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Regarding

Proposed Amendments to the California Low Carbon Fuel Standard Regulation

February 20, 2024

Introduction

We write to provide comments on the amendments to the California Low Carbon Fuel Standard (LCFS) regulation proposed by the California Air Resources Board (ARB) in its Initial Statement of Reasons[1] (ISOR). We are research scientists, research scholars, legal fellows, and doctoral students from Stanford University with special expertise in the development of climate and energy policy. Between us, we have more than 75 years of experience in the evaluation and development of energy and climate policy. Some of us have been active participants in ARB processes since the advent of the LCFS as an early action measure in the early days of AB32 implementation.

We write in our personal capacity. None of the views expressed below can or should be attributed in any way to the Climate and Energy Policy Program, the Woods Institute for the Environment, the Doerr School of Sustainability, or Stanford University.

While these comments provide some critiques and suggested changes to the proposed amendments to the LCFS and of the ISOR, we share what we believe to be ARB staffs' core objective of a safe, affordable, equitable, and most of all rapid transition to a zero emission California. We submit these comments as Californians who heartily endorse the ambition of that shared enterprise. We also commend and respect the tremendous time and effort, particularly with stakeholders, that ARB staff has made to generate the ISOR. We hope that our comments will be viewed as constructive and substantive, in alignment with our intent of assisting ARB in achieving that crucial mission.

[1] California Air Resources Board, Public Hearing to Consider the Proposed Amendments to the Low Carbon Fuel Standard, Staff Report: Initial Statement of Reasons, December 19, 2023. *Hereafter, "ISOR".*

Executive Summary

We actively participated in the hearing processes leading up to the release of the ISOR as well as in the Environmental Justice Advisory Committee (EJAC) discussions of the rule. Our work included conducting modeling using earlier versions of the ARB California Transportation Supply (CATS) model, used in the development of the proposed amendments evaluated in the ISOR. Our earlier comments and presentations led directly to improvements in the model to better reflect ongoing trends in the transportation sector as well as new regulations implemented by ARB since its last model update.

Our main comments are as follows, and are described in greater detail in subsequent sections:

(1) The rulemaking to date suffers from a lack of transparency because ARB staff has declined to release the CATS model input files upon which many of its conclusions are based. While ARB did release GREET modeling, which explains its views of life cycle accounting issues related to the rule amendments, the failure to release input and output files for CATS related to all alternatives considered for the ISOR fundamentally limits stakeholder opportunity to understand, let alone comment on, the proposals under consideration. **We ask that before ARB staff brings the proposal before the Board, that staff release these files and allow an additional round of public comment.**

(2) As recently stated by Jim Bushnell with respect to the ARB administered cap-and-trade program, the LCFS is entering its "teenage years."[2] This has several important implications – including a greater need to consider distributional impacts as the program matures, as well as the interaction between the cap-and-trade and LCFS programs and lastly, that combination's cumulative impacts. The ISOR does not evaluate this interaction, even though there is a parallel rulemaking in its early phases to significantly strengthen the cap-and-trade targets to 2030. **The impacts of these programs cannot be understood in isolation and ARB needs to evaluate them together to understand both environmental and socioeconomic impacts before the Board should consider votes on proposals to amend either program.**

(3) The transportation sector, in significant part due to ARB's own successful efforts over the past quarter century to facilitate entry of Zero Emission Vehicles (ZEVs) into the California vehicle fleet and to clean up diesel trucks, is in the middle of a rapid transformation. This rulemaking, relying on a relatively simple and deterministic model, proposes to create regulatory targets that will subsidize aspects of the transportation fuels sector, the refining sector, and the agricultural sector for the next 21 years. That process assumes greater certainty about the future than currently, exists, despite the rapidly and unpredictably evolving present context. It

[2] James Bushnell, California's Cap-and-Trade Market Enters its Teen-Age Years, Energy Institute Blog, Energy Institute at Haas, 2023, *at* https://energyathaas.wordpress.com/2023/11/27/californias-cap-and-trade-market-enters-its-teen-age-years/.

evaluates alternatives without any consideration of uncertainty even though ARB's other transportation policies are likely driving and will in the future continue to drive—along with technological innovation—transformative change. We believe that given rates of change in the sector, a more cautious and short-term policy is more prudent. **We recommend that ARB adopt a policy that sets incentives until 2035 and then reconsider the regulation in the early 2030s or thereabouts based on the facts at that point.**

(4) There are real questions about the greenhouse gas emissions reductions claimed in the ISOR. Notably:

(a) The interaction with the federal Renewable Fuels Standard (RFS) is critical to understanding the actual impacts (and induced leakage) from this rule, but ARB does not articulate a clear approach for considering them or do so in a transparent manner.

