

February 19, 2024

Liane Randolph, Chair
Members of the Board
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Dear Chair Randolph and Members of the Board,

I retired from the California Air Resources Board (CARB) two years ago. During my 13-year career at CARB, I worked almost exclusively on the Low Carbon Fuel Standard (LCFS), including over a year as Branch Chief overseeing the program.¹ I helped develop and enthusiastically support the LCFS. A strong LCFS is critical to helping California achieve its zero emission transportation goals. I begin this letter with five high-level recommendations for the Board to consider, two of which are described in much greater detail in attachments. I then convey my thoughts on the history of the LCFS, the power of special interests over the program, and the importance of thoughtfully considering the rapidly increasing cost of the regulation to low-income Californians. I finish the letter by briefly describing several focused recommendations. I do hope that you will read this letter in its entirety and please feel free to reach out if you have questions or would like to further discuss comments that resonate with you.

First and foremost, I highly encourage the Board to cap and ultimately phase out the use of crop-based diesel and aviation fuel in California. The use of crops such as corn and soy as feedstock to produce liquid diesel and aviation fuel is not a sustainable means of reducing GHG emissions and may actually increase emissions as compared to fossil fuels. Moreover, using crops to produce biofuels is expensive and exacerbates tropical deforestation and global hunger. **In fact, a portion of the GHG emission reductions that CARB is attributing to crop-based biofuels directly results from the most food insecure populations in the world eating less.** CARB's promotion of these fuels is not in line with its reputation as a global leader in environmental policy. For further discussion, please see Attachment A.

Second, rather than simply claiming that all potentially significant impacts are unavoidable, require staff to think creatively and reevaluate which impacts can be mitigated or avoided through LCFS requirements. Throughout the Draft Environmental Impact Analysis (EIA), CARB frequently made the determination that the impacts associated with expected compliance responses are Potentially Significant and Unavoidable. Based on this determination, CARB staff will request that the Board issue a Statement of Overriding Considerations. CEQA places the burden on the approving agency to affirmatively show that it has considered feasible mitigation and alternatives that can lessen or avoid identified impacts through a statement of findings for each identified significant impact. I do not believe that CARB has adequately demonstrated that they have considered feasible mitigation and alternatives that could lessen or avoid

¹ I am writing this comment letter on my own behalf as a private citizen.

several potential impacts on air quality. Moreover, there are several faulty assumptions in CARB's analysis that result in the overestimation of GHG and air quality benefits of the Proposed Amendments in the Draft EIA. These faulty assumptions also lead to the incorrect conclusion that the Proposed Amendments scenario is more cost effective and provides more air quality benefits than Alternative 1.² For further discussion, please see Attachment B.

Third, direct staff to immediately begin a rulemaking for dairy methane. Avoided methane crediting for dairies is unique under the LCFS. No other industry is treated as if their methane pollution is naturally part of the baseline and then lavished with large financial incentives for simply reducing their own pollution.³ Oil companies are not awarded large LCFS incentives for avoiding methane emissions at oil fields and refineries. Instead, they are regulated and penalized for their emissions. Likewise, landfill operators are not awarded large, avoided methane incentive for capturing methane escaping from landfills, rather they are regulated and required to do so. Excessively rewarding an industry for poor historic environmental performance is troubling in the least and furthermore, doing so only through a transportation fuels program distorts the market against the consideration of less costly and more sustainable methane mitigation options. Every effort should be made to regulate methane emissions from the dairy industry and limit any subsidies to the bare minimum necessary to resolve the problem. As it is, avoided methane crediting for dairies acts as an LCFS offset program, allowing oil companies to generate or purchase large amounts of credits while displacing very little or no fossil fuel.⁴ It is no wonder that oil companies are investing heavily in dairy digesters, as it allows them to comply with the LCFS, make a profit doing so, and retain their market share for fossil fuels.

Fourth, I recommend resetting the LCFS price cap and encourage the Board to set credit multipliers for high priority fuels and projects. Currently the price cap for LCFS credits is \$253 and by 2045 will likely be more than \$400. As shown in Table 1 later in this document, the pass-through cost increases substantially over time if the credit price is at or near the ceiling. To help prevent excessive pass-through costs in the latter years of the program, I recommend resetting the price cap to \$200 and removing the annual inflation adjustment. Moreover, if the Board believes that \$200 is not sufficient to incentivize high priority fuels or emission reduction projects, then the Board should adopt credit multipliers that are specific to those fuels or projects. Using credit multipliers will allow the Board to fine tune the regulation to provide extra incentive for high priority fuels and projects without unnecessarily overcompensating other credit generators in the program. Some stakeholders will hypocritically cry out "blasphemy" at such a suggestion and that the LCFS must be "fuel neutral" or that credit multipliers will create an "unlevel playing field". The truth of the matter is that transportation fuels

² Alternative 1 includes a limit on total credits from diesel fuels or sustainable aviation fuel produced from virgin oil feedstocks and a complete phase out of light-duty battery electric forklifts from the program.

³ At an LCFS credit price of \$200, dairy digester gas generates approximately \$80 per MMBtu in value from the LCFS and currently receives about \$40 per MMBtu in value from the federal Renewable Fuel Standard. The commodity price for natural gas is approximately \$5 per MMBtu.

⁴ Much of the current dairy gas is not displacing fossil fuel, but rather displacing landfill gas.

policy in California has never been a level playing field because the LCFS subsidy is allowed to stack on top of federal subsidies. This is particularly true for the heavy-duty and aviation sector where the LCFS stacking on the RFS, Biodiesel Blenders Tax Credit, and 40B tax credit for sustainable aviation fuel creates an unlevel playing field tilted heavily toward renewable diesel, biodiesel, sustainable aviation fuel, and renewable natural gas. A relatively low, fixed price cap with credit multipliers for high priority fuels and projects will allow the Board to truly establish a level playing field and equitably promote California's zero-emission transportation goals.

Finally, I highly encourage you to follow the recommendation made by [Earthjustice](#) to hold a non-voting Board hearing prior to the Board vote. Staff made significant changes to the proposal at the last minute that were not discussed at workshops or informational Board hearings, nor were they included in modeling that staff performed for the ISOR and Draft Environmental Impact Analysis.⁵ Moreover, staff have been surprisingly non-transparent in the amount of information included in the rulemaking materials, which is a change from prior LCFS rulemakings.⁶ It is so important to provide stakeholders with the opportunity to convince Board members, as a group and in a public setting, to change course prior to the voting meeting. I strongly urge you not to shortcut this process.

