



Chair Sanchez and Members of the Board
California Air Resources Board
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June 15, 2026

Via electronic submittal

Re: Earthjustice comments on Proposed Fiscal Year 2025-26 and Fiscal Year 2026-27 Funding Plan for the Air Quality Improvement Program

Dear Chair Sanchez and Members of the Board:

Thank you for the opportunity to comment on the California Air Resources Board's (CARB) Proposed Fiscal Year 2025-26 and Fiscal Year 2026-27 Funding Plan for the Air Quality Improvement Program (AQIP). Earthjustice supports CARB's proposal to allocate \$70 million in AQIP funding to the Clean Off-Road Equipment Voucher Incentive Projects (CORE). We further support the proposed approach to allocating any additional funding that becomes available to CORE, the Clean Truck and Bus Voucher Incentive Project (HVIP), and the Sustainable Heavy-Duty Initiatives for Future Technology (SHIFT) program. With extremely limited funding and unprecedented federal attacks on California's climate and clean air policies, CARB must ensure that any available funding is used exclusively to support battery-electric technologies that emit zero harmful air pollution.

I. We support CARB's proposed AQIP funding allocations of \$70 million to the Clean Off-Road Equipment Voucher Incentive Project.

We support the proposed AQIP funding allocations of approximately \$70 million to the Clean Off-Road Equipment Voucher Incentive Project (CORE) across the two fiscal years. CARB staff's rationale for these investments makes sense; the CORE program has high demand, is extremely cost-effective, and—with only \$70 million in total AQIP funding available—an investment in a single program is more likely to maximize benefits. Since CORE began in 2020, California has seen substantial growth in zero-emission off-road equipment technologies. Today, there are fifteen times as many eligible equipment types, five times as many participating dealers, and four times as many original equipment manufacturers for zero-emission off-road equipment as when the program began.¹ Further, over 75% of CORE vouchers have delivered direct benefits to low-income and disadvantaged communities by deploying non-polluting

¹ Cal. Air Res. Bd., *Clean Off-Road Equipment Vouchers* (2026), <https://ww2.arb.ca.gov/our-work/programs/clean-off-road-equipment-voucher-incentive-project>.

equipment like electric forklifts, transport refrigeration units, gantry cranes, and terminal trucks.²

II. CARB must use the limited incentive funding available exclusively to support non-polluting, battery-electric technologies.

CARB must focus investments on non-polluting, battery-electric technologies to maximize benefits in pollution-burdened communities, grow California's market for electric vehicles and equipment, and compensate for the significant consequences from federal attacks on programs, funding, and state authority. According to CARB's own analysis, the federal actions to limit and roll back California's regulations will result in an additional 175 tons per day of nitrogen oxides (NOx) that California must figure out how to eliminate in 2037.³ Over the lifetime of the impacted regulations, the federal attacks on clean air protections will be responsible for more than 14,500 additional cardiopulmonary deaths, 5,000 additional hospitalizations for cardiovascular and respiratory illness, and 6,700 additional emergency room visits.⁴ Furthermore, increased diesel particulate emissions will cause millions of additional cancers in overburdened communities like East Los Angeles, Boyle Heights, South Central Fresno, Barrio Logan, West Oakland, amongst many others.⁵ Beyond their direct adverse effects on human health, the federal actions undermine CARB's capacity to meet required commitments in the State Implementation Plan. Failure to meet the National Ambient Air Quality Standards can result in severe sanctions and consequences, including the implementation of contingency measures, revisions to the SIP, increased offset ratios for permitting, and the loss of billions of dollars in federal highway funding.⁶ Continued investment in polluting technologies is a waste of public dollars and will lock in communities to years of pollution impacts from harmful equipment.

A. Continued deployment of methane-fueled vehicles and equipment harms communities and is counterproductive to California's clean air and climate goals.

Methane combustion emits harmful pollutants and is inconsistent with air plans that emphasize the need to focus on zero-emission technologies in order to reach attainment under the Clean Air Act. In a 2021 brief titled, "A comparison of nitrogen oxide (NOx) emissions from heavy-duty diesel, natural gas, and electric vehicles," the International Council on Clean Transportation (ICCT) found that spark-ignited natural gas engines can produce five to fifty times more ultrafine particles than diesel-fueled vehicles certified to the same emission standard, and these ultrafine particle emissions are damaging to the human respiratory system.⁷ The brief further states that the three-way catalysts used to control NOx from spark-ignited natural gas engines can produce

² Cal. Air Res. Bd., *Outcomes and Results for Clean Off-Road Equipment Vouchers* (2025), <https://ww2.arb.ca.gov/our-work/programs/clean-road-equipment-voucher-incentive-project-core/outcomes-and-results-clean>.

