substantially alter the limits placed on fossil fuel-derived hydrogen in the LCFS. As detailed above in Section I, these changes will impact LCFS credit generation for fossil hydrogen paired with CCS and adversely impact the environment and human health in numerous ways.

Second, the proposed changes improperly exceed the scope of the changes that OAL called for in disapproval decision. Pursuant to Government Code Section 11349.1, OAL reviewed the proposed LCFS amendments and found that they failed to comply with the APA's procedural and clarity requirements.²⁸ OAL provided a detailed discussion of the 26 sections that required revision and identified procedural deficiencies.²⁹ Nowhere in its discussion did OAL identify concerns with Subsection 95482(h). Indeed, the OAL decision does not so much as mention the word hydrogen. Likewise, in its justification of the proposed Subsection 95482(h), CARB staff does not assert that they were made in response to OAL's decision. Without following the procedure set forth in the APA, CARB may not seize upon the OAL's disapproval of its regulation to substantively change key provisions of the regulation. But for the OAL's

 $^{^{26}}$ 47.09 x 2.5 = 117.25. It is generous to assume that hydrogen vehicles in 2035 would have an EER of 2.5 because this is the EER listed for light- and medium-duty vehicles, segments where it is especially difficult for hydrogen to compete against battery electric technologies. The EER listed for hydrogen heavy-duty trucks is 1.9. § 95486.1, Table 5.

²⁷ 17 CCR § 95488.9, Table 8.

²⁸ OAL Decision at 2, 22.

²⁹ Id. at 3-22.

disapproval, the LCFS amendments as submitted to OAL for approval would have been adopted and deemed effective when OAL reached its approval decision in February. CARB cannot take another bite at the apple and change LCFS hydrogen policy simply because it submitted a regulation that was <u>rejected</u> by OAL. The APA prohibits such machinations by requiring readoption for any significant changes made after OAL review, Cal. Gov. Code § 11349.4(a), and by setting forth detailed procedures for public participation in the rulemaking process. *See* Cal. Gov. Code § 11346 et seq.

Third, the issues raised by these proposed changes were not addressed at the November 8, 2024 Board hearing and could not have been anticipated from the existing record. CARB never proposed allowing fossil hydrogen paired with CCS to count toward the 80%-by-2030 goal nor did it suggest that it would exempt such hydrogen from the 2035 phase out deadline. There was no discussion of this possibility at the Board hearing, and the public could not have anticipated CARB's reversal in its hydrogen policy based on the record. As noted above, CARB's statements justifying the Board-approved version of Subsection 95482(h) indicated to the public that CARB thought only renewable hydrogen was consistent with 2022 Scoping Plan update, not hydrogen derived from fossil fuels, as now proposed. In response to myriad comments about Subsection 95482(h)'s consistency with the Scoping Plan, CARB stated in the FSOR that Subsection 95482(h) aligns with the Scoping Plan because "[t]he 2022 Scoping Plan Update scenario did not include hydrogen produced from fossil fuels, with or without carbon capture, as low-carbon, renewable hydrogen."30 CARB also stated in the FSOR that "[t]he proposed amendments do not preclude the use of carbon capture and sequestration on hydrogen production, provided that fossil gas is not the primary feedstock."³¹ Also, responding to comments critical of Subsection 95482(h)'s limits on fossil hydrogen, CARB asserted that "timing of this provision in the Proposed Amendments aligns with the current operational timeline for projects funded under the hydrogen hubs grants, which will expand the supply of renewable hydrogen in California starting in the early 2030s and aligns with mandates that 90% of electricity retail sales be renewable or zero carbon by 2035 (SB 1020 (Laird, Chapter 361, Statutes of 2022))."³² Thus, none of CARB's statements in the record indicate that it would reverse course on these fossil hydrogen limits. And as noted above, in the changes that CARB staff now proposes, it has not identified any new facts since publication of the FSOR that alter its FSOR rationale.

CARB's EIA also underscores the centrality of the fossil hydrogen limits in Subsection 95482(h) to CARB's regulatory package as approved for adoption by the Board. In the EIA's "Description of the Proposed Amendments to the Low Carbon Fuel Standard," CARB lists "Remove Eligibility of Fossil Fuel-Derived Hydrogen" as one of the major changes to the

³⁰ CARB, FSOR at 512 (emphasis added)

³¹ Id.

