August 27, 2024

Chair Liane M. Randolph and Members of the Board
California Air Resources Board
1001 I Street
Sacramento, CA 95812

Re: Comments on Proposed LCFS Amendments, August 12, 2024 15-Day Notice

Dear California Air Resources Board Members;

Air Liquide Hydrogen Energy U.S. LLC ("Air Liquide") submits this letter to comment on the proposed amendments to the Low Carbon Fuel Standard ("LCFS") Regulation, published in the 15-day notice dated August 12, 2024 (the "15-Day Notice"). Specifically, Air Liquide urges CARB to treat hydrogen produced with fossil feedstock in the same manner as other fuels, and to allow book-and-claim accounting for process energy. As members of the California Hydrogen Coalition, we are also supportive of the positions outlined in its comment letter regarding the impacts of the proposed amendments on LCFS credit market values, changes to the HRI program for light-, medium-, and heavy-duty vehicles, and the call for an additional 15-day review.

Air Liquide and its affiliated companies operate 128 facilities and employ nearly 2,000 people in California. Air Liquide's parent and affiliated companies are the world's leaders in industrial and medical gases. In California, Air Liquide is one of the largest producers of hydrogen for fuel-cell electric vehicles.

The proposed modifications to the LCFS regulations regarding hydrogen production:

- are inconsistent with the requirements of CARB's December 2022 Scoping Plan[1];
- Are not aligned with the LCFS's long-standing principle of encouraging carbon reduction by all means possible;
- Will constrict supply and increase costs in the California hydrogen sector; and
- Will negatively impact investment in the state, because project decisions are strongly influenced by the need for a stable investment landscape without arbitrary rule changes that run counter to the state's own climate plans.

Adoption of the modifications proposed in the 15-Day Notice risks suppressing California's nascent low-carbon hydrogen industry, stranding existing assets and projects, and increasing the overall cost of low-carbon hydrogen for California consumers.

1. Eligibility of Hydrogen Produced From Fossil Feedstocks to Generate LCFS Credits

The foundation of the LCFS is that every fuel is evaluated on the basis of the carbon emissions that result from its production and use. The emissions associated with each gallon or kilogram of fuel are quantified, in grams of carbon-dioxide-equivalent emissions per megajoule of energy, from "well to wheels," or from whatever the source of the fuel to the end use of the fuel for transportation purposes. In this sense, the LCFS is technology neutral. The state does not pick winners and losers, and does not

dictate to industry the means of producing the lowest carbon fuel. Instead, the state allows fuel producers to reduce emissions in the most efficient manner possible to produce fuels that will generate LCFS credits.

This is one of the primary virtues of the LCFS. The LCFS's science-based, quantitative approach is efficient and produces the maximum possible climate benefit, because it rewards producers of low-carbon fuels only in proportion to their ability to reduce climate-warming emissions. It does not reward fuels that may in some sense be "renewable" but do not reduce emissions, and it rewards most highly those fuels that have the greatest impact on the climate and the planet.

The draft amendments in the 15-Day Notice depart from this quantitative, science-based approach with respect to hydrogen. The proposed amendments include a new Section 95482(h) that assigns a carbon intensity to hydrogen unrelated to the emissions associated with its production and use:

> *Effective January 1, 2031, hydrogen produced using fossil gas as a feedstock is ineligible for LCFS credit generation unless biomethane attributes are matched to the hydrogen production as described in Section 95488.8(i)(2). Any volumes of hydrogen produced using fossil gas as a feedstock must be assigned the ULSD carbon intensity found in Table 7-1 of the LCFS regulation, as well as an EER of 1.*

Under this section, hydrogen produced with fossil feedstock is assigned the carbon intensity of diesel fuel unless the fuel producer uses book-and-claim accounting to match environmental attributes to the feedstock used for the production of the hydrogen. Under the proposed amendment, the actual emissions associated with the production and use of the hydrogen fuel are not quantified. The proposed amendment does not allow any credit for the reduction in emissions that may result from production with carbon capture and sequestration ("CCS").

Hydrogen produced with fossil fuel feedstocks should not be treated differently than other fuels under the LCFS. Although hydrogen produced from fossil fuel feedstocks may not generate any credits under the LCFS as the benchmarks for gasoline and diesel fuels decline over time, it nevertheless has the potential to contribute to reduced emissions in two ways. First, hydrogen produced with fossil fuels may have a very low carbon intensity if the emissions from its production are captured and sequestered with CCS. The 2022 Scoping Plan Update specifically recognizes an important role for hydrogen produced with CCS: "If steam methane reformation is paired with CCS, the hydrogen produced could potentially be low carbon. … Steam methane reformation paired with CCS can thus ensure a rapid transition to hydrogen and increase hydrogen availability until such time as electrolysis with renewables can meet the ongoing need …."[1] The Scoping Plan Update sets a target of 100 million tons of carbon dioxide removed with CCS by 2045. Discouraging production of hydrogen with CCS is directly contrary to CARB's climate plans as set forth in the Scoping Plan Update.

Second, fossil hydrogen is often blended with low-carbon hydrogen to produce the carbon intensity demanded by the market. Hydrogen fuel retailers are currently demanding hydrogen with a zero carbon intensity. To provide that hydrogen, hydrogen producers purchase environmental attributes to apply, with book-and-claim accounting, to the fuel sold. Those attributes, however, often have negative carbon intensity. For example, dairy digester feedstock may have a carbon intensity of negative 300 gCO_2e/MJ, and to obtain a zero CI for the hydrogen produced it may not be necessary to purchase environmental attributes for all of the hydrogen produced. Some fossil hydrogen may be blended with very low carbon hydrogen to produce a CI of zero.