³ California Air Resources Board, "Annual Update on California State Implementation Plans," at 18, (October 2025), <https://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2025/102325/25-7-2pres.pdf>.

⁴ *Ibid* at 19.

⁵ *Ibid* at 20.

⁶ *Ibid* at 21.

⁷ The Int'l Council on Clean Transp., *A comparison of nitrogen oxide (NOx) emissions from heavy-duty diesel, natural gas, and electric vehicles* (Sept. 2021), <https://theicct.org/sites/default/files/publications/low-nox-hdvs-compared-sept21.pdf>.

very high levels of ammonia, a toxic precursor to fine particulate matter formation, under certain operating conditions.⁸ The ICCT brief also showed that in real-world circumstances, natural gas trucks may have even worse consequences for health and air quality due to significant poor on-road, in-use performance. This may become especially true as vehicles age.⁹

In addition to harming health, reliance on compressed natural gas (CNG) and renewable natural gas (RNG) in the transportation sector is not a sound reduction strategy for greenhouse gas (GHG) emissions. “Renewable” is a misnomer, as all methane burning trucks have a large carbon footprint. A 2023 life cycle analysis of GHG emissions from electric, combustion, and hydrogen trucks found that, at best, methane-fueled trucks provide “marginal” GHG emission reductions compared to diesel.¹⁰ When using a near-term global warming potential for methane and accounting for the upstream leakage of methane, methane-burning trucks can have more significant climate impacts than diesel trucks.¹¹ Moreover, a CARB analysis of 200 vehicles in real-world testing showed that low-NOx methane-burning engines perform far worse on the road than their rated emission levels.¹²

B. Investments that fail to reduce emissions and that direct hydrogen to inappropriate end uses do not warrant funding allocations.

Producing hydrogen from fossil fuels emits greenhouse gases as well as a wide range of other health-harming pollutants, such as NOx and volatile organic compounds.¹³ While hydrogen produced via electrolysis avoids criteria pollutants, it can be even more carbon-intensive than steam methane reformation if the electrolysis is powered by grid-average electricity.¹⁴ Thus, to provide climate benefits and be truly “green,” the production of electrolytic hydrogen must include three key requirements (widely referred to as the “three pillars”): (1) electrolysis powered by new renewable resources, (2) electrolyzer loads that match the clean electricity

⁸ Ibid.

⁹ Ibid.

¹⁰ Adrian O’Connell et al., *A Comparison of the Life-Cycle Greenhouse Gas Emissions of European Heavy-Duty Vehicles and Fuels*, The Int’l Council on Clean Transp., at ii–iii, 20 (Feb. 2023), https://theicct.org/wp-content/uploads/2023/02/Lifecycle-assessment-EU-HDVs_final2.pdf.

¹¹ Ibid.

¹² CARB, *In-Use Emission Performance of Heavy-Duty Natural Gas Vehicles* (July 2021), https://ww2.arb.ca.gov/sites/default/files/2021-04/Natural_Gas_HD_Engines_Fact_Sheet.pdf.

¹³ Pingping Sun et al., Criteria Air Pollutants and Greenhouse Gas Emissions from Hydrogen Production in U.S. Steam Methane Reforming Facilities, *Environ. Sci. Technol.* (Apr. 2019) <https://doi.org/10.1021/acs.est.8b06197>; see also Sasan Saadat et al., Reclaiming Hydrogen for a Renewable Future, at 10-11 (Aug. 2021), https://earthjustice.org/wp-content/uploads/hydrogen_earthjustice_2021.pdf (describing the emissions impacts of steam methane reformation).

¹⁴ Earthjustice, “Reclaiming Hydrogen for a Renewable Future,” (November 2021), https://earthjustice.org/wp-content/uploads/hydrogen_2_pager_federal_final-1-14-22.pdf (citing California Air Resources Board, LCFS Life Cycle Analysis Models and Documentation, <https://ww2.arb.ca.gov/resources/documents/lcfs-life-cycle-analysis-models-and-documentation>).

profile every hour; and (3) clean electricity production in the same grid balancing region.^{15 16 17}

Hydrogen is expected to play a small role in decarbonizing the transportation sector. Uptake of hydrogen vehicles and equipment continues to decrease as hydrogen fuel costs increase significantly. Additionally, various hydrogen refueling stations are unavailable due to disruptions in the hydrogen supply this year.¹⁸ Of the 52 retail hydrogen stations across the state, more than 60% are not operating (i.e., 21 are unavailable and 11 are offline).¹⁹ Recent analysis finds that hydrogen vehicles will play a niche role, if any, in achieving climate goals. For example, independent analysts at Det Norske Veritas (aka DNV) estimated in 2024 that hydrogen would provide just 1% of on-road energy demand by 2050—a dramatic downward revision from its 2023 projection that hydrogen would provide about 3% of on-road energy by midcentury.²⁰ The UK Climate Change Committee (“UKCCC”) also commissioned an economic analysis of competing options for decarbonizing vehicles and concluded that “there will be no hydrogen cars or vans, and very little or potentially even no role for hydrogen in heavier vehicles.”²¹ Past modeling efforts have overestimated the potential market for FCEVs and underestimated the potential for BEVs.²²

