2490 Junction Place, Suite 200, Boulder, CO 80301

California Air Resources Board
1001 I Street
Sacramento, CA 95815
RE: Proposed 15-Day Changes to California LCFS

Dear California Air Resources Board,

Thank you for the opportunity to provide input regarding the 2024 California Low Carbon Fuel Standard (LCFS) 15-Day changes. We appreciate the complicated nature of any adjustment to such a vastly impactful and crucial policy to state decarbonization goals, and thank the staff for their tireless efforts soliciting and integrating feedback from stakeholders.

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.

The full comments below will be limited to addressing two primary topics in the proposed changes: book and claim electricity for hydrogen, and biomethane. However, we would like to note that while we were in favor of the initial proposal to include intrastate jet fuel on the mandated fuels list, we appreciate that despite removing that proposed change, CARB staff remains committed to reducing aviation emissions in California, whether or not that is via LCFS or another policy mechanism. We offer our support and deep background in aviation policy as a resource to CARB as it looks to support the decarbonization of California's aviation sector.

Please find our extended comments below, and please do not hesitate to reach out with any questions or comments in return.

Sincerely,
Jane Sadler
Senior Associate, Clean Industrial Policy

Book and Claim Electricity

As the proposed rules stand, hydrogen that is used as a feedstock *in the production of* transportation 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.

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.

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_2e/kWh *more* reduction than using zero emissions hydrogen. As such, hydrogen should be directed to transportation end uses that cannot be electrified, like aviation, where it can be combined with renewable electricity and efficient supplies of carbon dioxide to yield a liquid synthetic "e-fuel" through ASTM-certified pathways. E-fuels, despite being the least technologically mature pathway for SAF, have the greatest potential for meeting the gap between scaled demand in 2050 and potential scale of biobased SAF pathways. **By essentially preventing their use in California's LCFS, CARB risks setting back the in-state clean aviation industry, sending e-fuel SAF producers to other Clean Fuel Standard states to make and sell their fuels.** E-fuels are not the only forms of SAF that require hydrogen as a feedstock. Other forms of SAF—including those derived from waste fats, oils, and greases as well as biofeedstocks like corn, soy and canola—all require hydrogen in the process of production, albeit at much smaller volumes than e-fuel SAF.

Furthermore, only 10% of the clean hydrogen capacity planned by 2030 has currently identified a buyer. **At a time when hydrogen hubs across the country are searching for stable offtake agreements, preventing specific industries from offtaking certain types of clean hydrogen could have a serious cooling effect on the hydrogen economy in California, and could disadvantage ARCHES hydrogen producers.** According to RMI analysis, heavy duty transport—aviation, shipping, and trucking—will drive most of the demand for hydrogen in California. Scaling up demand for SAF is paramount as shipping fuel is not included in LCFS and trucking demand will ramp up slowly.

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, and is in alignment with California's Climate Change Scoping Plan.

Biomethane

Deliverability

In subsection 95488.8(i)(2), staff proposed to add the ability for the Executive Officer to require deliverability requirements for book-and-claim accounting for biomethane by 2038 if there is an approved gas system map that identifies interstate pipelines and their majority directional flow based on specified flow date. Before then, or if the Executive officer does not approve a gas system map, biomethane injected into the common carrier pipeline in North America can be reported as dispensed as bio-CNG, bio-LNG, or bio-L-CNG, or as an input to hydrogen production, without regards to physical traceability.