If CARB were to adopt the amendments as proposed, hydrogen producers and sellers of environmental attributes would adapt by using multiple feedstocks to obtain the zero CI demanded by the market. But requiring these actors to, in effect, "game the system" would be inefficient. It would result in higher prices for environmental attributes, potentially reduce production or sales of hydrogen, and create market friction where CARB should be seeking the opposite result.

The policy rationale that CARB provides for this proposed change is not persuasive. CARB states, in the 15-Day Notice, that CARB "is proposing to remove LCFS crediting eligibility for hydrogen produced from fossil fuels at the end of 2030 to align with the current operational timeline for projects funded under the hydrogen hubs grants, which will expand the supply of renewable hydrogen in California." In other words, CARB is assuming that the ARCHES hydrogen hub projects will be sufficient to produce enough electrolytic hydrogen, in just six years, to meet the state's needs. But whether the hydrogen hub projects will produce a vast new supply of renewable hydrogen is unknown. Those projects are in their infancy, and the degree to which they will succeed cannot be predicted with any certainty today. CARB's reliance on these projects is a quintessential example of counting one's chickens before they hatch. CARB should be using every available means to reduce carbon emissions, not assuming that some projects, which have not even started yet, much less succeeded, will be sufficient to satisfy the state's demand for low-carbon hydrogen.

Assigning a carbon intensity to hydrogen that does not reflect its actual carbon intensity is an unnecessary and counterproductive change to the LCFS. It is not justified by the reasons that CARB has provided and will make it less likely that the state will meet its climate change goals.

Moreover, adopting such disruptive changes sends the wrong signal to investors who are considering whether to support low-CI hydrogen projects. The 15-Day Notice represents an unexpected and surprising proposal and will negatively impact the investment and lending communities and ultimately risks provoking a retreat from investment in all low-carbon fuels because of fears of arbitrary and last-minute regulatory changes. CARB must refocus its efforts on sending clear regulatory support for all types of low-CI hydrogen projects.

Recommendation: Do not adopt the 15-day proposed changes regarding the restricted eligibility of fossil-produced hydrogen in the credit generating market.

2. Book-and-Claim Accounting for Process Energy Used to Produce Hydrogen

When hydrogen is produced, its carbon intensity is a product of emissions associated with both the feedstock (which may be gas, if the hydrogen is produced with steam methane reformation, or electricity, if it is produced by electrolysis) and "process energy." Process energy is the energy that is used to compress, liquefy, and distribute the fuel. The LCFS currently does not allow the use of book-and-claim accounting to reduce the CI of process energy.

CARB's proposed amendments to the LCFS published in the 45-day notice in December 2023 would have allowed the use of book-and-claim accounting for process energy used in the production of hydrogen.[2] The 15-Day Notice, however, limits the use of book-and-claim accounting to electrolytic hydrogen. (For electrolytic hydrogen, most of the process energy is used to liquefy the hydrogen.)

CARB has never provided a meritorious rationale for limiting the application of book-and-claim accounting under the LCFS. Book-and-claim accounting is efficient, because it allows fuel producers to use renewable feedstocks and energy wherever they may be found to produce the lowest possible

carbon-intensity fuels. With the use of book-and-claim accounting, a fuel producer can obtain renewable power and feedstocks in a single location, without having to build the infrastructure to transport solar, wind or hydroelectric power, or biomethane, to the production facility. The benefits of broad application of book-and-claim accounting would be enormous, and the risks, if any, would be insignificant. CARB has never published any information suggesting that book-and-claim accounting has been or would be abused if it were more widely available. The LCFS's requirements for third-party verification, which are already applied to book-and-claim accounting, assure that any abuse would be rare, and that it would be detected.

CARB should, at a minimum, reverse the changes made in the 15-Day Notice to Section 95488.8(i)(1)(C) and allow the use of book-and-claim accounting for process energy used in the production and distribution of hydrogen. Air Liquide also supports the use of book-and-claim accounting more widely, for all fuels, consistent with Air Liquide's belief that the LCFS should provide a level playing field and create a fair marketplace for all fuels.

Recommendation: Allow the use of book-and-claim accounting for process energy for all LCFS pathway evaluations regardless of the hydrogen production methods or energy sources. This would include electricity used in compression, refrigeration, liquefaction, storage, and distribution and all other energy sources used for process heat and distribution.

3. Effects on LCFS Credit Value and Changes to HRI Credit Program

As a founding member of the California Hydrogen Coalition (CHC), Air Liquide supports the comments made in the CHC's letter to CARB regarding the proposed amendments. In particular, the CHC letter has extensive comments on the potential effects of the proposed changes on the LCFS credit value and on changes in the light-duty HRI credits and the expansion of HRI to the heavy-duty vehicle market.

Air Liquide appreciates CARB's willingness to consider input from all stakeholders, and looks forward to working with CARB on amendments to the LCFS. We would also be happy to meet with CARB staff to discuss Air Liquide's comments.

Best Regards

David P. Edwards, PhD
Corporate Fellow
Air Liquide Hydrogen Energy, US LLC
david.edwards@airliquide.com
(612) 747 7636

---

[1] California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality, at 88 (Nov. 16, 2022).

[2] See proposed amendments to Section 95488.8(i).