(b) The failure of the ISOR to cap lipid biofuels and its reliance on outdated indirect land use (ILUC) calculations raises real questions regarding the actual reductions achievable by the ISOR given unprecedented renewable diesel supply growth.

We recommend that ARB reevaluate GHG emission reductions and adopt a cap on lipid biofuels at a level that is consistent with the assumptions underlying its current ILUC estimate.

(5) Criteria pollutant emission reductions associated with the proposed amendments are likely overstated, both because (1) ARB relies on an incorrect assumption about the relationship between in-state oil production and in-state fossil diesel consumption and because (2) ARB relies on outdated assumptions about the California medium and heavy-duty fleets. Over the past fifteen years, ARB has moved aggressively to force diesel retrofits with strong emission controls as well as the advent of advanced technology diesel engines that incorporate stringent emission controls. ARB's own science shows that new and retrofit diesel engines fueled by RD and BD as opposed to fossil diesel do not have lower emissions. Yet the rule, relying on older science that focused on older un-retrofitted diesel engines, makes claims that the rule will provide significant criteria pollutant benefits. **ARB staff should correct these assumptions and then recalculate an estimate of the potential criteria pollutant benefits of the different alternatives it has considered.**

(6) Although ARB included a relatively robust distributional analysis in the SRIA, it was largely omitted from the ISOR. We believe that, particularly for the proposed amendments to the LCFS—that will increase the degree that gasoline prices are impacted by the LCFS, —a distributional analysis is essential to fully understanding the consequences of the rule for low and moderate-income Californians. The proposed LCFS amendments, through simultaneous increases in credit prices and elevated carbon intensity reductions for fuel suppliers, necessitate a detailed examination of their combined impact. **We recommend that ARB staff revise the ISOR to incorporate a thorough and robust analysis of the effects arising from deeper CI reductions, higher credit prices and the newly proposed Automatic Acceleration Mechanism before presentation to the Board.**

We recognize and appreciate the significant outreach and staff time that has gone into the development of the ISOR. Simultaneously, we believe that the concerns we describe above regarding the current proposal are serious enough to warrant substantial reconsideration of the proposal. A right-sized LCFS amendment is called for: one that reflects the role of the LCFS as an important tool to force innovation in the liquid fuels sector, but also reflects the ability – or lack thereof – to accurately predict the transportation sector's future. We urge staff to recall that the founding idea of the LCFS, as articulated by Alex Farrell of UC Berkeley, was that the program would be an important supplement to cap-and-trade because of the unique and additional barriers to innovation in the fuels sector. We also urge staff and the Board to allocate sufficient time for the consideration of potential impacts and interactions between the LCFS and cap-and-trade programs. Additionally, we recommend conducting a comprehensive analysis of the distributional impacts of both programs as they mature, are updated for scoping plan consistency, and as their ambition deepens over the next decade.

I. To Enable Fulsome Review of the Proposed Amendments, CARB Should Provide the Inputs to its CATS Modeling, Consider Extending the Comment Period, and Hold Additional Community Meetings.

We appreciate CARB's early disclosure of its CATS model for public evaluation of the LCFS. To realize the full benefit of public engagement associated with a public-facing CATS model, we encourage CARB to make the input and output files it relied on in analyzing alternatives for this proposed rule (CATS model data) publicly available. To do so would be particularly useful because much of CARB's analysis of the proposal's impacts in the ISOR relies on CATS model data.[3]

Publicly available CATS model data is essential for the public and commenting experts to fully assess the potential benefits and drawbacks of the preferred alternative and other alternatives. If the input files were publicly available, commenters could also evaluate how different alternatives might shift those benefits and drawbacks and make suggestions for how to optimize the program for public benefit, consistent with ARBs assumptions regarding the baseline evolution of the liquid fuels market in California.

While we recognize that the CATS modeling results do not fully determine the ARB staff proposal as described in the ISOR, they are utilized both to justify the preferred alternative and to rule out other alternatives. These inputs are therefore key to understanding CARB's rationale for its proposal. We emphasize that our earlier analysis of ARB staff CATS modeling led to improvements in the model that contribute to the ISOR.

[3] *See, e.g.,* SRIA at B-1 (table chronicling predicted percentage of future alternative fuels production, within which 3 rows cite CATS model outputs or results under "Notes"). *See also,* discussion of the EJ alternative in the ISOR.

