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Dr. Laskowski and CARB Staff,

To begin, I would like to commend you and CARB Staff on the process undertaken to amend the Low Carbon Fuel Standard. Throughout the nearly yearlong process of Public Workshops and stakeholder engagement, CARB Staff has consistently been thoughtful and responsive to input and creativity from a variety of sources. This receptiveness is encouraging to developers and investors who rely on CARB's oversight and management for a well-functioning LCFS market.

As I am sure you and your colleagues can appreciate, this is a critical juncture in re-establishing the LCFS as the leading agent of transportation sector decarbonization. No program existing today is better designed than the LCFS, which is what has led it to so effectively make progress towards the goals of the California's Scoping Plan – and to motivate the private capital and innovation needed to do so. This has and will continue to lead to improved air quality, health, and economic output in the state.

In my letter submitted in March following the workshop CARB hosted on proposed changes, I offered four changes to the program which would enhance the LCFS's functioning and accelerate decarbonization outcomes in the state. Those four changes were:

1) a step-down in the CI reduction target in Q1 2024 to 19%;
2) a 30% CI reduction target for 2030;
3) an Auto-Acceleration Mechanism ("AAM"); and
4) reforming market participation requirements.

These continue to be of paramount importance. With that said, new data, discussion with other market participants, and commentary from CARB Staff has given me the opportunity to iterate on my specific proposals.

<u>Step Down</u>

In the May 22nd Public Workshop hosted by CARB, Staff presented proposals which included the implementation of a step-down in the CI reduction target. While I am encouraged that Staff is taking this proposal seriously, I must caution against the timeline of this change being pushed back to 2025, as was the case in Staff's presentation. If this were the timeline and 2024 were to be kept at the scheduled CI reduction target of 12.5%, our modeling shows that 2024 would have a net surplus of 12M credits, adding to 2023's forecasted 10M credit surplus. Credit prices would drop well below current levels. Sustained credit pricing at these levels would serve as cold water on the deployment of much-needed low carbon fuel infrastructure and technology development.

If CARB Staff has already determined that a January 1, 2024 implementation for a step down is no longer feasible, the magnitude of the step down should be amended from the previous suggestion of 19% to account for this. If CARB were to implement the step down mid-year in 2024, our modeling suggests that a 20% CI reduction target would be appropriate; this assumes that the annual schedule of increasing the CI reduction target each January 1 would still be

followed, meaning that in this scenario the 20% CI reduction target would only be in place for 6 months before changing on January 1, 2025. Because a Q1 2025 step down would need to account for both the 2024 bank build and the normal-course CI change from 2024 to 2025, our modeling shows that a 22% CI reduction is appropriate if CARB determines that an even longer lead time is necessary.

In CARB's most recent workshop, Staff noted that they are considering a step-down of 5% relative to the current schedule in 2025, which would result in a 18.75% CI reduction target in that year. This is insufficient in our view. This is largely due to the 4.5B gallons across 23 projects of new renewable diesel capacity that is currently in development and planning to come online in 2023 and 2024, most of which have publicly committed to sending their product to California to benefit from the LCFS. Due to the proposed delay and the lower-than-appropriate step down, our modeling would have the credit bank running surpluses each year through 2030, credit pricing remaining at depressed levels, and, as a result, lower decarbonization than would otherwise be achieved with a more ambitious program.

2030 CI Reduction Target

Looking at the 2030 target for CI reduction, the past few months have not had a major impact on the long-term forecasted fuel mix, so the previously suggested range of 30-32% as a 2030 target continues to hold. As noted in previous comments, these levels are predicated on the above step down in 2024; if CARB were to delay implementation until 2025, a target of 32% is more appropriate than is 30%, and targets of up to 35% should be considered. These values are based on rigorous modeling of current and future fuel supply, informed by project announcements, commodity pricing, interest rates, and the required rates of vehicle electrification under the Advanced Clean Cars II and the Advanced Clean Trucks regulations.

Auto-Acceleration Mechanism

I applaud CARB Staff for their openness to the Auto-Acceleration Mechanism, as evidenced by the recent workshop held on the matter. While I detail the specifics of my proposal in Appendix A attached, I want to highlight the thought process for several key aspects which underpin this.

