KOLOMA

August 7, 2022

Dr. Cheryl Laskowski
Transportation Branch Chief
California Air Resources Board
By electronic submittal to
https://www.arb.ca.gov/lispub/comm/iframe_bcsubform.php?listname=lcfs-wkshp-jul22-ws&comm_period=1

RE: Low Carbon Fuel Standard Public Workshop: Potential Future Changes to the LCFS Program

Dear Dr. Laskowski,

Koloma, Inc. ("Koloma) appreciates your time in hosting the public workshop on Potential Future Changes to the Low Carbon Fuel Standard ("LCFS") Program on July 7, 2022, as well as the opportunity to provide comments regarding potential changes. Koloma is developing a unique process for producing hydrogen at large scale. As a result of our work to develop hydrogen, we are also working to develop fuels that contain hydrogen as a component including ammonia, methanol and synfuels. We believe that if the regulatory changes to the LCFS discussed in this letter are implemented, CARB will trigger a hydrogen market transformation that is essential for California to achieve its goal of carbon neutrality by 2045. The market transformation contains the following components:

1. The rapid scaling of the hydrogen market
2. The broad use of hydrogen in the transportation sector
3. The creation of a strong market signal to decarbonize hydrogen based on carbon intensity ("CI")
4. The development of diverse sources of hydrogen including low CI and ultra-low CI hydrogen
5. A cost-effective, robust and carbon efficient distribution system for hydrogen

Summary of Recommendations

- **Hydrogen Book-and-Claim for Transportation**. We believe CARB should expand book-and-claim accounting to authorize the transfer of hydrogen via natural gas and hydrogen pipeline distribution systems to support the broad development of the hydrogen economy and hydrogen hubs consistent with the Draft Scoping Plan.
- **Hydrogen Book-and-Claim for Hydrogen Used as Process Energy in Facilities.** We believe CARB should jump start the hydrogen market by authorizing the book-and-claim transfer of the hydrogen with CI if the hydrogen is used as process energy or heat in the manufacturing of LCFS-eligible fuels such as ethanol, renewable diesel, or SAF.

- **Hydrogen-Derived Fuels in Tier 1 Pathways.** We believe CARB should expand the Tier 1 calculator to include more types of hydrogen production and should also integrate into the Tier 1 calculator fuels that utilize hydrogen as a component including ammonia, methanol, and synthetic fuels and make these fuels eligible for Tier 1 pathways.
- **Recognize and Value Carbon Mineralization for CCS.** With numerous companies now launching serious efforts to mineralize CO2, we recommend that CARB recognize well characterized carbon mineralization as a valid sequestration mechanism, particularly given California's vast resources that can be utilized to execute this sequestration strategy.
- **Expand Hydrogen Refueling Infrastructure ("HRI") for medium and heavy-duty vehicles.** We believe CARB should strengthen and expand the HRI program to include heavy duty vehicles given hydrogen's substantial potential in this sector.

CARB Must Establish Broad Book-and-Claim Accounting in the LCFS for Hydrogen to Enable California to Achieve Carbon Neutrality by 2045 and to Fulfill CARB's Draft Scoping Plan Scenario

In order to combat climate change and accelerate climate policy, Governor Brown issued Executive Order B-55-18 that set the goal for California of achieving carbon neutrality by 2045. Since that time, there have been substantial efforts undertaken to chart a feasible and cost-effective technology path for California to achieve this goal. Perhaps the three most important works that have been developed are the Draft 2022 Scoping Plan that CARB has developed, the Driving California's Transportation Emissions to Zero report developed by the Institute for Transportation Studies with funding from the California Budget Act of 2019, and the Getting to Neutral Report prepared by the Lawrence Livermore National Laboratory.