A credible forecast of the role of hydrogen in the transportation sector must compare the total cost of ownership (“TCO”) of hydrogen and battery electric vehicles, accounting for fueling, vehicle costs, and maintenance costs. The reason that many independent experts have found that BEVs will be the dominant zero-emission technology in the medium- and heavy-duty sector is

¹⁵ Evolved Energy Research, “45V Tax Credit: Three-Pillars Impact Analysis,” (June 2023), <https://www.evolved.energy/post/45v-three-pillars-impact-analysis>.

¹⁶ American Clean Power, “ACP Framework 3 Pillars for Building a Green Hydrogen Industry for Decarbonization,” (June 2023), https://cleanpower.org/gateway.php?file=2023/06/ACP_GreenHydrogenFramework_OnePager.pdf.

¹⁷ Wilson Ricks et al., Minimizing emissions from grid-based hydrogen production in the United States, Env’t Rsch. Letters (Jan. 6, 2023), at 7–8, <https://iopscience.iop.org/article/10.1088/1748-9326/acacb5/pdf> (finding that an hourly matching requirement is necessary to avoid spiking pollution on the power grid from electrolytic hydrogen production).

¹⁸ Hydrogen Fuel Cell Partnership, “Retail Hydrogen Station Network Status in California,” Last Updated May 4, 2026, <https://h2fcp.org/sites/default/files/Hydrogen-Distribution-and-Supply.pdf>.

¹⁹ Hydrogen Fuel Cell Partnership, “Station Operational Status System,” Accessed May 20, 2026, <https://m.h2fcp.org/>.

²⁰ 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>.

²¹ 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>.

²² For instance, when CARB adopted the first Advanced Clean Cars 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://www2.arb.ca.gov/resources/documents/2017-midterm-review-report>. 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, <https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/light-duty-vehicle>. 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 (August 2022).

their favorable TCO, which is the main driver of fleet purchase decisions. Academics,²³ truck manufacturers,²⁴ and multiple independent analysts have concluded that battery-electric technology is best positioned to decarbonize the vast majority of road transport – even long-haul trucking.²⁵ Battery electric vehicles (“BEV”) out-compete hydrogen options in all of the cost categories.²⁶ BEVs’ economic edge over FCEVs will likely grow as they increase their purchase-price advantage against FCEVs in almost all vehicle categories. A recent study by the International Council on Clean Transportation surveyed a body of literature on vehicle price projections and found that BEVs would maintain a price advantage over hydrogen vehicles.²⁷ The study also found that BEVs will beat diesel trucks on price in these categories by 2040, but hydrogen vehicles would not. The sole vehicle category in which hydrogen alternatives beat battery electric vehicles on price by 2040 was long-haul class 8 tractor trucks, and even in that category, FCEVs achieved only a slight advantage in retail price.²⁸ Given these data, CARB should not direct scarce research funds to hydrogen fuel cell deployment in the transportation sector.

CARB must not invest limited funding to lock California into technologies that fail to bring relief to communities breathing the consequences of our freight transportation system. The communities that are most burdened by freight pollution have consistently reiterated that they want investments in non-polluting, battery-electric technologies.

III. We support CARB’s proposed approach for allocating any additional AQIP funding to CORE, HVIP, and SHIFT.

We support CARB’s proposed approach to contingency provisions for additional funding, which first prioritizes CORE and HVIP, and then allocates any additional funding greater than \$51 million between CORE, HVIP, and SHIFT, including HVIP set-asides for transit buses and school buses.

There is a substantial unmet demand for incentives to help transition trucks, buses, and off-road equipment to zero-emission technologies. CARB staff have identified a funding need for CORE of \$200 million this year.²⁹ CARB staff have also identified a funding need for HVIP of \$450

²³ Patrick Plötz, *Hydrogen technology is unlikely to play a major role in sustainable road transport*, 5 Nature Elecs. 8 (Jan. 2022), <https://www.nature.com/articles/s41928-021-00706-6>.

²⁴ Matthias Grundler and Andreas Kammel, *Why the future of trucks is electric*, TRATON (Apr. 13, 2021), <https://traton.com/en/newsroom/current-topics/future-transport-electric-truck.html>.

²⁵ Ibid.