³² CARB, FSOR at 358

regulation, and again states that "[t]he 2022 Scoping Plan Update scenario did not include hydrogen produced from fossil fuels, with or without carbon capture as low-carbon, renewable hydrogen."³³ Thus, there was no reason for the public to anticipate that CARB would change course and later claim that hydrogen made from fossil fuels and paired with CCS would be deemed consistent with the 2022 Scoping Plan or allowed to generate credits beyond 2035, when the EIA's analysis and findings were based on a Project that ended credits for all fossil hydrogen in 2035.³⁴ Because the proposed changes were not addressed at the public hearing and could not have been anticipated from the existing record, they must be subject to the appropriate public process under the APA. Cal. Gov. Code §§ 11349.4 (a); 11346.8(c).

Finally, the proposed changes are directly contrary to Board Resolution 24-14. In relevant part, the resolution directs the Executive Officer to "monitor, report back to the <u>Board as part of</u> the next Scoping Plan Update, and propose any adjustments, if any of the following conditions may impede successful expansion of similar GHG reduction policies in other jurisdictions or impede the ability of the State to achieve its air quality and climate goals, and transition to zero emission technology," including "[h]ydrogen fuel availability to meet growing demand and role of state and federal incentives, including alignment with federal hydrogen incentives to increase hydrogen supply;"³⁵ This direction specifically contemplates the possibility of future changes to state and federal hydrogen policy as well as hydrogen supply and mandates the following course of action: (1) the Executive Office must report back to the Board at the next Scoping Plan update (which is required by 2027); (2) based on that reported information, the Board will review and approve of any "adjustments" to the LCFS regulations. The Resolution 24-14 does not authorize the Executive Officer to make changes to the regulation without Board consideration and approval. Thus, CARB must readopt the regulation if it makes the proposed Subsection 35482(h) changes.

III. Additional environmental review, including review of localized impacts, is required if CARB does not reject the proposed changes to Subsection 95482(h).

In addition to requiring readoption under the APA, CARB's proposed changes to Subsection 95482(h) will alter the Project such that new and additional environmental review is required under CEQA. Whenever a public agency must make a further discretionary decision to

³⁵ CARB Board Resolution 24-14 at 7,

³³ CARB, Final EIA at 19.

³⁴ Further, CCS was discussed in a meet that CARB staff had with CARB's Environmental Justice Advisory Committee. staff never suggested to the EJAC that it would propose amendments to the LCFS that would incentivize CCS paired with hydrogen in these amendments. https://ww2.arb.ca.gov/sites/default/files/barcu/board/mt/2024/mt091224.pdf.

https://ww2.arb.ca.gov/sites/default/files/barcu/board/res/2024/res24-14.pdf (emphasis added).

carry out or approve a project for which it has previously issued an approval, the agency must determine whether further environmental review is required due to changes in the project, changes in circumstances, or new information. *Department of Water Resources Environmental Impact Cases* (2022) 79 Cal.App.5th 556, 576. Here, CARB has proposed significant Project changes after the close of public comment and certification of an EIA. As discussed above in Section II, CARB's proposed new, significant changes to the Project require the agency to readopt the regulation to comply with Section 11349.4(a) of the APA. Because readoption is a discretionary decision, CARB must determine whether additional CEQA review is required due to these Project changes. 14 Cal. Code Regs. 15162(a), (c); *see Willow Glen Trestle Conservancy v. City of San Jose* (2020) 49 Cal.App.5th 127, 131. Significant project changes require CEQA review when, as here, the changes will result in new and worsened environmental impacts that have not been analyzed in an environmental review document. Pub. Resources Code § 21166(a); 14 Cal. Code Regs. 15162(a)(1).

The proposed changes to Section 954852(h) are significant because the changes go beyond mere ministerial modifications of the previously analyzed Project. *See Communities for a Better Environment v. South Coast Air Quality Management Dist.* (2010) 48 Cal.4th 310 (finding applicant's proposal to produce ultra-low sulfur diesel at oil refinery was not a mere modification where it would result in significant increased operation of polluting equipment). As explained throughout these comments, the Proposed changes substantially alter the limits placed on fossil hydrogen in the LCFS in ways that would trigger readoption under the APA. *See* Section II.

