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**California Air Resources Board**

1001 I Street  
Sacramento, CA 95815

**RE: Proposed 2024 Low Carbon Fuel Standard Amendments**

Dear California Air Resources Board,

Thank you for the opportunity to provide input regarding the 2024 California Low Carbon Fuel Standard (LCFS) Amendments. RMI is a global non-profit organization that focuses on deep decarbonization of the world’s most polluting sectors, leading sustainability programs across four geographies: the U.S., India, China, and the Global South. RMI has a 40-year history of advancing low and zero-carbon transportation solutions and transforming global power systems to support modern, low-carbon economies.

These comments will address the proposed rules on [page 149 of Appendix A-1](#), in section 95488.8(i)(1) that focus on the applicability of book-and-claim accounting for low-carbon intensity (CI) electricity for hydrogen production. As the proposed rules stand, hydrogen that is used as a feedstock in the production of e-fuels would not be eligible to use book-and-claim accounting to certify its CI score under California’s LCFS. This will limit such projects to relying on on-site, “behind the meter” clean electricity to certify their CI score; as grid electricity used to make hydrogen without the option of a well-regulated book-and-claim option will not result in clean hydrogen. E-fuels, including sustainable aviation fuel, maritime fuels such as methanol or ammonia, and renewable diesel, are made using low-emission hydrogen and biogenic or atmospheric CO<sub>2</sub> sourced from carbon dioxide removal facilities.

Limiting the end uses for hydrogen that is produced using grid-connected electrolysis would limit the amount of hydrogen produced in California, impede effective decarbonization of heavy transportation, and undermine the state’s decarbonization goals as stated in the 2022 Scoping Plan.

**We urge CARB to continue to allow book-and-claim accounting of low-CI electricity in the production of hydrogen feedstock for low-carbon transportation fuels.** Below we have outlined why the current proposed rulemaking would be counter to the stated goals of the LCFS and the 2022 Scoping Plan.

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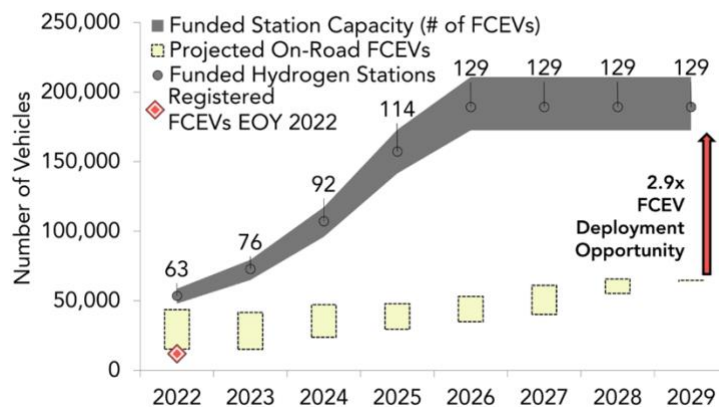
**1. Hydrogen has the greatest decarbonization potential in sectors that are difficult or uneconomic to electrify. For transportation, this often means being used as a feedstock in e-fuels.**

Hydrogen can be used to directly power fuel cell electric vehicles (FCEVs) but [RMI analysis](#) shows that direct electrification of light duty vehicles results in 0.41 kg CO<sub>2</sub>e/kWh *more* reduction than using zero emissions hydrogen. As such, hydrogen should be directed to transportation end uses that cannot be electrified, like aviation, maritime fuel, and even diesel replacement in some long-haul trucking routes. For these applications, hydrogen will be most commonly used to produce e-fuels rather than as a direct fuel in a FCEV.

In many cases, hydrogen’s highest and best use for decarbonization is as a feedstock into these fuels, rather than as a direct fuel itself. E-fuels should therefore benefit from book-and-claim accounting option in the same way that hydrogen as a direct fuel does.

**2. Light-duty FCEVs are not a large enough offtake market for the planned amount of electrolytic hydrogen production in California.**

FIGURE 22: COMPARISON OF PROJECTED VEHICLE DEPLOYMENT AND NETWORK RATED CAPACITY



Source: California Air Resources Board, [Annual Evaluation of Fuel Cell Electric Vehicle Deployment](#)

In addition to not being the most effective end use for hydrogen as a decarbonization tool, FCEVs alone will not generate enough demand to offtake hydrogen produced in California. According to CARB’s 2023 [Annual Evaluation of Fuel Cell Electric Vehicle Deployment](#), just under 13,000 FCEVs are currently on the roads (making up 1.1% of all zero emission cars in California). In the same report, CARB estimated that “the projected hydrogen fueling network capacity growth is expected to stay well ahead of demand through the end of the decade. By 2029, the statewide hydrogen fueling network will have rated capacity at full availability sufficient for nearly three times the number of expected FCEVs on the road.” In

an analysis that used the network capacity at recent levels of availability (as opposed to rated capacity) station capacity would still be at least double the projected demand.

