



February 20, 2024

Ms. Liane Randolph
Chair
California Air Resources Board
1001 I Street
Sacramento, CA 95864

Re: Proposed Low Carbon Fuel Standard Regulation

On behalf of the undersigned organizations and companies, we are pleased to submit the following comments for consideration as the California Air Resources Board (CARB) deliberates the proposed updates to the Low Carbon Fuel Standard (LCFS). We would like to express our gratitude for the diligent efforts undertaken to shape the low-carbon fuel standard to address the role of hydrogen. This supports the vision in the Scoping Plan and is crucial to recognize the comprehensive strides made in addressing the essential components of this transformative pathway for achieving carbon neutrality. While acknowledging the inclusion of significant policy components, we must underscore the importance of nuanced adjustments to ensure the success of hydrogen – a success that is also vital for achieving the standards set forth in Advanced Clean Fleets (ACF), Advanced Clean Trucks (ACT), Innovative Clean Transit (ICT), and Advanced Clean Cars 2 (ACC2) regulations. Our comments are largely focused on very specific intricacies that improve the operability of the initial proposal and we look forward to continuing to work closely with the Board and staff to finalize this regulation.

Ambition and Market Stability – Near Term Proposal

The regulatory aspirations of California’s LCFS have had significant influence in California and beyond – with states like Oregon, Washington, and Minnesota carefully watching this proceeding. The rapid expansion of low carbon fuel alternatives has been remarkable. However, accompanying this progress is a pressing near-term challenge that demands attention to ensure market stability.

Upon thorough market modeling analysis, we express reservations regarding the proposed one-time 5%¹ stringency step-down. We contend that this increment is insufficient for market stabilization. Consequently, we advocate for the implementation of a one-time 9% increase in stringency, set to commence in 2025. This adjustment is anticipated to yield a substantial 22.75% Carbon Intensity (CI) reduction, a notable enhancement from the initially proposed 18.75%. Moreover, we support a linear progression in stringency, reaching 30% from 2026 through 2030 after the initial 9% increase.

¹ The one-time 5% stringency step-down is essentially cancelled out by the 5% Diesel baseline CI increase noted in Table 7-1 – accordingly a more aggressive CI increase of 9% is needed.

Table 7-1² delineates the CI adjustment for the Diesel baseline. The proposed 5% increase elevates the CI benchmark for Diesel from 100.45 to 105.76, inadvertently augmenting the number of credits in the market. This unintended consequence is particularly pertinent due to the outsized impact of biodiesel and renewable diesel on the credit bank. Addressing this, we recommend a 9% increase in CI, effective from 2025, to align with CARB's objectives and stabilize the market.

Acknowledging CARB's ambition to manage the market's "potential overperformance," it becomes imperative to recognize the cumulative impact on the credit bank through 2030 by adjusting the Diesel baseline CI. As a precautionary measure, we advocate for CARB to incorporate an annual program review of the credit bank, encompassing both deficits and credits, along with a forecast of anticipated fuel demand and production. If the annual review validates the program's feasibility, we propose triggering the Automatic Acceleration Mechanism (AAM) in 2025, rather than waiting until 2027. The earliest market impact of the AAM would be felt in 2026, contingent on meeting market conditions.

While endorsing CARB's endeavors to manage the swift progress in fuel decarbonization, we underscore the urgency to make timely adjustments that will effectively influence the market in this regard. The immediacy of these adjustments is crucial to ensuring the continued success of the LCFS program.

Capacity Crediting

Light and Medium Duty Station Capacity

To optimize the effectiveness of the Low Carbon Fuel Standard (LCFS) program, a strategic focus on enhancing Light-duty (LD) Hydrogen Refueling Infrastructure (HRI) capacity is imperative. This is particularly crucial to accommodate the unique needs of medium-duty (MD) vehicles, given their co-mingling with LD fleets. The alignment of LCFS capacity credits with market behavior is paramount for station crediting.

In light of this, incentivizing 600kg stations should be reconsidered in the context of California's near- and long-term vehicle and fleet deployment goals. MD vehicles typically require larger stations, and their integration with LD fleets, as opposed to heavy-duty (HD), underscores the importance of incentivizing larger stations. Larger stations, proven to be more reliable, better align with California's policy goals and the current market dynamics.

Maintaining the existing 1200kg credit is recommended, considering its success in driving private sector investment without relying on state grants. This credit has proven effective in supporting the existing HRI, and its continuation is aligned with the ongoing success of the infrastructure.