These significant changes to the LCFS amendments would also result in new and worsened environmental impacts by altering LCFS credit generation for fossil hydrogen paired with CCS, requiring the need for subsequent or supplemental CEQA review. *See Citizens Comm. to Complete the Refuge v. City of Newark* (2021) 74 Cal.App.5th 460, 475 (concluding that the need for additional environmental review arises when there is a need to evaluate new or more severe significant environmental impacts that will result from changes to a project). As Section I.B. explains, fossil hydrogen production with CCS creates significant impacts throughout the supply chain, harming communities closest to hydrogen production facilities and generating downstream risks because of storage and transportation of carbon dioxide. Additionally, CCS equipment that uses amine-based solvents could cause additional environmental and public health harms, including smog formation, drinking water contamination, and impacts to aquatic life. *See* Section I.B.

None of these additional and worsened environmental impacts have been discussed or considered in the EIA. The EIA did not analyze both the production and downstream impacts of CCS with SMR facilities and downplayed the likelihood of significant impacts from CCS processes. For example, the EIA incorrectly suggests that CCS at SMR facilities would not use amine-based solvents because those facilities do not have "low-purity CO2 streams."³⁶ However, CARB itself has recently recognized that SMR facilities with carbon capture use amine separation.³⁷ Indeed, among the small handful of projects that have demonstrated SMR with CCS, multiple facilities have used amine-based solvents.³⁸ Academics are also attempting to refine the process of capturing carbon emissions from SMR facilities with amine-based technologies.³⁹ The U.S. Department of Energy is funding a CCS project at an SMR facility in Texas that does not plan to use an amine-based solvent to capture carbon dioxide from its syngas, but does intend to rely on an amine-based solvent to capture carbon from the flue gas stack that contributes about 45% of the facility's emissions.⁴⁰ An SMR facility could not plausibly operate in a manner that is consistent with California's long-term climate goals if it fails to abate the low-purity carbon dioxide stream in its flue gas emissions. Thus, CARB's environmental analysis cannot deny or ignore the potential environmental consequences of hydrogen producers deploying amine-based CCS technologies.

Because the proposed changes incentivize more fossil hydrogen and additional CCS, which will foreseeably result in new, additional impacts such as those from amine solvents, among others, CARB must analyze the environmental impacts of its proposed changes now in a subsequent or supplemental EIA in order to comply with CEQA. Alternatively, CARB should

³⁸ Shell's Quest carbon capture and storage project in Alberta, Canada, uses the monoethyldiamine (MDEA) solvent to remove carbon dioxide from the syngas of an SMR facility. Clean Air Task Force, Carbon capture and storage: What can we learn from the project track record?, (July 31, 2024), <u>https://www.catf.us/resource/carbon-capture-storage-what-can-learn-from-project-track-record/</u>. The Tomakomai CCS Demonstration Project in Japan also captured carbon dioxide from an SMR unit using an active amine process. International Energy Agency, Tomakomai CCS Demonstration Project, <u>https://www.iea.org/reports/ccus-around-the-world-in-2021/tomakomai-ccs-demonstration-project</u>; U.S. Department of Energy, Tomakomai Carbon Capture and Storage (CCS) Demonstration Project, <u>https://fossil.energy.gov/archives/cslf/Projects/Tomakomai.html</u>.

³⁶ CARB, Final EIA at 102.

³⁷ CARB, California Transportation Supply (CATS) Model v.0.2 – Technical Documentation for August 2023 Example Scenario (Aug. 2023) at 18, <u>https://ww2.arb.ca.gov/sites/default/files/2023-08/CATS%20Technical_1.pdf</u> ("Older SMR processes typically use an amine separation, which is selective for CO2, resulting in a very high capture efficiency (90 percent or higher). Many modern hydrogen production facilities are likely to use membrane separation to create a higher purity hydrogen stream. If these facilities are also using CCS, they will add amine separation as an additional step to purify the CO2."). CARB relies on the CATS model in the LCFS rulemaking to understand how different regulatory approaches to the transportation sector affect compliance scenarios.