First, it is clear that the triggering mechanism should be based on credit- and deficit-generation; price-based mechanisms are too manipulable to be a viable measure of market overperformance. While other commentors have suggested using credit-to-deficit ratios or credit bank levels as the key AAM-triggering metric, the best design would use achieved CI reduction. The reason for this is that using achieved CI reduction allows for comparison across years. While a 1.1 credit-to-deficit ratio has meaning at a given CI reduction target, those levels of credit- and deficit-production would mean a different level of decarbonization in each year; meanwhile, achieving, for example, 15% CI reduction means the same thing regardless of the CI reduction target in that year. This comparability allows us to avoid double counting the overperformance from one year into another year by considering only the overperformance incremental to the already-accounted-for decarbonization (the mechanism for which is detailed in Appendix A), something which is not possible in a credit-to-deficit trigger design.

In my previous comments, I suggested using a fixed threshold of 1% overperformance to trigger an acceleration event. Instead, we now propose using a threshold value equal to the year-over-year change in CI scheduled for proximate January 1. For example, if in 2025 we had a baseline CI target of 22% and in 2026 that was scheduled to increase to 24%, the AAM would only be triggered if the measured overperformance exceeded 2%. This is advantageous compared to the previous design in that it maintains the threshold as being "one year ahead of schedule" instead of a fixed amount that may lose meaning as the program progresses.

Next, the magnitude of each acceleration should be based on the magnitude of the overperformance which caused the Acceleration Event. Whereas others have suggested that all Acceleration Events should result in the pull-forward of the compliance schedule by one year, this is overly rigid. This design may result in too large of an acceleration in some contexts and too little of an acceleration in others. Instead, adjusting the CI reduction schedule by the magnitude of the overperformance would ensure that the acceleration is calibrated to the reality of the market. This is exactly the same logic that CARB has previously used for the Incremental Deficit Calculation based on the average CI of crude oil (§ 95489.a), which adjusts the CI of CARBOB and diesel not by a set amount but instead based on the degree by which crude oil's CI exceeded the baseline amount.

Lastly, I want to note why the AAM is key to a well-functioning LCFS market. This is not because it is particularly likely to be triggered – it intentionally is not, particularly when paired with an appropriate 2024 step down. Instead, it is important because it serves as an insurance policy on the market; it removes the risk of unlikely-but-consequential outcomes where the adopted CI reduction schedule proves entirely out-of-step with the market's ability to deliver on those targets. While we each believe that our own forecasts are strong, prediction is very difficult, especially when it's about the future. It is plausible that a 2030 CI target of 30% is too conservative, in which case it is far better to have the AAM move quickly to rectify the situation rather than take years – and continue emitting far more CO2 than necessary – to go through the existing process. Time is of the essence.

Market Participation

Though CARB Staff has not included this suggestion in their commentary in previous workshops, liberalizing market participation rules is low hanging fruit for the LCFS program. The LCFS market, unlike nearly any other commodity market, has poor market depth and few tools for market participants to hedge risk. In my previous comments, I noted how the large obligated parties hold substantial market power due to these regulations and how the risks of market volatility are pushed onto project developers. In the financial world, boring is safe and safe is productive. We've unintentionally created a system where boring is only for the oil companies and safe is regulatorily prevented for everyone else. The consequence of this has been lower investment, depressed project development, and slower decarbonization.

CARB should move to reform this piece of the LCFS and allow new parties to enter the market. This would invite competition for credits, enable risk-sharing programs, and lead to faster decarbonization of the transportation sector.

I thank each member of the CARB team for their efforts to build a better LCFS program. Incorporating the many diverse perspectives of the stakeholders of this program is no small feat, especially when so many care about our shared goals so fervently. I'd welcome any opportunity to further discuss my proposals and designs if Staff feels it would be helpful.

Regards,

Asher Goldman
Principal, Net Negative Partners

Appendix A: Auto-Acceleration Mechanism Design

The below describes the mathematical equations that result in a well-functioning Auto-Acceleration Mechanism ("AAM"). For all equations, we use the notation of describing each quarter q as being in the present ($t = 0$), past ($t < 0$), or future ($t > 0$) with each whole number added or subtracted from t indicating the number of quarters before or after the present.