Before providing detailed comments, I believe it is important to understand the history of the LCFS and the power that wealthy special interests have exerted over the program. Throughout these comments, I urge the Board to adopt many of the recommendations from the Environmental NGO and Environmental Justice Communities. Industrial stakeholders will lead you to believe that these recommendations are a radical departure from the history and philosophy of the LCFS. The truth is that most of the LCFS provisions and credit generating opportunities that the environmental community wants to eliminate, phaseout, or amend were not allowed in the original regulation. Under the original LCFS regulation adopted in 2009,

- Dairy projects did not receive avoided methane credit and would have been assessed approximately the same carbon intensity as landfill gas,
- RNG projects (e.g., landfills and dairies) were not allowed to “deliver” biomethane to California using an accounting ledger,
- Oil producers and petroleum refiners could not receive credit for emission reduction activities at their facilities,
- Offset credit could not be generated for direct air capture (DAC),
- Credit could not be generated by unused hydrogen stations and EV chargers,
- Credit could not be generated by forklifts,
- Alternative jet fuel could not participate as an opt-in credit generator,

⁵ Confirmed by email with CARB staff.

⁶ When contacted by stakeholders to provide more comprehensive data, assumptions, and calculations that were relied upon in making the determination that the Proposed Amendments scenario is superior to each of the Alternative scenarios, staff refused to provide the information, requiring at least one stakeholder to submit a Public Record Act request. Unfortunately, this information will not be available in time to inform comments during the 45-day period.

- Average Midwest corn ethanol did not generate credits but rather generated deficits in year one of the regulation, and
- Soy biodiesel and renewable diesel were only marginally better than fossil diesel and included a very large land use change penalty that more accurately reflected the likelihood that using soy oil to produce fuel indirectly contributes to tropical deforestation.

The original LCFS was designed to radically transform California's transportation sector by helping fund the transition from internal combustion to zero emission vehicles and accelerate the commercialization of advanced renewable biofuels, primarily produced from waste cellulosic feedstock. Over the next 10 years this vision slowly changed and the LCFS was revised to provide additional and unnecessary support to landfills and first generation crop-based biofuels, to mitigate the methane problem created by the dairy industry itself, to provide support for big oil to reduce emissions from their own facilities and more easily comply with their Cap-and-Trade obligations, and to provide support for direct air capture, a technology that has no direct relationship to transportation fuels. Many of us have witnessed this transition from an innovative regulation into a swag bag for venture capitalists, big oil, big agriculture, and big gas, increasingly coming at the expense of low- and moderate-income Californians. The LCFS is an extremely complicated program, which provides powerful special interest groups with a distinct advantage, as they can afford to pay for lawyers, lobbyists, former CARB staff, and research designed to promote their self-interests. Unfortunately, the same cannot be said for the lower-income consumer of gasoline. Powerful special interest groups will argue that changes to the regulation were objective, data driven, and made to reflect evolving science. I disagree. I believe many were subjective policy and modeling decisions, made not with the best interest of the California consumer and California's long-term transportation goals in mind, but rather with the intent to placate these powerful special interests and to achieve policy outcomes outside of transportation decarbonization. At this point, the LCFS gravy train has gained so much momentum that the only recourse from the staff's perspective is to quickly ramp up the targets, risking large costs to low-income gasoline consumers and public backlash. However, there is another option. Restoring many aspects of the original regulation would better focus the program on achieving California's long-term zero-emission transportation goals and at a much lower cost to the California consumer.

Do not ignore the problem of pass-through cost to gasoline consumers. In both 2015 when CARB readopted the regulation and in 2018 when the targets were extended to 2030, staff estimated the maximum pass-through cost of the amendments to consumers of gasoline and transparently conveyed this information to the public. For the current rulemaking, CARB staff provided similar calculations and rationale in the [SRIA](#).⁷ The estimation of pass-through cost uses the target CI reduction (converted to deficits generated per gallon of gasoline) multiplied by the estimated future market price for credits.⁸ A basic rule of thumb says that a 1 percent reduction in carbon intensity at \$100 credit price adds slightly more than 1 cent to the cost of gasoline. So, in late 2023

⁷ See pages 55-59

⁸ See the discussion and calculation for pass-through cost on pages 48-50 of the 2018 [SRIA](#).

with a target CI reduction of 11.25 percent and a credit price of \$75, the pass-through was a modest 9 to 10 cents per gallon. Table 1 below shows future estimates of the pass-through cost under the amended regulation at a range of reasonable credit prices. These costs are in addition to the pass-through cost for the Cap-and-Trade program which could exceed \$1 per gallon in 2030 and reach \$1.50 per gallon in 2035.⁹ **To put the pass-through cost in perspective, at a \$200 credit price, the LCFS could cost gasoline car drivers approximately \$250 a year in 2025, rising to whopping \$1150 a year by 2045.**¹⁰

Table 1: Estimated LCFS Pass-Through Cost to Gasoline (\$ per gallon)

Year	Percent CI Reduction	\$150 Credit Price	\$200 Credit Price	Credit Price at Ceiling ¹¹
2025	18.75	\$0.30	\$0.41	\$0.54
2030	30	\$0.49	\$0.65	\$0.95
2035	52.5	\$0.85	\$1.13	\$1.84
2040	75	\$1.22	\$1.62	\$2.90
2045	90	\$1.46	\$1.94	\$3.84

However, in the current staff report, staff disavowed this calculation of pass-through cost and focused instead on total fuel costs to all California consumers.¹² CARB staff wrote “retail fossil fuel prices are strongly influenced by many factors beyond LCFS credit prices (e.g., global events, holiday weekends, seasonal fluctuations, refinery disruptions and decisions about production that affect supply, refinery pricing decisions, seasonal fuel blends, taxes) and fossil fuel producer pricing strategies are complex and reflect local and regional market conditions...Predicting how LCFS credit price changes impact these complex pricing strategies and the per gallon gasoline and diesel prices paid at the pump in the future by consumers is beyond the scope of this work.”