All of these works emphasize the centrality of electrification coupled with the rapid expansion of hydrogen as necessary components of a successful strategy. As is well recognized by CARB's Draft Scoping Plan, there are real-world limits and impacts to expanding renewable electricity supply. The challenge of rapid electrification was further heightened by the goal that Governor Newsom set in his recent letter to CARB Chair Liane Randolph calling for "an energy transition that avoids the need for new natural gas plants to meet our long-term energy goals while ensuring reliability and meeting growing demand for electricity."[1]

Within this scenario of electrification and fossil-fuel phaseout, the rapid deployment of hydrogen and fuel cell technology for transportation and storage at scale becomes essential. CARB recognized the importance of hydrogen to multiple sectors in the analysis contained in the Draft Scoping Plan:

> *"To support the transformation needed, we must build the clean energy production and distribution infrastructure for a carbon-neutral future. The solution will have to include transitioning existing energy production and transmission infrastructure to produce zero-*

[1] Governor Gavin Newsom Letter of July 22, 2022, to CARB Chair Liane Randolph, at page 2, available at https://www.gov.ca.gov/wp-content/uploads/2022/07/07.22.2022-Governors-Letter-to-CARB.pdf?emrc=1054d6

carbon electricity and hydrogen, and utilizing biogas resulting from wildfire management or landfill and dairy operations, among other substitutes."[2]

As a result, Hydrogen was a central part of CARB's Proposed Scenario for the 2022 Draft Scoping Plan for multiple AB 32 GHG Inventory sectors including:

- 25% of Ocean-going Vessels to utilize hydrogen fuel cell electric technology by 2045[3]
- Line haul and passenger rail rely primarily on hydrogen fuel cell technology[4]
- Biomass supply used to produce low carbon hydrogen for transportation[5]
- Renewable hydrogen blended in natural gas pipeline at 20% volume ramping up between 2030 and 2040[6]
- In 2030s, dedicated hydrogen pipelines constructed to serve certain industrial clusters[7]

To achieve these goals across multiple sectors, CARB must facilitate the rapid expansion of hydrogen supply and distribution by enabling the flexible transfer of its environmental attributes including its CI through book-and-claim accounting. Without such flexibility, hydrogen will be stranded at production sites or remain economically infeasible due to having to utilize costly and energy intensive liquefaction processes and/or truck transport. Specifically, CARB must expand book-and-claim accounting to hydrogen for two qualifying applications.

A. Hydrogen Book-and-Claim for Transportation Fuel. We believe CARB should expand book-and-claim accounting to authorize the transfer of hydrogen via pipeline distribution systems to support the broad development of the hydrogen economy and hydrogen hubs. Tracking, attestation, and verification requirements that currently apply to renewable natural gas ("RNG") can be similarly utilized to track and account for the CI of the hydrogen injected into pipelines and utilized in LCFS-qualifying applications.

The difficulty of supplying Low-CI electricity to electric vehicles presented a similar challenge to CARB in that last rulemaking. CARB overcame that hurdle by the enabling the transfer of the CI of Low-CI Power via book-and-claim accounting. As stated in the Description of Problem in the Initial Statement of Reasons ("ISOR") for the last major LCFS rulemaking, "The CI of pathways for electricity supplied to vehicles, and hydrogen produced by electrolysis rely almost entirely on the source of electricity, but no options exist under the current regulation for matching low-CI electricity to an EV or electrolysis load."[8] In the ISOR, CARB provided the following rationale for enabling book-and-claim accounting: "To allow for these fuel pathways to further decarbonize, a book-and-claim accounting system will allow electric vehicles to use renewable electricity from renewable generation assets located in more efficient, practical or economical areas. Support for electricity decarbonization for electric vehicles allows for ultra-low carbon fuel pathways, which will help California better meet GHG emission reduction goals."

---

[2] Draft Scoping Plan, at vi.
[3] Id., at Table 2-2: Actions for the Proposed Scenario: AB 32 GHG Inventory sectors, at p. 59.
[4] Id.
[5] Id. at p. 62.
[6] Id.
[7] Id.
[8] LCFS ISOR at III-95.