Trigger & Threshold

The optimal trigger is the achieved CI reduction in each calendar year. In the recent Public Workshops, some market participants suggested using credit-to-deficit ratios as a trigger for the AAM; this construction is very similar, with it only departing from that by scaling the credit-to-deficit ratio by the current CI target. This has an advantage over the raw credit-to-deficit ratio in that achieved CI deduction is comparable across periods. Looking at this on a quarterly basis, we can then take an average of the four quarters of the year, weighted by total energy use (E_q) in each quarter, to get the annual number. The AAM would then be triggered in the event that the trigger exceeded the threshold, defined as the CI one year ahead of the end of the Acceleration Event ($q = t + 4$). These are defined in Equations 1, 2, 3, and 4, with each CI value in terms of percent reduction relative to the 2010 baseline:

Equation 1: $CI_{Achieved,q=t} = CI_{ReductionTarget,q=t} * \sum Credits_{q=t} / \sum Deficits_{q=t}$

Equation 2: $CI_{WtdAvg,q=t} = \sum_{q=t-3}^{q=t} (CI_{Achieved,q} * E_q) / \sum_{q=t-3}^{q=t} (E_q)$

Equation 3: $CI_{Threshold,q=t} = CI_{ReductionTarget,q=t+4}$

Equation 4: $Trigger\ AAM\ when\ CI_{WtdAvg,q=t} \geq CI_{Threshold,q=t}$

Showing the above for the 2022 calendar year, we can see that the recent overperformance has pushed the 4-quarter weighted average CI reduction beyond what the threshold would be.

Period	CI Reduction Target (A)	Credits (B)	Deficits (C)	Achieved CI Reduction (A*B/C)	Energy Use	Threshold	Trigger?
2022 Q1	10.00%	5,837,928	5,151,120	11.33%	515.5 PJ		
2022 Q2	10.00%	6,777,045	5,393,021	12.57%	542.9 PJ		
2022 Q3	10.00%	6,968,461	5,205,830	13.39%	528.9 PJ		
2022 Q4	10.00%	7,129,119	5,475,996	13.02%	547.7 PJ		
2022	10.00%	26,712,553	21,225,967	12.58%	2,111.7 PJ	11.25%	Yes

Implementation Schedule

As proposed by others in the recent Public Workshop on this matter, it would be best for the AAM to be evaluated each May 15 based on the previous 4 quarters of data, and any Acceleration should be implemented on the proximate January 1. This timeline would provide market participants ample time to digest the change to the CI reduction schedule and plan accordingly.

A system in which an Acceleration Event can occur on a rolling schedule with the rolling 4 quarters determining the triggers and threshold is also viable. As noted by AJW and others in the Public Workshop, this has the drawback of a) long lead times before the change would be

implemented (an Acceleration Event triggered based on Q2 2025 – Q1 2026 would not be implemented until January 1, 2028) and b) added complexity. As such, the weight of the evidence suggests a calendar year approach is preferred.

Acceleration Magnitude

Once an Acceleration Event has occurred, the subsequent question is how large of a change to make to the future CI reduction schedule. Whereas some market participants have suggested that this would be most simple if the answer to this were a fixed pull-forward the CI schedule by one calendar year, this is too simple for its own good. The key issue with this is that such a design would not take into account the size of the overperformance which caused the Acceleration Event. We don't have to look far for an example of where a one-year pull-forward would be insufficient: 2022's achieved CI overperformance (12.58% - 10.00% = 2.58%) was *twice as large* as the one-year pull-forward would be (11.25% - 10.00% = 1.25%).