I reached out to Danny Cullenward, Senior Fellow with the Kleinman Center for Energy Policy and Vice Chair of California’s Independent Emissions Market Advisory Committee, to get his take on the change in CARB’s approach. Here is an excerpt from his response: “With respect to how much of the cost impact is passed through to consumers, I appreciate that it is difficult to assess this kind of question empirically, but I’ve also been skeptical of views that claim a substantial portion is paid for by the refiners. I don’t see the reasoning for why refiners would choose to pay much or any of the total cost, especially not when operating in islanded market (for CARBOB) that is designed, in part through the free allocations to in-state producers in the cap-and-trade program, to be relatively hostile to refined product imports. I’d also flag that arguments that refiners may be exercising market power — e.g. the “mystery gasoline surcharge” identified by Severin Borenstein, and the broader concerns around “price gouging” issues that led to the new oversight function at the CEC — would suggest conditions under which refiners would pass 100% of the costs through. Point is, the market

⁹ See Cap and Trade workshop: slide 34 of [November 16, 2023 workshop presentation](#)

¹⁰ Estimates assume 15,000 miles annual driving in a vehicle getting 25 miles per gallon.

¹¹ The credit price at the price ceiling was estimated assuming inflation of 3% in 2023 and 2% for all future years.

¹² See middle of page 82 to top of page 84 of the [ISOR](#)

structure for CARBOB in particular would suggest more market power for refiners, rather than less, and that implies most or all of the costs getting passed through.”

[Data](#) reported by refiners to the [California Energy Commission under SB 1322](#) further supports the likelihood that the full cost of the LCFS (and Cap-and-Trade) is being passed on to consumers. As indicated in this data, California refiners reported an LCFS cost of 9 to 10 cents per gallon of gasoline in late 2023, the same as the maximum pass-through cost calculated above.

In the staff report, CARB also wrote “the program has a price ceiling to ensure credit prices do not go unchecked. This further ensures that the cost pass-through is managed and unnecessary costs of the program are not passed on to consumers.” Table 1 above shows estimated pass-through costs at the price ceiling. I’ll leave it up to the Board to decide if the price ceiling provides appropriate management of costs.

CARB’s about-face and focus in the ISOR on total fuel costs to all California consumers instead of pass-through costs is a diversion and reminds me of an old joke:

Question: Why did CARB paint the elephant’s toenails red?

Answer: So they could hide the elephant in a cherry tree!

The calculation of total fuel cost to all California consumers results in an average cost per mile travelled that encompasses both the higher cost to gasoline consumers and the lower cost to ZEV owners. Focusing on this metric rather than the pass-through cost to gasoline completely misses the point for two reasons. First, the total fuel costs to all California consumers does not isolate the effects of the LCFS, but rather encompasses the effects of all transportation policies in California including the ACC and ACT regulations, which are the most important policies driving the adoption of EVs. Second, because EVs are disproportionately being purchased by wealthier individuals, consumers of gasoline will increasingly become, on average, lower and lower income. Through higher prices of gasoline at the pump, gasoline consumers pay the cost of subsidizing the alternative fuels and projects that receive LCFS credit, and over time, this cost per gallon of gasoline is expected to grow substantially. It is important to understand and acknowledge this regressive nature of the LCFS. **CARB should not be avoiding the discussion of pass-through costs, but rather should be considering all possible means to minimize the pass-through cost while preserving those credit generating opportunities that achieve real, additional emission reductions and/or accelerate the transition to zero emission transportation in California.** In voting on these amendments, you as Board Members are deciding how much you believe future California gasoline consumers should be paying for subsidies to combustion biofuels that exacerbate global hunger and may not reduce GHG emissions at all, for subsidizing dairies to mitigate their own pollution, for subsidizing out-of-state landfill and dairy gas projects, for helping oil companies reduce their Cap-and-Trade obligation through implementing non-innovative emission reduction projects, and for subsidizing out-of-state direct air capture projects which don’t help California achieve AB32 GHG reduction goals. As an example, if you approve the amendments as written and credit

prices increase to \$200¹³, lipid-based biofuels will generate approximately \$3 billion of LCFS subsidy in 2025 and out-of-state landfills and dairy digesters will likely generate about \$1 billion. Are the benefits of renewable diesel and biodiesel worth this cost to California gasoline consumers? Should California gasoline consumers continue to foot the bill for out-of-state RNG projects to the tune of a billion dollars per year? Could we better use \$4 billion each year on projects that help achieve California's long-term zero-emission transportation goals? Balancing the cost of the LCFS against the desire to achieve emission reductions and placate powerful special interests presents many difficult choices, which do not go away by trying to hide the elephant.

Fortunately, there are many actions that CARB can take to reduce the pass-through cost to consumers of gasoline. These actions involve limiting credit generation that does not advance California's long-term zero-emission transportation goals, eliminating excessive credit generation, eliminating LCFS subsidies that do not result in additional global GHG emission reductions beyond what would already occur through other State and Federal programs, and minimizing the potential for credit price spikes. Cutting out unnecessary and ineffective credit generation will allow for less stringent targets and lower pass-through costs, without sacrificing real, additional GHG reductions achieved by the program. In addition to a cap on crop-based biofuels and resetting the price cap, I outline several recommended actions in the discussion below.

Eliminate double counting of emission reductions from direct air capture (DAC):

In several provisions of the LCFS regulation amendments (e.g., book-and-claim electricity, book-and-claim RNG, book-and-claim hydrogen, renewable or low-CI process energy), the regulation text prohibits generating LCFS credits if the RECs or environmental attributes are "being claimed in any other voluntary or mandatory program with the exception of (insert list of programs where stacking is allowed)". However, such language is conspicuously absent from section 95490 for DAC or other CCS projects. It is public knowledge that Oxy 1PointFive is already preselling future emission reductions in the voluntary carbon market for its first DAC project and intends to bundle DAC emission reductions with crude oil being marketed as "carbon neutral crude" or "net zero oil". See:

- [1PointFive announces agreement with Airbus for purchase of 400,000 tonnes of carbon removal credits](#)
- [Amazon makes first investment in direct air capture climate technology | Reuters](#)
- [Oxy teams with Macquarie to deliver the world's first carbon-neutral oil from Permian basin to India](#)

While I agree that the LCFS value for CCS and DAC should stack with Federal 45Q tax credit, generating LCFS credit for emission reductions that are also sold to other entities in the voluntary carbon market and/or bundled with crude as "net zero oil" is a clear instance of double or maybe even triple counting of emission reductions. If your

¹³ After the previous rulemaking to adjust targets in 2018, credit prices quickly increased to \$200 and remained at this level for nearly two years. See [figure 4 of the LCFS Dashboard](#).

intention is to allow double or triple accounting, then that should be transparently stated and discussed in a public forum.