This same reasoning is equally applicable to and necessary for expanding the supply and deployment of hydrogen in transportation applications in this LCFS rulemaking. As CARB stated in the Draft Scoping Plan:

"Transitioning away from ICE vehicles is part of the solution, but we must ensure that an adequate supply of zero-carbon alternative fuel is available to power these vehicles. Electricity and hydrogen are the primary fuels for ZEVs, and both fuels must be produced using low-carbon technology and feedstocks to minimize upstream emissions as the LCFS calculates life-cycle carbon intensity of fuels."[9] *(…)*

"The Low Carbon Fuel Standard is the primary mechanism for transforming California's transportation fuel pool with low-carbon alternatives and has fostered a growing alternative fuel market."[10]

B. Hydrogen Used as Process Energy. We believe CARB should provide a jump start to the hydrogen market by authorizing the book-and-claim transfer of the hydrogen with CI via natural gas pipeline if the hydrogen is used as process energy or heat in the manufacturing of LCFS-eligible fuels such as ethanol, renewable diesel, or SAF.

As stated by CARB in the Draft Scoping Plan:

"Hydrogen produced from renewable resources and renewable feedstocks can serve a dual role as a low-carbon fuel for existing combustion turbines or fuel cells, and as energy storage for later use. Reliability also can be supported through increased coordination and markets in the interconnected western power grid; this is already helping to better integrate renewables."[11] *(…)*

"*Decarbonizing industrial facilities depends upon displacing fossil fuel use with a mix of electrification, solar thermal heat, biomethane, low- or zero-carbon hydrogen, and other low-carbon fuels to provide energy for heat and reduce combustion emissions*."[12]

We support the comments made by the Coalition for RNG regarding CARB approving this book-and-claim expansion for RNG, and it is our opinion that the same logic that supports expanded RNG qualification is equally applicable to hydrogen.

Tracking, attestation, and verification requirements that currently apply to renewable natural gas ("RNG") can be similarly utilized to track and account for the CI of the hydrogen injected into pipelines and utilized in LCFS-qualifying transportation fuel applications and as process energy for producing low carbon fuels.

[9] Draft Scoping Plan, at 152.
[10] Id. at 153.
[11] Id. at 163.
[12] Id. at 165.

Development of a new Tier 1 CI calculator for hydrogen pathways

Koloma is supportive of the development of an expanded Tier 1 CI calculator for hydrogen pathways and increased eligibility for Tier 1 pathway application process for hydrogen. Currently, the list of recognized hydrogen pathways is limited to those for steam methane reforming ("SMR") and electrolysis technologies. Koloma's technology produces hydrogen without being in the SMR or electrolysis categories, but should not be disadvantaged for this distinction. In addition to hydrogen, we believe CARB should integrate fuels that utilize hydrogen as a component including ammonia, methanol, and synthetic fuels into the Tier 1 calculator and make these fuels eligible for Tier 1 pathways.

Aviation and shipping industries are likely to start adopting these hydrogen-based fuels prior to the next rule making session. CARB's work relating to the Scoping Plan and in other analysis pertaining to technology readiness has identified the promise of hydrogen in multiple medium and heavy-duty applications. These industries are more likely to start broadly adopting these hydrogen-based fuels if CIs can be efficiently secured for diverse hydrogen pathways. These sectors have consistently been identified as hard to decarbonize due to federal preemption as well as due to the need for massive quantities of energy dense liquid fuel for these demanding applications.

Recognize and Value Carbon Mineralization for CCS

With numerous companies now launching serious efforts to mineralize CO_2, we recommend that CARB recognize well-characterized carbon mineralization as a valid sequestration mechanism, particularly given California's vast resources that can be deployed to execute this sequestration strategy.

Expand HRI for medium and heavy-duty vehicles

We believe CARB should strengthen and expand the HRI program to include heavy duty vehicles given Hydrogen's substantial potential in this sector, and support the many comments that have been submitted to CARB on the benefits of this expansion.

Conclusion

Koloma thanks the California Air Resources Board for its consideration of our input regarding potential upcoming changes to the LCFS Program. Please do not hesitate to contact us if any further input or clarification would be helpful. We look forward to continuing to support the LCFS Program and providing input towards this process.

Sincerely,

Peter L. Johnson
Chief Executive Officer
Koloma, Inc.