A better system would use the magnitude of the observed overperformance to adjust the future CI reduction targets. By using this approach, the scale of each Acceleration Event would exactly match what the market has already demonstrated it can absorb; said otherwise, it "right-sizes" the CI schedule. This is shown in Equation 5 and Equation 6:

Equation 5: $CI_{Overperformance,q=t} = \max(0, CI_{WtdAvg,q=t} - CI_{ReductionTarget,q=t})$

Equation 6: $CI_{NewReductionTarget,q\geq t+4} = CI_{ReductionTarget,q\geq t+4} + CI_{Overperformance,q=t}$

Equation 6 is flawed. While we could simply adjust the future CI reduction targets by the observed overperformance as done above, an adjustment needs to be made to prevent double-counting overperformance from one period into the next. This occurs in the year after an Acceleration Event, where a change to the future CI reduction schedule has already been determined but it is not impacting the current CI reduction target. This scenario is shown in Table 2 below:

Period	Original CI Reduction Target	Accelerated CI Reduction Target	Achieved CI Reduction	Over-performance	Threshold	Trigger?
2022	10.00%	10.00%	12.58%	2.58%	1.25%	Yes
2023	11.25%	11.25%	12.58%	1.33%	1.25%	Yes
2024	12.50%	15.08%				

Table 2: Example Acceleration Event Implementation, 2022-2024

First, see how the 2022 overperformance only impacts the CI reduction target in 2024, leaving 2023 as a year where we know an Acceleration Event has occurred but the consequences of the Acceleration Event have not yet been implemented. Using the hypothetical numbers highlighted in the 2023 row, note how the equations above would double count some of the overperformance from 2022 into 2023; even though the market remained at 12.58% achieved CI reduction (i.e., no new decarbonization) and even though the AAM would have already addressed that overperformance through the 2.58% increase to the CI reduction target coming in 2024, the delay in the implementation of that first Acceleration Event results in a second Acceleration Event.

A simple fix for this is the introduction of an adjustment for the "pending" Acceleration Event. This issue is avoided if we just subtract the triggered-but-not-yet-implemented Acceleration

Event from the calculated overperformance. Table 3 shows what this would look like using the same numbers as shown in Table 2:

Period	Original CI Reduction Target	Accelerated CI Reduction Target	Achieved CI Reduction	Over-performance	Pending Acceleration Adjustment	Adjusted Over-performance	Threshold	Trigger?
2022	10.00%	10.00%	12.58%	2.58%			1.25%	Yes
2023	11.25%	11.25%	12.58%	1.33%	-2.58%	-1.25%	1.25%	No
2024	12.50%	15.08%						

Table 3: Example Acceleration Event Implementation with Pending Acceleration Adjustment, 2022-2024

Note how 2023 no longer triggers an Acceleration Event. Importantly, 2023 still *could* trigger an Acceleration Event if the overperformance were large enough. Whereas some have suggested that we could pause the AAM in the year after an Acceleration Event, this design has the advantage of that, if necessary, it can address an overperformance incremental to the one already accounted for. Through this, the AAM would prevent runaway scenarios in which the pace of transportation decarbonization has increased meaningfully. That is detailed with alternative hypothetical 2023 numbers in Table 4:

Period	Original CI Reduction Target	Accelerated CI Reduction Target	Achieved CI Reduction	Over-performance	Pending Acceleration Adjustment	Adjusted Over-performance	Threshold	Trigger?
2022	10.00%	10.00%	12.58%	2.58%			1.25%	Yes
2023	11.25%	11.25%	15.50%	4.25%	-2.58%	1.67%	1.25%	Yes
2024	12.50%	15.08%						
2025	13.75%	18.00%						

Table 4: Example Acceleration Event Implementation with Pending Acceleration Adjustment, 2022-2025

Here, 2023 saw a meaningful increase in the achieved decarbonization and we were able to account for that through the AAM without double counting the previous overperformance. This structure is described in Equation 7, 8, and 9 below. It should be noted that Equation 9 is a corrected version of Equation 6 above and as such Equation 6 should not be used:

Equation 7: $CI_{PendingAcceleration,q=t} = CI_{Overperformance,q=t-4}$

Equation 8: $CI_{AdjOverperformance,q=t} = \max(0, CI_{Overperformance,q=t} - CI_{PendingAcceleration,q=t})$

Equation 9: $CI_{NewStandard,q\geq t+5} = CI_{Standard,q\geq t+5} + CI_{AdjOverperformance,q=t}$

In totality, this design would effectively guard against a substantial mismatch between the CI reduction schedule CARB sets and the market's ability to deliver decarbonization outcomes. Many of the individual aspects offered here are what I view as the best solution and I would be happy to discuss with CARB or any other stakeholder the thought process and mechanics of this.