Remove Enhanced Oil Recovery (EOR) as an Eligible Sequestration Method: California SB 1314 prohibits the use of EOR as a sequestration method for CCS projects in California. Section 1 of SB 1314 reads “The Legislature finds and declares that the purpose of carbon capture technologies, and carbon capture and sequestration is to facilitate the transition to a carbon-neutral society and not to facilitate continued dependence upon fossil fuel production.” CO₂ EOR is a tertiary oil production method that is only used when oil field production has declined to the point that it is no longer profitable to continue producing using secondary production methods such as waterflood. As such, use of EOR results in the recovery of oil that otherwise would not be produced. The LCFS program should not be providing incentive to squeeze additional oil from these fields. Let's leave this oil in the ground! Out of consistency with California requirements, I strongly encourage the Board to remove EOR as an eligible sequestration method under the LCFS. This can be done by setting a grandfather date (e.g., 2028) after which projects using EOR cannot be certified.

Place a cap on out-of-state DAC projects: Based on press releases, DAC projects are expected to be massive, resulting in credit generation of up to one million MT annually for each project. At a credit value of \$200, a single out-of-state project may result in approximately \$200 million leaving the California economy annually, while providing no jobs for Californians, displacing no fossil fuels in California, resulting in no air pollution benefits to California communities, and not even counting toward California's AB32 emission reduction goals. Therefore, not only will Californians be paying for a large out-of-state project that provides no immediate benefit to the state, but they will also have to pay again for separate emission reductions that do count toward the State's goals. In effect, these DAC projects would act as “LCFS offsets”, allowing oil companies to comply with the LCFS without affecting their fossil fuel sales. Credit generation for out-of-state DAC projects should either be quickly phased out through a grandfather date or tightly capped as is done in the Cap-and-Trade program for offsets. If left uncapped, a proliferation of DAC projects¹⁴ could result in repeated triggering of the Auto-Acceleration Mechanism leading quickly to excessive pass-through costs to California consumers.

Stop receiving new petroleum project applications in 2025 and phase out crediting by 2030: The innovative crude and refinery investment projects that have been approved to date are certainly not innovative and are excessively subsidized. These projects should not be credited through the LCFS. All projects certified under the innovative crude provision are for solar electricity, which is cost effective without LCFS credit value. Likewise, the refinery investment credit project certified for the Chevron refinery in Richmond is providing approximately 60,000 credits annually for a hydrogen plant upgrade that Chevron was planning to do before the LCFS was even adopted.¹⁵ These

¹⁴ Oxy 1PointFive has announced a [goal of completing 70 DAC projects by 2035](#).

¹⁵ See <https://ccpulse.org/2014/07/31/richmond-approves-stalled-modernization-plan-at-chevron-refinery-2/>

are certainly not additional emission reductions. In effect, the LCFS is subsidizing oil companies to meet their Cap-and-Trade obligation.

Stop overcompensating dairy digester projects: It is my understanding that capital financing for dairy digester projects is commonly paid off in ten years, after which only maintenance and operating costs remain. While dairy digester operators may reasonably argue that they need full avoided methane credit for the first ten years while paying of capital costs, having full avoided methane credit for the next twenty years is gross overcompensation. **Moreover, after paying off capital costs for the digester, it is no longer appropriate to assume a baseline of methane emissions to the atmosphere.** With avoided methane crediting, a dairy digester project generates approximately \$70 to \$125 per MMBtu in total value from the LCFS, RFS, and gas sales.¹⁶ The operating and maintenance costs for a digester project are about \$25 per MMBtu (\$35 per MMBtu if trucking of the gas is required).¹⁷ In other words, digester projects getting avoided methane credit are generating about 100 to 400 percent annual profit after paying off the digester. To avoid this needless overcompensation, I recommend assigning a fixed CI value of zero g/MJ for the remaining 20 years of LCFS crediting.¹⁸ At a CI value of 0 g/MJ, the dairy digester project would generate a combined value of approximately \$40 to \$60 per MMBtu, which is much more in line with the operating and maintenance costs.

Do not allow dairy projects to get more credit for increasing the herd size: Avoided methane credit should be capped based on the historic herd size before LCFS certification. This would prevent dairy projects from receiving additional credit for growing the herd size and exacerbating local air quality problems.

Apply biomethane deliverability requirements for all biomethane pathways: In a last-minute revision, staff decided to grandfather all RNG projects that break ground prior to 2030 from proposed deliverability requirements, and projects breaking ground in 2030 or later will only be affected by deliverability requirements starting in 2040. I recommend the Board direct staff to revert to the original concept discussed in workshops and apply deliverability requirements for all pathways starting in 2028. As an exception, I recommend that dairy digester projects that break ground prior to 2025 be allowed to complete their first 10-year crediting period under current deliverability requirements. These dates will provide sufficient time for out-of-state RNG projects that do not meet the deliverability requirements to contract with fleets outside of California and continue receiving value from the RFS. This timing will also allow these digester operators sufficient time to work with their own state legislatures to provide additional funding if necessary to avoid potential stranded assets. Gasoline consumers in

¹⁶ At an LCFS credit price of \$100 to \$200, dairy digester gas generates approximately \$40 to \$80/MMBtu in value from the LCFS, \$26 to \$40/MMBtu in value from the federal Renewable Fuel Standard, and about \$5/MMBtu for the gas for a total value of approximately \$70 to \$125/MMBtu.

¹⁷ See calculation details at <https://asmith.ucdavis.edu/news/digester-update>

¹⁸ This recommendation should be made together with a phase out of book-and-claim accounting for landfill gas.

California have jump started the dairy digester industry in these states, they shouldn't be asked to fund these projects in perpetuity.

Quickly phase-out book-and-claim accounting for landfill gas: Landfills do not need LCFS credit as the RFS incentive for these projects is already excessive. Moreover, over 98 percent of the landfill gas generating credit under the LCFS is from out-of-state sources. Producing landfill gas for transportation is estimated to cost approximately \$10 per MMBtu¹⁹ but these projects currently receive about \$40 per MMBtu in incentive from the RFS. In other words, the LCFS providing incentive for these projects does not result in additional global GHG reductions, only more profits. I recommend eliminating book-and-claim accounting for landfills in 2028, which will provide sufficient time for out-of-state landfill gas operators to find a different purchaser for their gas.