The US Auto Manufacturers' letter to CEC³ underscores the industry's perspective on MD vehicles and their operational needs. Specifically, we believe that these stations and the HRI credits supporting them should contemplate high-flow refills at 10 or more kilograms per session of vehicles that have a gross vehicle weight rating of 26,000 lbs or lower, often referred to as class 6.

² https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/lcfs_appa1.pdf

³ [Necessity for H₂ Refueling Stations for Medium-Duty Fuel Cell Electric Vehicles in the U.S.](#), United States Council for Automotive Research, August 23, 2023

Limitations on Locations

To enhance the viability of hydrogen refueling station, flexibility in locations for both HD and LD is paramount. The current absence of a comprehensive station network argues against stringent geographic limitations. These limitations have the immediate consequence of limiting decarbonization and air quality impacts of transitioning from fossil fuels, especially in the overburdened communities along these statewide transportation corridors.

While the implementation of the screenings within the CalEnviroScreen tool and the definitions in regulations provide some flexibility there is still a greater need for adaptability in station placement. Additionally, the impact of inflation and LCFS pricing on GFO 19-602 station buildout necessitates a reassessment of location constraints. The proposed restriction on HD locations are particularly limiting as the SR-60 corridor is not eligible. For example, an existing site supporting the refueling of heavy-duty trucks and wants to add H2 or charging for that matter but isn't technically located in "the right location", will not be eligible for capacity credits even if they are proximate to or there is a nexus to supporting trucks that go into disadvantaged communities. We believe additional discretion should be provided to the Executive Order (EO) on station location crucial to accommodate the evolving landscape.

HyCap Modeling and Multi-Modal Stations

The complexity in modeling multi-modal stations for capacity crediting necessitates ongoing collaboration with CARB staff and the National Renewable Energy Laboratory (NREL) to refine the HyCap model. The model must evolve to consider diverse weight classes refueling at the same location. These refinements and functionality are essential and should progress concurrently with the adoption of the LCFS. We will work diligently with CARB staff and NREL to refine and test the model to reflect real world practices and fueling profiles.

Inequity in Capacity Crediting Standards

The imposition of an 80% renewable content requirement exclusively for HRI raises pertinent questions, particularly in comparison to Fast-Charging Infrastructure (FCI). This requirement places hydrogen at a competitive disadvantage against other energy sources, which benefit from substantial federal, state, and ratepayer subsidies not extended to hydrogen. The absence of a pathway to generate Hydrogen-Renewable Identification Numbers (H-RINs) in the federal Renewable Fuel Standard (RFS) further disadvantages hydrogen compared to Renewable Natural Gas (RNG) and electricity.

Moreover, the 80% renewable content mandate introduces cost implications. While our industry strives for a high renewable content aligns with market goals, the exclusive application of this requirement to hydrogen is deemed discriminatory. Both the LCFS and HRI send robust signals that have prompted hydrogen station operators to provide decarbonized and renewable hydrogen. However, given the thin market supply and the exclusive application of this requirement to hydrogen, it is crucial to reassess the fairness and practicality of this stipulation.

We suggest that this additional requirement should be eliminated as it is unnecessary and counter to the carbon intensity focus and technology neutral principles that have driven innovation and investment in the LCFS program to date. Existing requirements to state funded projects could be grandfathered but is unnecessary as the LCFS sets the standard and drives commercial decisions that favor lower carbon products. Going forward, the requirement is discriminatory, will reduce available supply, increase the cost of H2 thereby hindering adoption and achievement of the state's zero carbon goals.>

Crediting Window

The shift from a 15-year to a 10-year timeframe for capacity credits has a significant impact on station financing and economics.

Notably, this change introduces a new challenge for HD stations, which are both larger and more capital-intensive. The shorter 10-year timeframe contrasts with the previously longer capacity crediting period, creating a misalignment with the capital costs associated with HD infrastructure. The substantial capital investment demands a longer-term perspective to ensure the economic viability and sustainability of HD stations. Reevaluating the timeframe in consideration of the unique characteristics and financial requirements of HD infrastructure is crucial for fostering a conducive environment for hydrogen development in this sector.

Capacity Credits for Private Depots

As a principle we believe that public programs should support only publicly available infrastructure. The crediting of private refueling locations under HRI should be grounded in several considerations.

This approach fails to expand the availability and optionality of hydrogen/fuel cells in the current-year or near-term obligations. The reduced number of publicly available stations limits the options for fleets complying with ACF, particularly impacting the adoption of fuel cell electric trucks.