While the addition of the potential for deliverability requirements for biomethane is a step in the right direction, RMI believes that this does not go far enough. If CARB wishes to more **Deliverability requirements should be phased in as soon as possible for biogas and biomethane certification.** Any biomethane claimed indirectly under the LCFS program for use as bio-CNG, bio-LNG, or bio-L-CNG in CNG vehicles or as an input to hydrogen should be physically deliverable to the hydrogen production plant or to the California gas system to ensure a robust book and claim system with climate integrity. While much of the North American gas system is considered connected, there are key considerations to consider when designing rules for qualifying gas pathways for LCFS crediting:

- Local air quality and environmental justice concerns when trading gas attributes across significant distances
    - For instance, if a dairy digester in the Midwest can transfer its emissions attributes to a blue hydrogen facility in California, it is the communities in California that will be adversely impacted by the combustion and fossil-gas hydrogen production taking place. And the reverse is also true – communities in the Midwest must suffer the air pollution and health hazards of largescale dairy digesters maintaining economic viability due to sales of environmental attributes without the local economic or decarbonization benefits of producing and using hydrogen nearby.
- Gas system deliverability is dynamic: LCFS regulations should plan for a time when gas infrastructure may be coming offline and is less interconnected than it is today. Finally, when considering deliverable gas over long distances, there is bound to be greater leakage along the transmission and distribution networks. CARB would need to use a granular leakage certification method for biogas transportation for the

deliverability issue becomes less critical from an emissions accounting perspective. But if that is not considered, a requirement of deliverability will help mitigate leakage that occurs as gas is "delivered" over longer distances.

Biomethane Crediting for Hydrogen Production

Currently, LCFS calculates the carbon intensity (CI) of dairy biomethane between -102.79 and -790.41 grams of carbon dioxide emissions per megajoule (gCO2e/MJ), with an average of -269 gCO2/MJ. When dairy farmers across the county use anaerobic digesters to capture their biomethane and inject it into natural gas pipelines, these intensely negative scores allow them to generate tradeable LCFS credits. These credits can then be used to offset the emissions of things like hydrogen production that uses fossil fuels as a feedstock. **As a result, dairy biomethane contributed almost 20% of the credits in the LCFS program according to recent LCFS data yet provided less than 1% of energy used for transportation under the program**.

The reason for these negative CI scores is the assumption that dairy biomethane would have been vented into the atmosphere otherwise. This is despite the fact that for many sources, methane generation could have been avoided in the first place through alternative practices – such as organic waste diversion from landfills or alternative manure management – and would likely have been captured and put to another productive use regardless. Furthermore despite the negative scores that biomethane receives under current LCFS rules, the real emissions from biomethane use are *not* negative. Dairy biogas burned in natural gas pipelines still releases emissions upon use, and traditional LCAs often exclude the impact of potent fugitive emissions from the carbon intensity score of dairy biogas.

The true emissions intensity of biogas and biomethane sources is very dependent on fugitive methane, which when released into the atmosphere has roughly 80 times the near-term warming power of carbon dioxide. As EPA acknowledges in its RNG Operations Guide, "fugitive emissions of methane, depending upon their magnitude, can negate the climate and environmental benefits of RNG projects." The IPCC also references multiple studies (Scheutz and Fredenslund 2019; Bakkaloglu et al. 2021) that show how fugitive emissions can make biogas production emission intensive.

Furthermore, the gray and black hydrogen producers that purchase credits from dairy biomethane producers in order to qualify under LCFS *also* heavily emit CO2—but via current LCFS crediting math this whole process is considered 'zero emission'.

At the least, CARB should set guardrails so that any negative CI scores are not used to offset a fossil facility's real emissions in lieu of actual reductions at the facility. CARB

could create no-blending safeguards, whereby any biogas or biomethane used must supply the full share of fuel consumed.

LCAs should be based on a counterfactual scenario that reflects the most climate beneficial outcome. At minimum, any methane that can be captured should be assigned a baseline counterfactual of capture and flare, which acknowledges the cost of methane pollution, the urgent need for controls, and the other economic and regulatory factors already driving abatement. In most scenarios, a more appropriate counterfactual would be diversion from productive use (e.g., another biogas/biomethane energy project) or the complete avoidance of methane creation via alternative management practices (e.g., waste prevention, composting, or alternative manure management).

Additionally, there should be feedstock eligibility requirements in place to ensure this program doesn't perversely lead to additional waste/methane generation by expanding operations. Qualifying sites should be required to monitor for fugitive emissions and demonstrate they are collecting methane and co-pollutants at the source to the maximum extent possible.