Phase out crediting for light-duty and heavy-duty forklifts: Staff took a step in this direction by reducing the EER for light-duty forklifts but should go a step further and set phase out dates of 2030 for light-duty forklifts and 2040 for heavy-duty forklifts. With limited exceptions, all forklifts will be required to be zero-emission by 2040.²⁰

Return to the Board if the Auto-Acceleration Mechanism (AAM) is triggered repeatedly: The AAM is designed to automatically increase the stringency of the program if there is a chronic excess of credit leading to a buildup of the credit bank and reduction of credit prices. In discussing the rationale for the AAM, CARB wrote "The existence of an AAM is expected to decrease market volatility and increase market confidence, which will promote low-carbon technology investments." However, in the staff report, CARB staff made no effort to assess the impact of this mechanism on the credit price or even qualitatively discuss the implications as part of the scenario analysis. For example, in the Proposed Amendments scenario, CARB staff estimate average credit prices ranging from \$76 to the price cap, but they do not discuss whether this large volatility in the market is reasonable given the addition of the auto-acceleration mechanism to the proposal. Will the AAM effectively set a credit price floor that is well above \$76? Will unexpected credit generation result in multiple triggers of the AAM and unexpectedly high pass-through costs? Because of the uncertainty surrounding the impact of the AAM on credit price and pass-through cost, I recommend requiring that a rulemaking be initiated if the AAM is triggered twice in any six-year period. Moreover, this rulemaking should be completed before a third acceleration is allowed. Repeated triggering of the AAM indicates market conditions that staff and the Board did not anticipate when approving these amendments. Staff should be required to investigate and return to the Board with amendments to establish new compliance targets and address the cause(s) of the market imbalance, if necessary.

Address the potential for the AAM to overcorrect the market: I suggest not allowing an acceleration to occur in either 2031 or 2032 as the rate of CI decline for the benchmarks

¹⁹ See <https://www.erm.com/globalassets/documents/mjba-archive/issue-briefs/rngeconomics07152019.pdf>

²⁰ See [workshop materials](#) for the forthcoming Zero-Emission Forklifts Regulation.

is already doubling and an acceleration that occurs in either of these years would quadruple the rate of target CI decline. Here are the scenarios of concern:²¹

- The AAM is triggered in May of 2030. This trigger has occurred because the market is generating too many credits based on an annual benchmark decline through 2030 of 2.25 percent. In 2031, the rate of benchmark decline is already scheduled to double to 4.5 percent. An acceleration in 2031 would quadruple the rate of benchmark decline to 9 percent.
- The AAM is triggered in May of 2031. Again, this trigger has occurred because the market is generating too many credits based on an annual benchmark decline through 2030 of 2.25 percent. In 2031, the benchmark has already declined by 4.5 percent, which may itself correct the market. However, in 2032, an acceleration will occur increasing the target CI reduction another 9 percent.

Either of these scenarios may result in an overcorrection with the credit price going to the ceiling, at which it may be stuck for many years. Under the above scenarios, credit price at the ceiling will result in a pass-through cost of approximately \$1.30 per gallon of gasoline. Such a pass-through cost would be politically untenable for the program.

Withhold LCFS credits for violating other State and Federal requirements: Apparently, CARB has not been too serious about holding credit generators responsible for complying with other State and Federal requirements, as there do not appear to be any enforcement actions taken against entities for non-LCFS violations.²² If the Board is truly intent on requiring regulated parties to comply with these requirements as a condition for generating LCFS credits, then I recommend that the Board direct staff to make the following amendments:

- Clearly define what types of State and Federal requirements (e.g., environmental, safety, labor, tax) are of concern and the repercussions for violating these requirements.
- Require regulated parties to report all violations and require third-party verification bodies to verify compliance with this reporting requirement.
- Investigate regulated parties with violations and withhold credits from entities with serious and/or repeated notices of violation.

If you have read this far, I do thank you for engaging with me 😊 .

Best regards,
Jim Duffy

²¹ I wrote these scenarios assuming that the AAM has not already been triggered prior to 2030. If the AAM has previously been triggered, then the years of concern will advance by one year. In other words, I suggest not allowing an acceleration to occur in either of the two years following the transition from a 2.25% rate of decline to a 4.5% rate of decline.

²² See [LCFS Enforcement](#) webpage for a listing and description of settlements and account balance adjustments since the inception of the program.

Attachment A: Cap on Crop-based Biofuels

I most strongly urge the Board to **cap and ultimately phase out the use of crop-based diesel and aviation fuel in California**. The use of crops such as corn and soy as feedstock to produce liquid diesel and aviation fuel is not a sustainable means of reducing GHG emissions and may increase emissions as compared to fossil fuels. Moreover, using crops to produce biofuels is expensive and exacerbates tropical deforestation and global hunger. CARB's promotion of these fuels is not in line with its reputation as a global leader in environmental policy.

If the rest of the world follows California's example, the demand for virgin vegetable oil will be enormous: Just last year CARB issued a news release celebrating the accomplishment that the LCFS has resulted in renewable diesel and biodiesel replacing 50% of diesel. CARB often prides itself on providing an example for the world to follow. **So, what would happen if the rest of the world follows California's lead and replaces over 50% of its diesel fuel with renewable diesel and biodiesel?** Currently, the world annually produces 200 million metric tons of vegetable oil, a majority from the tropical countries of Indonesia, Malaysia, and Brazil. Replacing 50% of diesel worldwide would require an additional 600 million metric tons, necessitating a fourfold increase in worldwide production of vegetable oil. It doesn't take a scientist to know that the impact of such an increase in vegetable oil production on agricultural commodity prices, global hunger, tropical deforestation, and biodiversity would be enormous, especially in a world that is expected to add another 2 billion people by 2050. **Which leads me to ask: Are you really being a leader if the world would be much better off not following?**

Crop-based biofuels are not sustainable: Many studies, including work performed by CARB²³, show that full life cycle emissions, including emissions from increased fertilizer application and land use change (LUC), are significant, highly uncertain, and appreciably or entirely negate the carbon benefit of using biogenic feedstock. In fact, a recent assessment of GHG emissions resulting from corn ethanol production in the U.S. found that total life cycle emissions for corn ethanol exceed those of gasoline.²⁴ And a recent Model Comparison Exercise conducted by the US Environmental Protection Agency highlights the deep uncertainty underlying the modeled climate benefits attributed to soybean oil-based biofuels.²⁵ Another recent research study published in Nature Sustainability shows that the pace of tropical deforestation has more than doubled over the first two decades of this century, the same time period over which biofuel production has significantly increased in response to state and federal policies.²⁶ This study also shows that most (82%) of the forest carbon loss is at some stages associated with large scale commodity or small-scale agricultural activities, particularly in Africa and Southeast Asia.

