



19 Sep, 2022

State of California, Air Resources Board

Regarding: 2nd Public Workshop to Discuss Potential Changes to the Low Carbon Fuel Standard

Dear Low Carbon Fuel Standard team:

Thank you for the opportunity to comment on the ideas and materials related to the Low Carbon Fuel Standard in California presented in this workshop. The University of California, Davis Institute of Transportation Studies, along with the Policy Institute for Energy, Environment, and the Economy has been engaged in research, policy analysis, and technical assistance relating to alternative fuel policy for well over a decade. We commend CARB and the LCFS program staff for holding robust, collaborative workshops like the one on August 18, which allow stakeholder engagement and focused discussion on a variety of topics. Most of these comments relate to topics identified by staff at that workshop as being of particular interest. We emphasize that neither UC Davis, nor the Policy Institute for Energy, Environment, and the Economy takes any formal positions regarding regulatory action and we are not requesting any specific actions or outcomes. We provide these suggestions as guidance, based on our long history of research and engagement on these topics. Please find several comments below, in no particular order.

Efforts to Streamline Pathway Certification and Project Development

CARB staff sought feedback on proposals relating to the Deemed-Complete date for pathway certification, as well as the development of a true-up provision for pathways using a temporary CI while their formal pathways are in the process of certification. The streamlining and true-up concepts discussed at the August 18th workshop present the opportunity to reduce pathway certification costs to project developers, and reduce the risk that delays in certification could lead to significant loss of incentive revenue. To the extent that such provisions do not interfere with the foundational relationship between the amount of GHG reduction and the amount of incentive, they seem likely to help the LCFS achieve its long run goals. To the extent that the true-up detracts from “deposits” into the buffer account, which was designed to backstop the program against situations where invalid credits or uncovered deficits could not be recovered (e.g., bankruptcies), adequate means to safeguard the program’s accounting relation to properly-issued credits is important.



Developing a Tier 1 Hydrogen Calculator

CARB staff have identified Steam Methane Reforming (SMR) and electrolysis as potential pathways for development of a Tier 1 Hydrogen calculator. Tier 1 calculators are generally appropriate for technology and feedstock combinations for which there is a deep record of real-world performance data, under a variety of conditions. For some hydrogen production technologies, such as steam methane reformation (SMR), such a record exists. Staff should carefully consider whether a sufficiently consistent record of performance exists for electrolysis units when deployed at commercial scale. Where an inadequate record exists, Tier 2 certification, with a clear obligation for project developers to report efficiency and yield data, would provide maximum certainty that real-world performance matches modeled values.

All hydrogen pathways, regardless of whether they're based on the Tier 1 or Tier 2 process, need to account for real-world energy and emissions impacts from the hydrogen pathway. Given California's persistent drought and likely future challenges in obtaining water for any large-scale use, it is important that the environmental impacts of procuring water and cleaning it to a purity compatible with electrolysis are accurately included in the life cycle of electrolysis pathways. Additionally, any hydrogen pathway must consider the energy used in pressurization or cryogenic chilling, and also hydrogen leakage in a way that recognizes hydrogen's secondary climate warming effect. The following resources are a non-exhaustive list of recent peer-reviewed studies that help inform quantification of the GHG impacts from hydrogen leakage in transportation, distribution and vehicle fueling systems.

- <https://pdfs.semanticscholar.org/2901/7f35d70295af32860db77ae41de57823e48a.pdf>
- <https://www.sciencedirect.com/science/article/abs/pii/S0360319920302779?via%3Dihub>
- <https://www.sciencedirect.com/science/article/abs/pii/S0360319919347275?via%3Dihub>
- <https://www.sciencedirect.com/science/article/abs/pii/S0360319921001804?via%3Dihub>
- <https://www.sciencedirect.com/science/article/abs/pii/S036031992031106X?via%3Dihub>

Emission Factor

We agree that there may be opportunities to better align emission factors (EFs) with the best current scientific understanding, and are happy to work with LCFS staff as these proposals move forward. EFs play a major role in life cycle analysis and fuel carbon intensity modeling, and virtually all EFs will evolve over time, as newer and better data are collected. While staff should continue to seek the most accurate EFs possible, there may be value in developing a process by which EFs or similar modeling parameters can be updated without requiring a full rulemaking. CARB has established processes for regular updates to California grid average carbon intensity for electricity, as well as for crude oil average carbon intensity updates by the OPGEE model. Developing a similar protocol to allow regular updates to constituent EFs could



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help ensure strong alignment between the emissions reduced by a fuel and the incentive it receives as a result of its CI score.

EV Residential Base Credit Methodology

Staff have identified several potential sources for estimating residential EV charging to accurately calculate a representative state-wide charging rate. To the extent possible, EV credits should be assigned based on actual data rather than model-based estimates. Given the several methods for obtaining data discussed by staff and stakeholders at the August 18th workshop, there seem to be opportunities to base future EV residential base credit generation calculations on more robust estimates of real-world behavior. We are happy to work with LCFS staff to investigate uncertainties and expected outcomes.

Once again, we thank CARB staff for the thorough and transparent discussion of the LCFS program and potential changes. We look forward to continued collaboration throughout the coming months. If we can clarify or add anything to this letter, please do not hesitate to reach out. We can be reached by email at cwmurphy@ucdavis.edu or by phone at 530-754-1812.

Signed,

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