It is clear that light-duty FCEVs will not constitute a large enough offtake sector to support electrolytic hydrogen plans in California. Allowing electrolytic hydrogen used as a feedstock to use book-and-claim electricity would afford hydrogen producers flexibility in finding offtakers while still benefiting from LCFS and decarbonizing priority offtake sectors.

### **3. The proposed addition of intrastate jet fuel to the LCFS will require access to hydrogen as a feedstock for sustainable aviation fuel.**

In the Proposed 2024 LCFS Amendments, CARB suggests eliminating the exemption for intrastate fossil jet fuel. We applaud this expansion of the program and suggested it as a lesson for other LCFS states to learn from in [a recent policy memo](#). However, adding restrictions to electrolytic hydrogen as a feedstock in the same rulemaking is counterproductive to this action.

While most sustainable aviation fuel (SAF) that is currently on the California market is made from lipids and biofeedstocks, it is unlikely that this pathway will be able to scale to meet the sector's low carbon fuel needs. SAF made from biofeedstocks faces steep competition for those feedstocks (e.g. corn and soy) from other biofuels, biogenic carbon removal, bioenergy, and other end uses. Additionally, the scaling of these crop-based fuels [comes with its own problems](#), including inefficient land use, increased food prices, and the undermining of the sustainability of the eventual fuel. In part due to these problems, [SAF made from biofeedstocks is only expected to reach a global high of 8.9 billion gallons by mid-century](#), contributing to slightly less than 10% of the global aviation fuels market at that time. It is increasingly clear that biogenic SAF will not be able to scale to the level needed to meet decarbonization goal.

At the same time, the technology required for battery electric or hydrogen fuel cell-powered aircraft is still [more than a decade away](#). Current battery densities for flight are [less than 200 Wh/kg](#) — acceptable for short haul flights but inefficient for longer hauls. Long haul electrification would require densities in [excess of 350 Wh/kg](#), which may not be available until 2040. Hydrogen fuel cell technologies face similar challenges.

This leaves hydrogen-derived SAF as the best option for aviation decarbonization right now. Hydrogen-derived SAF is an emerging fuel, but the technology is well-understood and will be scalable as feedstock supply chains mature. It is imperative that SAF producers can access low-CI hydrogen--specifically electrolytic hydrogen that does not depend on biofeedstocks--to create the fuel necessary to participate in LCFS.

#### **4. This rule will reduce IRA dollars flowing into the state.**

The Inflation Reduction Act (IRA) offers multiple credits that will support the production of hydrogen and hydrogen-derived fuels; by limiting the eligible offtakers for grid-connected electrolytic hydrogen, this proposed rule will likely reduce the amount of hydrogen produced and therefore the amount of federal funding that California companies can unlock through the 45V tax credit and other federal funding opportunities. 45V is a tech-neutral credit which evaluates all production pathways with the same set of emissions standards, including grid-connected and behind the meter electrolytic hydrogen, and non-electrolytic hydrogen that meets CI requirements. Furthermore, there has been intense debate and research into how grid connected electrolytic hydrogen may certify its CI score to qualify for 45V. We believe that CARB should align its book-and-claim system (for all hydrogen, regardless of its end use) to the federal standards. In this way it can reduce regulatory strain on California companies and draw tax credits to the state.

By limiting the production of hydrogen-based SAF, this rule will also reduce the amount of 40B/45Z credits for the production of SAF that California companies may pursue. All together, this could severely limit the growing hydrogen and SAF industries as well as industries up and down their supply chains.

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We urge the Air Resources Board to reconsider this small but consequential element of the proposed 2024 amendments to the Low Carbon Fuel Standard. To accomplish its decarbonization goals and to successfully support the growing hydrogen industry, the LCFS must allow book-and-claim accounting of low-CI electricity supplied for hydrogen production through electrolysis for use in production of a transportation fuel.

Sincerely,

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