²³ See 2015 LCFS Rulemaking document at [Microsoft Word - APPENDIX I-iLUC FINAL ks.docx \(ca.gov\)](#)

²⁴ Lark et al., Environmental outcomes of the US Renewable Fuel Standard, PNAS 2022 Vol. 119 No. 9.

²⁵ See <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P1017P9B.pdf>

²⁶ Feng, et al., Doubling of annual forest carbon loss over the tropics during the early twenty-first century, Nature Sustainability, 5, pages444–451 (2022)

Producing crop-based biofuels increases food prices and exacerbates global hunger: As indicated by the research quoted above and multiple other research studies^{27,28}, diverting crops from human and animal feed markets to produce biofuels results in an increase in agricultural commodity prices as compared to the counterfactual without biofuel production. This increase in food prices results in increased hunger, especially amongst the most vulnerable populations of the world. According to Tom Hertel, professor at Purdue University and author of several studies on LUC impacts of biofuels (including original modeling work performed for CARB's LCFS), **“reduced food consumption is an important market-mediated response to increased biofuels production. While lower food consumption may not translate directly into nutritional deficits among wealthy households, any decline in consumption will have a severe impact on households that are already malnourished”**.²⁹ The biofuel industry wrongly claims that the LUC CI penalty for crop-based biofuels negates any food price increases and food consumption impacts and therefore CARB does not need to impose any additional limits on biofuel consumption beyond the current LUC CI penalty. However, according to Hertel et al., if food consumption were held constant in the CARB LUC model (instead of allowing food consumption to decrease as is done in the actual LCFS modeling), twice as much forest conversion to agriculture would be predicted and the LUC CI penalty would increase by 40%. **In essence, a portion of the emission reductions attributable to crop-based biofuels under the LCFS is the result of the most food insecure populations in the world eating less.**

Crop-based renewable diesel, biodiesel, and aviation fuel is an extremely expensive means of reducing GHG emissions: Renewable diesel, biodiesel, and aviation fuel receives monetary incentives from the federal RFS, the federal Biodiesel Blenders Tax Credit, and the California LCFS. These incentives stack and adding the incentive values of these three programs resulted in a total societal cost in 2023 of nearly \$4 per gallon and a GHG cost effectiveness (or ineffectiveness) of more than \$600 per metric ton of GHG emission reduction, a value that greatly exceeds any reasonable estimate of the social cost of carbon.³⁰ Considering that emission reductions from crop-based biofuels are highly uncertain, one can only conclude that policies incentivizing these biofuels are a costly and risky means of spending limited consumer dollars on climate change mitigation. Moreover, because of the RFS volume mandate, renewable diesel and biodiesel would have been produced and consumed in the U.S. without the LCFS incentive. Stacking the smaller LCFS incentive on top of the larger federal incentives merely results in the shuffling of the lowest CI renewable diesel, biodiesel and ethanol to California. **Essentially, California consumers are paying a significant cost to support combustion fuels that achieve very little real global GHG reduction,**

²⁷ See [Economics of Biofuels | US EPA](#)

²⁸ See [The impact of the U.S. Renewable Fuel Standard on food and feed prices \(theicct.org\)](#)

²⁹ Hertel et al., Effects of US Maize Ethanol on Global Land Use and Greenhouse Gas Emissions: Estimating Market-mediated Responses, Bioscience, Vol. 60 No. 3, 2010.

³⁰ Cost effectiveness estimated by dividing the total incentive value by the estimated GHG emission reduction for soy renewable diesel under the LCFS.

money that would be much better spent helping California transition to zero emission transportation.

In conclusion, emissions associated with producing crop-based biofuels are highly uncertain and may, in fact, be greater than fossil fuels on a full life cycle basis. Moreover, these fuels are very expensive and exacerbate tropical deforestation and global hunger. Because of these issues, the European Union has taken steps to restrict the use of biofuels produced from food and feed crops, and mainstream environmental organizations such as International Council on Clean Transportation, Natural Resources Defense Council, Union of Concerned Scientists and Earthjustice, as well as UC Davis Institute for Transportation Studies are urging CARB to limit the use of vegetable oil-based biofuels under the LCFS.^{31,32} **Promoting the use of these fuels is not in line with California's role as a global leader in environmental policy, and I highly encourage the Board to direct staff to cap and ultimately phase-out the use of crop-based biofuels in California.**

Postscript: In lieu of a cap on crop-based biofuels, CARB could acknowledge that the RFS and Biodiesel Blenders Tax Credit are responsible for setting the total volumes of ethanol and biomass-based diesel consumed in the US, and only award LCFS credit for achieving reductions in excess of RFS requirements. For example, the RFS requires a CI reduction of 50 percent for biomass-based diesel to qualify for RINS. The LCFS could have a separate benchmark table for biomass-based diesel that starts at a 2010 baseline CI of 54.88 g/MJ (i.e., a 50 percent reduction) and declines to a 2045 CI target of 5.29 g/MJ (i.e., a 90 percent reduction from the 2010 baseline CI). Likewise, the RFS requires a CI reduction of 20 percent for ethanol to qualify for RINS. The LCFS could have a separate benchmark table for ethanol that starts at a 2010 baseline CI of 79.32 g/MJ (i.e., a 20 percent reduction) and declines to a 2045 target CI of 7.93 g/MJ. The major advantage of this approach as compared to a volume cap is that it doesn't create two separate markets for credits and can be seamlessly incorporated into the LRT-CBTS without major modifications to the software.

³¹ See comment letters from [ICCT](#), [NRDC](#), [UCS](#), and [Earthjustice](#).