Private depots should not be overbuilt and capacity crediting for private fleets is counterproductive to the purpose and intent of HRI. It hinders effective utilization of resources and undermines the efficiency of the infrastructure. Private depots carry no risk, they control their own demand. The purpose of the HD HRI program is to eliminate the risk of underutilization and promote the installation of HD H2 stations absent adequate bilateral contracts that would secure offtake and return on capital invested. Private transit facilities incur no such risk.

The HD HRI is intended to eliminate the chicken and the egg problem, by promoting deployment of stations in anticipation of zero-emission vehicle fleet growth. If HD HRS development is dependent on bilateral contracts, it will take a lot longer to deploy and penetration of HD FCETs into the market will take much longer.

Timing and Approvals

The stipulated 24-month timeline from HRI approval to bringing the Hydrogen Refueling Station (HRS) online raises concerns due to permitting and supply chain delays that have been common to date. The retraction of an approved HRI award has a substantial impact on the viability of a project. We propose granting the Executive Officer the discretion to extend this timeline, provided tangible progress is evident, similar to the flexibility afforded in ACF regulations.

Moving to the approval process for HRI applications, while we agree with the imperative to expedite approvals, the suggestion of tying approvals to a calendar quarter seems overly rigid. Instead, we advocate for a more streamlined 90-day approval period, maintaining efficiency without compromising the thorough evaluation of applications.

Lastly, the current practice of requiring Original Equipment Manufacturer (OEM) certification for a station before operations appears antiquated in the current landscape. It is pertinent to reconsider and potentially eliminate this requirement, aligning with industry advancements and ensuring regulatory practices remain synchronized with technological progress.

In essence, these proposed adjustments aim to strike a balance between expeditious progress and a comprehensive evaluation, fostering an environment conducive to the dynamic and evolving nature of hydrogen infrastructure development.

Reporting

The introduction of a new quarterly reporting requirement (Appendix A-1, §95491(d)(4)(D)) for hydrogen (H₂) fuel sold through pathways utilizing book-and-claim accounting poses notable challenges, particularly for fuel retailers with mixed product inventories supplied from multiple sources.

Comparatively, electricity, utilized for charging does not face a similar reporting burden and gets to maintain a three-quarter temporal requirement and no additional requirements. This creates an inequitable disparity in policy standards between hydrogen and electricity, placing hydrogen at a distinct disadvantage. The differential treatment risks compromising the equitable evolution of both energy sources within the ZEV landscape, warranting a reassessment of reporting requirements to ensure consistency and fairness.

Tier 1 Calculator

The liquification energy needs appear to be higher than experienced by actual operation, prompting a need for further evaluation and adjustments to align with realistic energy requirements.

We urge consideration of broadening eligibility criteria by including "process energy" for book and claim in the Tier 1 calculator. The exclusion of process energy is highlighted through a sample calculation, raising the possibility of necessitating Tier 2 pathway submissions solely for process energy credits. This approach is deemed burdensome for all parties involved and merits reconsideration.



Tier 1 Hydrogen Pathway Summary
FOR APPLICANT ONLY - CONTAINS CONFIDENTIAL BUSINESS INFORMATION - DO NOT DISTRIBUTE

Applicant Information	
Application #	
Company Name	
Company ID	
Facility ID	
Pathway Type	Steam Methane Reformation
H2 Production Data	Default Values
Operational Data Period	

Hydrogen Production Quantities			
	Unit	Total	Gaseous Hydrogen (GH2)
Total Hydrogen Produced	kg	90,000	90,000
	MJ, LHV	10,800,000	10,800,000
H2 for LCFS Pathway(s)	Produced	kg	90,000
	T&D Loss Factor	%	1.0%
	Dispensed	kg	88,479
	(Calculated)	MJ, LHV	10,617,531
Maximum Matchable B&C	MMBtu, HHV	12,142	Without B&C
Hydrogen Reportable by Pathway	kg	90,000	With B&C RNG
Delivered H2 for CI Calculations	MJ, LHV	10,617,531	0
			10,617,531