Written communication with ARB staff[4] has indicated that they intend to release nothing more than the V0 sample input file published as a part of the public meeting to describe ARBs improvements to the CATS model (V0.2). The publicly-available CATS input file released on August 16th, 2023, is an example baseline that requires further modifications, such as current producers, market behavior and actual feedstock trends to resolve the model accurately. Without that information, stakeholders will not have a meaningful opportunity to comment on the proposed amendments to the LCFS or the discussion of alternatives in the ISOR.

If ARB were to release these files, all parties to the rulemaking would also require additional time to evaluate and provide comment on the CATS model data – both the input assumptions and the output files for different alternatives. We therefore recommend that ARB release the CATS model data as soon as possible and then provide additional time for parties to comment prior to moving forward with the proposals contained in the ISOR.

II. The LCFS amendment in the ISOR cannot be evaluated without considering its interaction with the Cap-and-Trade Program and likely amendments.

(a) The Waterbed effect needs to be considered.

Notably absent from the list of policies accounted for in the SRIA and ISOR baseline is the California cap-and-trade program. In principle, the California cap-and-trade program acts as a limit on total GHG emissions from regulated sectors in the state, including transportation. When the stringency of the LCFS is increased, any additional emissions reductions from the transportation create additional room under the emissions cap that may be filled by other sectors, if the emissions cap level is unchanged. In this way, increasing the stringency of the LCFS will further reduce emissions from transportation within California, but at the same time allow other sectors to emit more under the cap. The net will be unchanged emissions unless leakage occurs (see below).

Accordingly, a more stringent LCFS depresses cap-and-trade program allowance prices and allows emissions in other sectors to replace some of the reductions from the LCFS—reducing the effectiveness of the policy and altering the true emissions reductions it achieves. This has been referred to as the '*waterbed effect*'.[5] Additionally, depressing cap-and-trade program allowance prices contribute to reduced revenue from the cap-and-trade program available for funding California's climate programs through the Greenhouse Gas Reduction Fund. We recommend that ARB staff reevaluate the estimated GHG emission reductions of the proposed amendments to the LCFS, taking into account the interaction with cap-and-trade.

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[4] Email communication between Michael Wara and Matt Botill.

[5] Knut Einar Rosendahl, 2019. "**EU ETS and the waterbed effect**," Nature Climate Change, Nature, vol. 9(10), pages 734-735, October.

(b) Leakage caused by the interaction of LCFS and cap-and-trade could be significant.

Further, there is another issue that may cause the increased stringency of the amended LCFS program to contribute to a *net increase in emissions*. Because the cap-and-trade program does not evaluate all upstream emissions associated with biofuel production (such as agriculture emissions from feedstock production or biorefining outside of California), to the extent that the LCFS increases production of biofuels, it will also increase emissions outside of the cap-and-trade program. At the same time, any emissions reductions from gasoline and diesel fuels in California achieved by the LCFS may be offset by increases in other sectors based on the waterbed effect (see above).[6] We recommend that ARB staff reevaluate the estimated GHG emission reductions of the proposed amendments to the LCFS, taking into account the potential for leakage effects.

(c) Prices in both emissions programs create impacts that need to be considered jointly.

All this context becomes even more important given the stated objective in the recent scoping plan update of amending the cap-and-trade program to tighten the cap prior to 2030.[7] There have been a number of preliminary workshops in 2023 to evaluate this idea.[8] At the same time, Bushnell et al. were funded by ARB staff to conduct modeling to assess the potential emissions and allowance price impacts of alternatives.[9] Notably, all four scenarios evaluated (other than an end to the program) show that prices will be at the price ceiling of $110 per allowance by 2030. In combination with strengthened 2030 LCFS ambition and the potential for multiple triggers of the proposed LCFS Automatic Acceleration Mechanism due to the growth of RD supply,[10] a scenario is likely in which cumulative consumer price impacts could be quite substantial by the late 2020s – amounting to significantly more than $1.50 per gallon of gasoline.

We note that despite considerable efforts by ARB and other state agencies, uptake of EVs has primarily been via high-income Californians to date. This trend is not expected to change radically over the next several years. This means that the burden from combined pass-through of both cap-and-trade allowance prices and LCFS credit prices – both of which will be required inputs to each gallon of liquid fuel – could be substantially higher for low income Californians than evaluated in either program in isolation (see below re distributional effects).