³² See ITS Research Report "Driving California's Transportation Emissions to Zero", [Carbon Neutrality Study 1: Driving California's Transportation Emissions to Zero – University of California Institute of Transportation Studies \(ucits.org\)](#), pages 392-396.

Attachment B: Comments on the Draft Environmental Impact Analysis

Throughout the Draft EIA, CARB frequently makes the determination that the impacts associated with expected compliance responses are Potentially Significant and Unavoidable. Based on this determination, CARB staff will request that the Board issue a Statement of Overriding Considerations. CEQA places the burden on the approving agency to affirmatively show that it has considered feasible mitigation and alternatives that can lessen or avoid identified impacts through a statement of findings for each identified significant impact. I do not believe that CARB has adequately demonstrated that they have considered feasible mitigation and alternatives that could lessen or avoid several potential impacts on air quality and agricultural and forest resources. For example:

- Trucking of biofuel feedstock and finished product, trucking of manure or food and green waste to a centralized digester, trucking of biomethane from digesters to the pipeline injection point, trucking of hydrogen from production facilities to dispensing stations, and trucking of carbon dioxide from the capture facility to the sequestration point are all reasonably foreseeable compliance responses resulting in local air quality impacts. As an example, the conversion of the Paramount refinery to renewable diesel production by World Energy results, by their own calculations, in an estimated 125 tpy increase of NOx emissions for transport of feedstock and finished product.³³ These emissions could be mitigated by requiring these LCFS participants to use zero emission trucks as a condition for generating credit.
- Converting biogas to electricity using internal combustion generators is a reasonably foreseeable compliance response resulting in local air quality impacts that could be avoided by requiring LCFS participants to use non-combustion alternatives such as fuel cell generators as a condition for generating credit. In fact, CARB staff in the air quality calculations assumed that dairy electricity projects would use fuel cells even though the regulation does not require it. I suggest making it official.
- Continued siting of new fuel production facilities in overburdened communities is a reasonably foreseeable compliance response which exacerbates entrenched air quality problems that could be avoided by requiring LCFS participants to site all new production facilities in locations receiving a CalEnviroScreen score of “X” or lower as a condition for generating credit.
- Continued methane leaks from dairy digester projects are reasonably foreseeable and could be avoided by requiring LCFS participants to employ periodic leak detection and repair at digester facilities and transport equipment.
- Increasing dairy herd size to generate additional LCFS credit is a reasonably foreseeable compliance response resulting in local air quality impacts that could be mitigated by capping avoided methane credit based on the historic herd size before initial LCFS certification.

³³ See page 2-41 of the AltAir EIR

<https://www.paramountcity.com/home/showpublisheddocument/8001/637811424787470000>

- Increased biofuel feedstock production is a reasonably foreseeable compliance response resulting in land use change and global hunger impacts that are not being mitigated or avoided by the existing land use change CI penalty. Future impacts could be avoided by placing a cap on use of crop-based feedstocks to produce biofuels.

The Board should require staff to take a step back and think creatively when determining which potentially significant impacts can be mitigated or avoided rather than simply claiming that all impacts are unavoidable.

Moreover, there are several faulty assumptions in CARB's analysis that result in the overestimation or inaccurate portrayal of GHG and air quality benefits of the Proposed Amendments. These faulty assumptions also lead to the incorrect conclusion that the Proposed Amendments scenario is more cost effective and provides more air quality benefits than Alternative 1. These faulty assumptions include:

- CARB staff are not using the latest data on tailpipe PM emissions from vehicles consuming renewable diesel. The ISOR and Draft EIA attribute health benefits to increased use of renewable diesel in California, especially associated with reduced PM2.5. This is based on a 2011 analysis, and ignores a more recent [2021 study prepared for CARB that looks at the NOx and PM from Biodiesel and Renewable Diesel Emissions in Legacy and New Technology Diesel Engines](#). The key finding in this more recent study is that air quality benefits from older engines are not observed in new technology diesel engines, which are now required in California for the on-road fleets. This undercuts one of the main justifications offered to reject limits on renewable diesel and results in an inaccurate portrayal of the criteria pollutant emission benefits of the proposed amendments in the Draft EIA. Ironically, because renewable diesel does offer PM reductions in older trucks that are still in use elsewhere in the US, concentrating most of US renewable diesel in California does not help Californians but it does harm others across the United States, many of whom reside in overburdened communities. A large percentage of renewable diesel currently consumed in California originates from a region of Louisiana known as Cancer Alley. Residents of Cancer Alley suffer from the additional pollution emitted by newly constructed or expanded renewable diesel refineries but do not benefit from the reduced tailpipe emissions that would occur if the renewable diesel were consumed locally instead of being shipped to California.
- CARB incorrectly attributes 100 percent of the GHG emission reductions associated with consuming biofuels to the LCFS. Setting aside the argument that the CI values CARB calculates for crop-based biofuels are highly uncertain and likely significantly underestimated, CARB staff have changed the assumptions they use in attributing GHG emission reductions to the LCFS for biofuel. In the rulemaking for the 2018 amendments ([see Attachment F page F-14](#)), staff acknowledged that the federal Renewable Fuel Standard (RFS) and Biodiesel Blenders Tax Credit are primarily responsible for driving the production of

biofuels. Through its design, the RFS essentially creates a volume mandate for biofuels, and therefore the total volume produced in the United States is effectively fixed by the RFS. In other words, if the LCFS ended today, the same amount of biofuel would be produced in the US. Because of this, the LCFS subsidy does not result in more production of biofuel beyond that incentivized by the RFS and blenders tax credit, but rather provides incentive to incrementally reduce the CI and shuffle the lowest CI production to California. Under the RFS, corn ethanol is required to achieve a 20 percent CI reduction and biomass-based diesel is required to achieve a 50 percent CI reduction to qualify for the subsidy. Therefore, in the 2018 LCFS rulemaking, staff gave credit to the federal programs for a CI reduction of 20 percent for corn ethanol and 50 percent for biomass-based diesel, and only gave credit to the LCFS for CI reduction in excess of these values. For example, under these more appropriate assumptions, the LCFS took some credit for lower CI of fuels made from used cooking oil and tallow which have CI reductions of about 60 to 80 percent but took no credit for emission reductions from fuels made from soy and canola oil which have CI reductions of about 50 percent. Conversely for the 2024 amendments, staff appears to be crediting the LCFS for the full CI reduction ([see page 38 of ISOR](#)), effectively ignoring the contribution of the federal programs. This change in assumption results in an overestimation of the GHG benefits of the Proposed Amendments scenario in the Draft EIA.