³⁹ See, e.g., Muhammad Zubair Shahid and Jim-Kuk Kim, Design and economic evaluation of a novel amine-based CO₂ capture process for SMR-based hydrogen production plants, Journal of Cleaner Production (May 20, 2023), <u>https://www.sciencedirect.com/science/article/abs/pii/S0959652623008624</u> ("Chemical absorption using amine solvents is the most commercially recognized technology to capture CO₂ from the SMR-based hydrogen production plant.").

⁴⁰ Air Liquide, Combined Carbon Capture Solution on Air Liquide South Texas Steam Methane Reformer, 2024 FECM/NETL Carbon Management Research Project Review Meeting, slides 5–6, <u>https://netl.doe.gov/sites/default/files/netl-file/24CM/24CM_PSCC_6_Odom.pdf</u>.

decertify the LCFS Amendments' EIA, conduct the environmental analysis anew because of these proposed changes, and recirculate the document for public comment and review.

Importantly, any environmental review must address the impacts of fossil hydrogen production and CCS on adjacent communities. The locations of fossil hydrogen producers that sell into the LCFS are known. In its air quality modeling spreadsheet CARB lists "California SMR Hydrogen Facilities," which are located in at least three air districts throughout the State.⁴¹ CARB knows which existing SMR facilities produce hydrogen that generates LCFS credits, providing a strong indication of which facilities will further ramp up hydrogen production to supply the growing market for hydrogen as a transportation fuel. The Current Fuel Pathways spreadsheet, which contains a list of certified LCFS pathways, also identifies hydrogen producers and their locations.⁴² Finally, a 2019 study has also listed the locations of all SMR facilities.⁴³

CARB admits in the EIA that "[s]taff expects proposed amendments will increase the production of low-carbon fuels in California, which will result in increased emissions at the production facilities."44 The addition of the proposed changes to Subjection 95482(h) would only increase such emissions for the reasons described above in this Section and Section I.B. CARB must connect this data and assess the impact of increasing hydrogen production on communities impacted by these hydrogen and CCS facilities. This sort of analysis is not only appropriate but required, even for a programmatic environmental review such as this one. See Cleveland National Forest Foundation v. San Diego Association of Governments (2017) 17 Cal.App.5th 413, 440. As noted in prior comments, submitted before the Board hearing, it is insufficient for CARB to simply conclude, without analysis, that long-term air quality impacts of the Amendments will be significant and unavoidable. CARB must analyze the foreseeable air quality impacts from new or expanding hydrogen production and CCS expansion. CARB's failure to disclose localized impacts and analyze the public health and air quality implications would leave the public and decisionmakers in the dark about the Project's pollution burdens and public health impacts to frontline communities. The programmatic nature of environmental review does not excuse CARB's failure to disclose and assess the magnitude and severity of air quality impacts from the Amendments' impacts on hydrogen production at already existing SMR facilities and expected new facilities, which would likely be located near known freight corridors to reduce the

08/2024%20LCFS Amendments Air Quality Calculations 15Day%20Proposed 1.xlsx. ⁴² CARB, Current Fuel Pathways

Hydrogen Production in U.S. Steam Methane Reforming Facilities (2019), https://pubs.acs.org/doi/suppl/10.1021/acs.est.8b06197/suppl_file/es8b06197_si_001.pdf. ⁴⁴ CARB, SRIA at B-2.

⁴¹ CARB, Air Quality Analysis Workbook from 15-day Package, Emissions Factors – Production) tab. https://ww2.arb.ca.gov/sites/default/files/2024-

https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/current-pathways_all.xlsx. ⁴³ Sun et al., Supporting Information for Criteria Air Pollutants and Greenhouse Gas Emissions from

costs of serving the heavy-duty freight vehicles that are most difficult to electrify. Failing to provide this analysis would violate CEQA.

IV. Given the federal threats to EV support, CARB should enhance credit generation for EV charging infrastructure.

CARB's landmark zero-emission vehicle (ZEV) rules—vital pieces of California's strategy to meet air and climate goals—are under unprecedented attack. As the Trump administration takes steps to rescind California's Clean Air Act waivers,⁴⁵ deny approval of future waivers,⁴⁶ and slash federal funding,⁴⁷ CARB must increase support for battery EVs. The need for this support was evident when the Board voted on the LCFS amendments, and it is even more apparent now, given the federal assault on bedrock climate and clean air laws.