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[6] William Scott, 2024, Cost, Innovation, and Emissions Leakage from Overlapping Climate Policy, SSRN working paper, *at* https://ssrn.com/abstract=4724013.

[7] Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality, pg. 112, *at* https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf.

[8] *See*, https://ww2.arb.ca.gov/our-work/programs/cap-and-trade-program/cap-and-trade-meetings-workshops and staff presentations therein.

[9] *See*, Bushnell, James. "California's Cap-and-Trade Market Enters its Teen-Age Years" *Energy Institute Blog*, UC Berkeley, November 27, 2023, https://energyathaas.wordpress.com/2023/11/27/californias-cap-and-trade-market-enters-its-teen-age-years/.

[10] Colin Murphy and Jim Wook, 2024, Updated Fuel Portfolio Scenario Modeling to Inform 2024 Low Carbon Fuel Standard Rulemaking, Updated Fuel Portfolio Scenario Modeling to Inform 2024 Low Carbon Fuel Standard Rulemaking, *at* https://escholarship.org/uc/item/5wf035p8.

(d) Cap-and-trade prices will likely be high enough in the next few years to incentivize methane reductions at dairies.

One particularly controversial aspect of the proposed amendments to the LCFS presented in the ISOR is the continued reliance on book-and-claim crediting of both in-state and out-of-state dairies until as late as 2040. This has been described by staff and stakeholders as needed to ensure that statutory methane reduction objectives are achieved at a major source of California's methane emissions: large dairies (also termed Confined Animal Feeding Operations, or CAFOs). ARB staff has also stated that they are concerned that eliminating book-and-claim might "strand" investments made at dairies to capture methane from liquid manure holding tanks.

Estimates of the cost of installing and operating dairy manure methane digesters vary and range from as little as $30/ton to as high as $90/ton. Today, LCFS prices are in the middle of this range – as of this writing, $65/credit. ARB staff has stated concerns that additional digesters will not come online consistent with their goals for the sector if book-and-claim, which critics point out does not consider additionality, is eliminated.

But ARB has also created a second pathway for digesters to access revenue from carbon markets in California – via a compliance grade offset in the cap-and-trade program.[11] Uptake of this opportunity has been limited: both because until very recently, allowance prices in cap-and-trade were below $30, and also because during the same time, credit prices in the LCFS were close to $200. However, ARB's own modelling[12] indicates that by 2030, the most likely outcome for all scenarios considered in cap-and-trade, so long as the program is extended, is that allowance prices will be at the price ceiling – in 2030 equal to $110/ton. If LCFS credits have been sufficient to incentivize methane digester installation, it stands to reason that the much higher allowance and offset price would as well.

The interaction between the LCFS and the CAT is therefore critical in evaluating the emissions impact and affordability of the two programs. Because the current ISOR does not evaluate this crucial policy interaction between California's flagship climate policies, ARB cannot yet fully understand even near-term impacts from the ISOR. We recommend that ARB conduct an analysis of the joint impacts of proposed amendments to the LCFS and cap-and-trade and revise the ISOR to reflect these results.

III. ARB should limit the duration of proposed amendments and the incentives they create to balance the need for project certainty with the deep uncertainties regarding the future of the liquid fuels sector—10 years is long enough.

[11] *See*, Air Resources Board, Livestock Projects, *at* https://ww2.arb.ca.gov/our-work/programs/compliance-offset-program/compliance-offset-protocols/livestock-projects

[12] *See*, Bushnell, James. "California's Cap-and-Trade Market Enters its Teen-Age Years" *Energy Institute Blog*, UC Berkeley, November 27, 2023, https://energyathaas.wordpress.com/2023/11/27/californias-cap-and-trade-market-enters-its-teen-age-years/

Amendments to the LCFS proposed in this rulemaking would set a trajectory to the year 2045 for subsidies directed towards CAFOs, refineries, and other low-carbon fuel producers. In public meetings related to the scoping plan, ARB staff have repeatedly articulated concerns about the need to create long-term certainty so that investments in lipid biofuel, hydrogen, and methane digesters can secure finance based on the LCFS. This is a valid concern.

However, that concern needs to be balanced in the present rulemaking against the real uncertainty associated with the ongoing transition in the transportation sector – in significant part due to ARBs ambitious rulemakings related to light, medium, and heavy-duty vehicles. Last year, in the light duty segment, ZEVs accounted for more than 25% of new vehicle sales, up almost 6% from 2022.[13] While there will no doubt be challenges in a full transition to ZEVs in all three weight classes, the transition is rapidly picking up steam. This is even more true in light of the fact that since the pandemic, essentially all the growth in global light duty vehicle sales has come from ZEVs. California, and in particular ARB, deserves tremendous credit for this success.