- CARB staff makes a flawed assumption that inflates the GHG and criteria pollutant benefits associated with displacing fossil diesel. In the GHG and air quality analysis presented by CARB, staff assume that a reduction in the consumption of fossil diesel in California will result in a proportional reduction in oil production in California. Staff then attribute the reduced criteria pollutant and GHG emissions associated with the oil production decline to the LCFS ([see page B-1](#) of the SRIA for equations). I see several issues with this logic.
 - First, CARB totally disregards the fact that crude production in California is in terminal decline and has been for the past 40 years ([see page 7](#)). CARB's calculations assume a static baseline at 2019 crude production levels, rather than a dynamic baseline that accounts for the long-term historical rate of decline in production. In other words, CARB assumes that crude production in California would remain constant at 2019 levels without CARB regulations, when it will likely decline to near zero by 2045 based exclusively on naturally declining production from quickly maturing oil fields. If we want to understand the benefits or costs of an action or regulation, it should be measured against counterfactual case where the action or regulation did not happen. In either world, California oil production is dropping.
 - Second, even if CARB properly assumes a declining baseline for the calculations, I don't see evidence for a relationship between California oil production and fossil fuel demand in California, especially given the fact that California crude makes up only 25 percent of oil supply to California

refineries. Changes to the “rate of oil production decline” in California are largely the result of global oil price, California wholesale NG price, and approval of new well drilling. In other words, California oil production declines more rapidly when global crude prices are low and NG prices are high, and oil production declines less rapidly when crude prices are high and NG prices are low.³⁴ Changes in California fossil fuel demand will not significantly affect this dynamic because these changes are too small to significantly affect global oil prices. California refineries will much more likely respond to reduced demand for fossil fuels by reducing crude imports first, as is clearly evident by dramatically reduced imports during the pandemic (see the LCFS Dashboard [Figure 8](#) which shows that imports of crude oil declined by nearly 100 million barrels between 2019 and 2020 while California production declined by only 6 million barrels). Moreover, if there were a link between California crude production and fossil fuel demand in California, one would expect to see California crude production increase after the pandemic in response to the rebound in gasoline and diesel consumption. Instead, California crude production continued its relatively steady annual decline and imported crude volume increased.

- Third, CARB is assuming that a reduction in fossil fuel demand will result in a proportional reduction in refining capacity in California. Although this is probably the strongest assumption CARB makes, it is in no way assured. California refiners may simply respond to reduced demand in California by exporting excess production, especially given the legal fights and costs associated with cleanup that will ensue after shutdown. In other words, will California refineries continue to operate and sell barely profitable fuels to satisfy increasing consumption in Asia or will they shut down and incur extremely expensive cleanup costs?
- CARB staff is significantly underestimating criteria pollutant emissions at renewable diesel, renewable gasoline, and sustainable aviation fuel production facilities. Staff assumes that these facilities have similar emissions to a simple oil refinery and estimate emission factors of 0.058 and 0.022 tons per million DGE for NOx and PM2.5 emissions respectively.³⁵ Environmental Impact Reports for the AltAir and Phillips 66 refinery conversions indicate emission factors of 3 to 4 times these values. For the AltAir facility, data indicates emission factors of 0.152 and 0.090 tons per million DGE for NOx and PM2.5 emissions respectively.³⁶

³⁴ California oil producers have been injecting steam to recover oil for over 50 years and the remaining oil is getting much harder to extract as indicated by the increasing amount of steam injected per barrel of oil produced. The rate of California oil production is largely dependent on the amount of steam that the oil field operators can afford to inject. During periods like 2011 – 2014 when global crude prices were high (above \$100 per barrel) and NG prices low, oil companies could afford to inject more steam and oil production remained nearly constant ([see figure 2 on page 8 and figure 6 on page 10](#)). When global crude prices dropped in 2015, California oil production resumed its decline.

³⁵ See page B-2 of <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/appc-1.pdf>

³⁶ See pages 2-37 through 2-46 for estimated project emissions for the AltAir facility <https://www.paramountcity.com/home/showpublisheddocument/8001/637811424787470000>

For the Phillips 66 facility, data indicates emission factors of 0.249 and 0.082 tons per million DGE for NOx and PM2.5 emissions respectively.³⁷

- CARB staff assume that all future dairy to electricity projects will use fuel cell electric generators even though there is no requirement that project operators use fuel cells rather than combustion generators.³⁸ This assumption results in extremely low NOx and PM2.5 emission factors for these projects and therefore underestimates potential emissions.
- As discussed previously, CARB appears to be allowing future CCS and DAC projects to receive LCFS credit for emission reductions that will also be sold to other entities in the voluntary carbon market and/or through the marketing of zero-emission crude oil. If this is the case, the GHG emission reductions claimed for the LCFS in the Draft EIA are significantly overestimated as the same emission reductions are also being sold to parties not participating in the LCFS.

The net result of all these assumptions is that CARB is significantly overestimating the criteria pollutant and GHG reduction benefits associated with biofuel production and consumption, dairy electricity projects, as well as CCS and DAC projects, which results in an inaccurate portrayal of the benefits of the amendments in the Draft EIA.

Finally, CARB did not update the CATS model, rerun the Proposed Amendments scenario, and update the economic and air quality analyses between the submission of the SRIA to DOF in September and release of the rulemaking package in January.³⁹ During this period, a few changes were made to the proposed amendments. The most significant of these changes were to grandfather all pre-2030 dairy and swine projects from the proposed phaseout of avoided methane and to grandfather all pre-2030 RNG projects from the proposed deliverability requirements. Therefore, the economic and air quality analyses presented in the ISOR and Draft EIA do not reflect the actual LCFS amendments proposal.

³⁷ See Stationary Source Table 1 on PDF page 119 for estimated project emissions for the P66 facility <https://www.contracosta.ca.gov/DocumentCenter/View/72908/Appendix-B--Air-Quality-and-GHG-Emissions-Technical-Data-PDF>

³⁸ See pages B-2 and B-3 at <https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2024/lcfs2024/appc-1.pdf>

³⁹ Confirmed by email with CARB staff on 1/26/2024.