Despite the central importance of battery EVs, California's commitment to them, and the growing threats to their deployment, CARB staff fails to propose enhancements to EV fast charging infrastructure (FCI) crediting even though it proposes increased crediting for hydrogen refueling infrastructure (HRI).⁴⁸ FCI is already disadvantaged in the LCFS program, and this proposal would exacerbate the uneven playing field. CARB must correct this unjustified asymmetry and boost FCI crediting at this critical time.

First, CARB should eliminate the capacity crediting cap (of 1.5x the CapEx) for FCI to provide developers with greater investments certainty. Removing credit limits would signal CARB's commitment to maintaining infrastructure growth and California's commitment to its ZEV goals, especially in a time of regulatory and federal financial uncertainty. CARB staff

⁴⁵ See, e.g., Executive Order 14154, Section 2 (e), <u>https://www.whitehouse.gov/presidential-actions/2025/01/unleashing-american-energy/;</u> Advanced Clean Cars II Notice of Approval in 2024, <u>https://www.govinfo.gov/content/pkg/FR-2025-01-06/pdf/2024-31128.pdf</u>; Advanced Clean Trucks approval in 2023, <u>https://www.govinfo.gov/content/pkg/FR-2023-04-06/pdf/2023-07184.pdf</u>.

⁴⁶ In 2019, the first Trump administration withdrew the waiver for Advanced Clean Cars I <u>https://www.epa.gov/system/files/documents/2025-01/hd-acf-carb-waiver-withdraw-resp-2025-1-14.pdf</u>. The waiver was reinstated under the Biden administration in 2022. In 2025, CARB revoked its waiver request for Advanced Clean Fleets and the In-Use Locomotive Standards, limiting CARB's enforcement

request for Advanced Clean Fleets and the In-Use Locomotive Standards, limiting CARB's enfo of these Board-approved regulations.

 ⁴⁷ Including Advanced Technology Vehicle Manufacturing Loans, used and new clean vehicle tax credits, charging infrastructure tax credits, the National Electric Vehicle Infrastructure (NEVI) Formula Program.
⁴⁸ CARB, Attachment A-2.1, Proposed Regulation Order

https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/atta2.pdf (*compare* changes to 95486.3 at 21-22 and 27-28 (increasing credit generation for hydrogen refueling by lowering the derating factors and eliminating the credit cap provision) *with* changes at 31 and 36 (same derating and credit cap provisions not altered for EV charging infrastructure).

proposes to remove this cap for HRI, and there is no basis for withholding such a change for FCI.⁴⁹

Second, CARB must make the arbitrary derating for FCI at least at parity with the HRI stations, allowing for continued investment even under the significant uncertainty of the Advanced Clean Trucks rule and potential slower EV adoption due to the revocation of the Advanced Clean Fleets waiver request. Staff's current proposal increases the credit generation factors for HRI (from 50% to 62.5% for shared stations and from 25% to 31.5% for private stations) but inexplicably leaves the FCI factors unchanged (i.e. 20% for shared and 10% for private charging).⁵⁰ CARB provides no explanation for why the specific increases were chosen, nor any evidence or analysis justifying that HRI needs more support than FCI. CARB claims that "through the public engagement process, stakeholders have confirmed that 6,000 kg/day, derated to 50% of the nameplate capacity, provides sufficient incentive for MHD-HRI stations,"⁵¹ whereas no such confirmation was made from FCI stakeholders. In fact, FCI stakeholders noted that the HD FCI provisions help address "utilization risks in the early market phases" even with such regulatory requirements of the Advanced Clean Trucks and Advanced Clean Fleets rules.⁵²

CARB's unjustified preference for hydrogen refueling over EV charging is puzzling and troublesome given the overwhelming evidence shows that battery EVs will do almost all of the work cleaning up California's transportation sector. CARB's own estimates show electricity will power 88% of the zero-emission transportation energy demand through 2045, far exceeding the contribution of hydrogen fuel cell vehicles.⁵³ CARB cut its own hydrogen fuel cell vehicle projections by two-thirds (from 62,600 to 20,500)⁵⁴—even before potential federal rollbacks

https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/lcfs appe.pdf.