Carbon Intensity (CI) Calculations								
Fuel Pathway Inputs			Emission Factors		Emissions	GH2 CI (gCO ₂ e/MJ, LHV)		
Category	Name	Value	Unit	Value	Unit	gCO ₂ e	Without B&C	With B&C RNG
Feedstock	North American Natural Gas	9,243	MMBtu, LHV	75,496	gCO ₂ e/MMBtu, LHV	697,776,824	65.72	
Process Energy	North American Natural Gas	3,345	MMBtu, LHV	75,496	gCO ₂ e/MMBtu, LHV	297,800,042	28.05	28.05
	GH2 Compression	171,000	kWh		gCO ₂ e/kWh			
	Balance of Low-CI Electricity	1,354	kWh		gCO ₂ e/kWh			
	Balance of Grid Electricity	21,825	kWh		gCO ₂ e/kWh			
Book-and-Claim	RNG Matched to GH2	12,142	MMBtu, HHV	57,662	gCO ₂ e/MMBtu, HHV	700,120,753		65.94
Transportation and Distribution	GH2 Tube Trailer Truck	9,000,000	kg-miles	12.01	gCO ₂ e/kg-mile	108,094,529	10.18	10.18
	GH2 Fueling	10,617,531	MJ GH2, LHV	3.25	gCO ₂ e/MJ H ₂ , LHV	34,532,267	3.25	3.25
Fuel Pathway CI (gCO ₂ e/MJ H ₂ , LHV)							107.20	107.42
Margin of Safety (entered by applicant)								
Fuel Pathway CI with Margin of Safety							107.20	107.42

These suggestions aim to refine the Tier 1 Calculator, ensuring accuracy in energy needs and streamlining the credit allocation process for process energy without imposing undue administrative complexities.

Developing the Hydrogen Economy

To stimulate robust demand for hydrogen, crucial for the rapid expansion of distributed Low-Carbon Intensity (CI) hydrogen production, we propose reinstating CARB's prior eligibility provision for LCFS electricity book-and-claim. Previously, this provision encompassed "hydrogen used in the production of a transportation fuel."

While we appreciate CARB's recent decision to extend eligibility to Low-CI hydrogen derived from sources meeting the criteria outlined in §95488.8(i)(3), we express concern over the LCFS Proposal's restrictive stance on how hydrogen can be used as a fuel. Specifically, the proposal limits book-and-claim eligibility to "hydrogen used as a transportation fuel," deviating from existing regulations that include hydrogen used in the production of a transportation fuel.

CARB's rationale for this restriction is grounded in concerns about the limited availability of Low-CI power in California and the constraints on power supply expansion. Although we acknowledge these concerns and the intent to ensure sufficient Low-CI power for Zero Emission Vehicles (ZEVs), we assert that limiting the use of Low-CI book-and-claim to neat/unblended hydrogen for Fuel Cell Electric Vehicles (FCEVs) impedes the substantial growth of hydrogen supply essential to achieving CARB's ambitious 1,700x growth target by 2045.

Our market-based concern stems from the limitation's impact on the addressable hydrogen market demand, constraining it from small to infinitesimal. To develop multiple facilities in California, hydrogen

project developers require substantial capital, and investors seek a clear return on investment (ROI). Arbitrary limitations on electrolytic hydrogen contradict state policies and market conditions.

Book-and-Claim

We respectfully propose that CARB modifies the LCFS amendments to make book-and-claim available for hydrogen used to produce transportation/alternative fuels. Specifically, hydrogen used for transportation fuels would adhere to the Strict Power Purchase Agreement (PPA) book-and-claim power sourcing regime. To align with CARB's goal of maximizing Low-CI power for FCEVs, we recommend reinstating hydrogen used as a fuel in FCEVs to the flexible Renewable Energy Certificate (REC) power sourcing regime outlined in the LCFS Proposal for Low-CI electricity supplied to Battery Electric Vehicles (BEVs) under §95488.8(i)(1)(A)-(B). This approach restores parity between BEVs and FCEVs in book-and-claim power sourcing flexibility.

Recognizing the priority given to ZEVs in the Scoping Plan, hydrogen used neat in FCEVs would be subject to the Flexible REC Book-and-Claim, while hydrogen used to produce transportation fuel (e.g., power-to-liquids, sustainable aviation fuel, or renewable diesel) would adhere to the Strict PPA Tier requirements. This two-tier system accelerates hydrogen supply growth while aligning with the Scoping Plan's emphasis on ZEVs over internal combustion engines.

Conclusion

We appreciate CARB staff's work on the development of the proposed rule and their commitment to improving the LCFS. Successful adoption of battery and fuel cell electric vehicle technologies requires changes in LCFS to reinforce market pricing, parity in policy, and encourage deployment of fueling and charging infrastructure for zero-emission fleets. The undersigned associations and companies will continue to develop the vehicles and infrastructure as well as low-carbon, zero-carbon and renewable hydrogen needed to build this market and reduce emissions. We look forward to continuing to work with CARB staff on the necessary details to achieve consensus for the upcoming workshop and rulemaking proceeding.

Thank you,

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