²⁶ Earthjustice. “Earthjustice Comments on Integrated Energy Policy Report Commissioner Workshop on Firm Zero-Carbon Resources and Hydrogen,” (Aug. 19, 2025) at 7-9, <https://efiling.energy.ca.gov/GetDocument.aspx?tn=265703&DocumentContentId=102544>.

²⁷ Yihao Xie et al, ICCT, *Purchase costs of zero-emission trucks in the United States to meet future Phase 3 GHG standards* (March 2023) at 16–20, <https://theicct.org/wp-content/uploads/2023/03/cost-zero-emission-trucks-us-phase-3-mar23.pdf>.

²⁸ Ibid. at 22 (Fig. 17).

²⁹ CARB, *Drive Forward Incentives Public Workshop* (Nov. 13, 2025), <https://ww2.arb.ca.gov/sites/default/files/2025-11/Drive%20Forward%20Incentives%20Workshop%20Nov%202025.pdf>.

million this year.³⁰ For on-road medium- and heavy-duty vehicles, a study by the UC Davis Institute of Transportation Studies has projected a need for over \$4 billion in additional incentives over the next ten years to keep California's zero-emission vehicle transition on track and achieve the sales targets in the Advanced Clean Trucks regulation.³¹ Without additional funding for HVIP and CORE, fleets and equipment operators that are ready to deploy zero-emission trucks, buses, and off-road equipment this year will be unable to move forward, delaying pollution reductions and slowing California's zero-emission transition.

HVIP's point-of-sale vouchers make zero-emission trucks and buses more affordable, and are a proven tool for helping truck and bus fleets transition to non-polluting vehicles. HVIP has already helped over 2,000 fleets purchase over 11,000 zero-emission trucks, buses, and vans across California.³² Through HVIP, non-polluting vehicles are successfully meeting the needs of diverse truck and bus fleets across the state—small businesses and public agencies make up over 80% of zero-emission vehicle orders through HVIP, and 58% of vouchers were used to purchase vehicles deployed in communities overburdened by air pollution.³³ HVIP is also extremely effective in driving private investment in zero-emission trucks and buses, and has unlocked over \$3 of private investment for every \$1 of voucher funding spent.

Funding for SHIFT also plays an important role in California's work to transition to non-polluting transportation technologies. While HVIP and CORE remain essential for scaling electric vehicles and equipment that are already commercially available and in high demand, SHIFT provides a complementary pathway for demonstrations and pilot projects that can help innovative technologies, infrastructure models, and deployment strategies move from pre-commercial development toward broader market use. Investments in innovation are important, especially to accelerate electrification for heavy-duty applications.

As CARB implements any future SHIFT funding, those resources should be focused on battery-electric technologies, charging infrastructure, grid integration, and other strategies that directly support electrification. This focus would ensure that limited innovation dollars reinforce the proven market transformation to electric technologies that is already underway, while helping to solve barriers that are limiting the next stage of heavy-duty electric vehicle and equipment deployment. Given limited public funds and urgent air quality needs, future SHIFT funds should not be used to invest in combustion-based pathways or hydrogen fuel-cell technologies. Any new SHIFT funding should be used for projects that accelerate electrification technologies and help overcome the practical barriers to scaling electric vehicles and equipment across California's on-road and off-road heavy-duty sectors.

³⁰ CARB, *Drive Forward Incentives Public Workshop* (Nov. 13, 2025), <https://ww2.arb.ca.gov/sites/default/files/2025-11/Drive%20Forward%20Incentives%20Workshop%20Nov%202025.pdf>.

³¹ Anuj Chole et al., *Brief: Promoting Affordable Access to Zero Emission Trucks: A Total Cost of Ownership (TCO) Based Approach to a Zero Emission Truck Incentive Program*, UC Davis Institute of Transportation Studies (Nov. 1, 2025), <https://escholarship.org/uc/item/6zt5110c#author>.

³² Cal. Air Res. Bd., *California's Clean Truck and Bus Incentive Project sees record growth as zero-emission market expands* (Apr. 23, 2025), <https://ww2.arb.ca.gov/news/californias-clean-truck-and-bus-incentive-project-sees-record-growth-zero-emission-market>.

³³ *Ibid.*; California HVIP, Impact, <https://californiahvip.org/impact/>.

IV. Conclusion.

We appreciate your consideration of our recommendations to ensure the Funding Plan for AQIP can best advance the deployment of non-polluting equipment and vehicles. We urge CARB to prioritize investments that reduce emissions, advance electrification, and deliver demonstrable benefits to California. CARB should fund electrification technologies that meet the State's air quality, climate and equity goals, rather than technologies that continue to rely on polluting fuels.

Sincerely,

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Earthjustice