(https://ww2.arb.ca.gov/sites/default/files/2024-

⁴⁹ Id.

⁵⁰ Id.

⁵¹ CARB, Appendix E: Purpose and Rationale of Proposed Amendments for the Low Carbon Fuel Standard Requirements (Jan.2, 2024) at 42

 ⁵² Hall et al., Low Carbon Fuel Standard Amendments (2nd 15-Day Changes) (Oct. 16, 2024) at 1, https://www.arb.ca.gov/lists/com-attach/39-lcfs2024-2nd15day-AG0HaVA1WVUDbFA+.pdf.
⁵³ CARB provided the expected energy demand for fuel types in its LCFS scenario model

<u>08/scenario_inputs_15Day_Proposed_9step_30_final_posted_0.xlsx</u>) and explained the rationale for the fuel demand by fuel type in its CATS modeling documentation

⁽https://ww2.arb.ca.gov/sites/default/files/2023-08/CATS%20Technical_1.pdf). From 2025-2045, the electricity demand is estimated as 4.92E12 MJ and the hydrogen demand is estimated as 6.44E11 MJ. Of the total ZEV-related energy (i.e. electricity and hydrogen (not including gas, diesel, cng), 88% of the energy need is from electricity and 12% is from hydrogen.

⁵⁴ CARB, 2024 Annual Evaluation of Fuel Cell Electric Vehicle Deployment and Hydrogen Fuel Station Network Deployment (2024) at 14 <u>https://ww2.arb.ca.gov/sites/default/files/2024-12/AB-126-Report-2024-Final.pdf</u>.

were identified.⁵⁵ Other experts' most recent economic modeling has also shown that the role of hydrogen in surface transportation is likely to be very limited, as the costs of battery EVs decline more quickly than previously forecasted and hydrogen vehicle costs decline more slowly than anticipated.⁵⁶ Further, even though EV adoption may be slower than what was expected with full enforcement of CARB's Advanced Clean Cars II, Advanced Clean Trucks, and Advanced Clean Fleets regulations, the data are clear: more consumers are purchasing EVs,⁵⁷ and more infrastructure is needed. Indeed, the current level of EV infrastructure deployment (i.e. 179, 241 reported EV chargers) is less than 1/6 of what California Energy Commission (CEC) says is needed by 2030 (i.e. 1.01 million chargers). ⁵⁸

⁵⁵ This is not the first time that CARB has slashed its projections for the role of hydrogen vehicles in the transportation sector. For instance, when CARB adopted the first ACC rule in 2012, it estimated cumulative sales of light-duty FCEVs to reach 56,844 by 2022. In the 2017 midterm review for the rule, CARB estimated that cumulative sales of light-duty FCEVs would reach 35,083 by 2022. CARB, 2017 ZEV Calculator Tool *available at* https://ww2.arb.ca.gov/sites/default/files/2020-

<u>01/zevcalculator_2017_ac.xlsx</u>. However, just 11,897 light-duty FCEVs were on the road in California at the end of 2022. CEC, Light-Duty Vehicle Population in California, <u>https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/light-duty-vehicle</u>. In its 2022 Advanced Clean Cars II rulemaking, CARB found that California could achieve 100% sales of zero-emission light-duty vehicles with just 2.8% sales of FCEVs. CARB, Final Statement of Reasons for Rulemaking for the Advanced Clean Cars II Regulations, Appendix F at 7 (Aug. 25, 2022), https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/fsorappf.pdf.

⁵⁶ For instance, a February 2025 report from the U.K. Climate Change Committee included the key message that by 2050, "[T]here will be no hydrogen cars or vans, and very little or potentially even no role for hydrogen in heavier vehicles." UKCCC Seventh Carbon Budget at 146,

https://www.theccc.org.uk/wp-content/uploads/2025/02/The-Seventh-Carbon-Budget.pdf. The supporting documents for this report include ERM, ZEV HDV Uptake Trajectories: Modeling Assumptions (2024), https://www.theccc.org.uk/wp-content/uploads/2025/02/ZEV-HDV-uptake-trajectories-ERM.pdf. In addition, independent analysts at DNV estimated in 2024 that hydrogen would provide just 1% of on-road energy demand by 2050—a dramatic downward revision of its projection in 2023 that hydrogen would provide about 3% of on-road energy by midcentury. Leigh Collins, DNV slashes forecast for hydrogen use in road transport amid advances in battery-electric trucks, Hydrogen Insight (Oct. 17, 2024), https://www.hydrogeninsight.com/transport/dnv-slashes-forecast-for-hydrogen-use-in-road-transport-amid-advances-in-battery-electric-trucks/2-1-1725398.

⁵⁷ California Energy Commission (2025). California Energy Commission Zero Emission Vehicle and Infrastructure Statistics (last updated Jan. 31, 2025) <u>http://www.energy.ca.gov/zevstats;</u> https://www.energy.ca.gov/files/zev-and-infrastructure-stats-data;

LDV Sales and Shares Last updated 1-31-2025 ada.xlsx (showing light duty ZEVs represent over 25% of new car sales in 2024, and that percentage is increasing);

<u>Medium Heavy Duty Vehicle Population Last updated 04-30-2024 ada.xlsx</u> (showing 95% of the MHD ZEVs registered with DMV in 2023 were battery EVs (as opposed to FCEVs)

⁵⁸ See California Energy Commission (2025). Zero Emission Vehicle and Infrastructure Statistics, EV Chargers (last updated March 6, 2025)

https://www.energy.ca.gov/filebrowser/download/7390?fid=7390#block-symsoft-page-title (showing only 179,241 public or shared private chargers are in operation across California); Davis, Adam et al.,

It is also irresponsible for CARB to favor hydrogen fueling stations with special credit generation opportunities that are unavailable to EV charging stations because hydrogen fueling stations present unique stranded asset risks. In a 2023 fact sheet, CARB and CEC explained that "investments in hydrogen fueling infrastructure may become stranded assets" if several barriers are not addressed.⁵⁹ The agencies highlighted the need to transition to fully clean and renewable hydrogen production, lower hydrogen fuel prices so that they do not remain far above the costs of equivalent fuel for internal combustion engines (ICE) and battery electric vehicles, and improve the availability of fuel cell electric vehicle (FCEV) models.⁶⁰ These factors do not pose similar risks to EV charging stations because (1) Senate Bill 100 created a process for transitioning their fuel to renewable energy, (2) fuel costs for EVs are already lower than fuel costs for ICE vehicles, and (3) manufacturers offer a broader range of battery electric models than FCEVs.

Given this robust evidence, CARB should appropriately boost FCI crediting to reflect the critical importance of battery EVs for California's energy transition and to counter federal threats to EV deployment and California's clean air and climate goals. Significant changes will require readoption of the regulation under the APA, and this process will provide CARB with an opportunity to consider additional evidence on the importance of LCFS support for EV deployment given the altered federal landscape.

In sum, we urge CARB to (1) reject staff's unjustified proposal to increase subsidies for polluting fossil hydrogen and to (2) boost support for EV infrastructure in the face of federal attacks and rollbacks. If CARB does not reject staff's proposal to significantly change the regulation in favor of fossil hydrogen, it must readopt the regulation and conduct additional review under CEQA.

Sincerely,

<u>/s/ Nina Robertson</u> Nina Robertson Sara Gersen

²⁰²³ Assembly Bill 2127 Second Electric Vehicle Charging Infrastructure Assessment: Assessing Charging Needs to Support Zero-Emission Vehicles in 2030 and 2035. California Energy Commission. Publication Number: CEC-600-2024-003, at ii

<u>https://efiling.energy.ca.gov/GetDocument.aspx?tn=254161</u> (projecting that "California will need 1.01 million chargers (including 39,000 direct-current fast chargers) to support 7.1 million light-duty plug-in electric vehicles in 2030.").

⁵⁹ CARB and CEC, Hydrogen Vehicle Fueling Infrastructure and Fuel Production in California: Frequently Asked Questions (2023), <u>https://calmatters.org/wp-content/uploads/2023/08/AB-118_FactSheet_H2-4.pdf</u>.

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