The future for medium and heavy-duty ZEV technology is much less certain, however. It may be that the challenges of electrifying these fleets are overcome through a combination of innovation and smart policy support. It may also be that some or even a large fraction of these vehicles continues to rely on either liquid (RD and BD) or gaseous fuels (for example green or blue hydrogen). Despite what ARB staff CATS modelling in the ISOR and the recent 2022 Scoping Plan Update seems to indicate, how this transition will play out is fundamentally uncertain at this point – even for the early 2030s.

The idea that we know enough now to accurately predict its trajectory all the way to 2045 is simply not credible at this time. Yet the rulemaking under consideration today would lock in a variety of large subsidies for particular technologies that, given what it knows now, ARB thinks may be important for the transition to zero emissions fleets or for its agricultural methane reduction goals. And these subsidies are being offered to extremely powerful industries in California. Once offered, they will be exceedingly difficult—both from a practical and a political perspective—to pull them back as circumstances evolve.

In the past, most recently in 2018, ARB has not tried to regulate decarbonization of the liquid fuels sector using the LCFS for much longer than a decade. We recommend that ARB stay consistent with this precedent here, and limit amendments it makes today to the next decade – through 2035. A ten-year time horizon recognizes ARB's concerns today in creating sufficient certainty to allow for project finance, but also balances that concern against the tremendous uncertainty that rapid technological innovation and adoption creates for the LCFS.

That does not mean that in a future rulemaking – conducted in the early 2030s, perhaps – ARB would not act to extend incentives that they see as essential to their policy goals at that

[13] *See,* California Energy Commission, New ZEV Sales in California, *at* https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/new-zev-sales.

time. It means only that by acting today, the agency will preserve its freedom of movement and future responsiveness to the uncertain but rapid evolution in transportation technologies.

IV. ARB's assessment of the GHG emissions impacts of the rule are almost certainly overstated and need to be reevaluated.

We perceive several issues with ARB's calculation of GHG emission reduction benefits of the proposed LCFS amendments against which costs must be judged. Quantification of GHG emission benefits is especially important for the LCFS since that is the basic justification for the policy's existence.

Below, we discuss two issues that merit substantial reanalysis or correction in the GHG emission benefits:

(1) Transparency regarding the interaction of the LCFS proposed amendments with the federal Renewable Fuels Standard (RFS);
(2) the implications of the massive growth in RD supply for indirect land use change (ILUC) emissions.

(a) Contrary to ARB's prior practice, the ISOR is unclear on how the RFS is accounted for and appears to claim credit for emission reductions caused by the RFS. It also does not account for resource shuffling caused by the RFS and LCFS interaction. ARB should be transparent about how it accounts for this interaction if in fact that has changed since the 2018 LCFS amendments.

In prior amendments to the LCFS (again, most recently in 2018) ARB acknowledged that the RFS had significant impacts on RD and BD consumption in California. It also assumed that the best approach for estimating the benefits of the LCFS was to develop a baseline volume and carbon intensity that the RFS would produce, and then assume that the additional stringency of the LCFS would produce GHG benefits incremental to that RFS baseline. In the present rulemaking, ARB is not transparent regarding its approach and may have abandoned this approach in favor of neglecting impacts of the RFS and claiming all GHG benefits for the LCFS.

The SRIA indicates that impacts of the amendments to the LCFS account for the role of the RFS in the baseline[14] However, no additional detail is provided to indicate how this is reflected in ARB's estimates, and how contributions from the RFS change under the proposed alterations to the LCFS. The SRIA states that GHG emissions are derived from "CATS outputs of the fuel quantities and average annual CI associated with each fuel."[15] Importantly, the impacts of the RFS are not static and change in response to alterations to California's LCFS. It is not clear if and how exactly these dynamics are accounted for in the present rulemaking.

[14] SRIA at 12.
[15] *Id.* at 25.

The federal RFS sets a nation-wide volumetric mandate for biofuels and allows flexibility for where those biofuels are produced and consumed. An additional unit of biofuel consumed in California counts equally toward compliance with the federal RFS as one consumed elsewhere in the country. Therefore, when the stringency of the LCFS is increased, greater biofuel consumption in California reduces the amount required to be consumed by other states, effectively offsetting some of the emissions benefit. This dynamic is critical to incorporate into the design and evaluation of the LCFS.

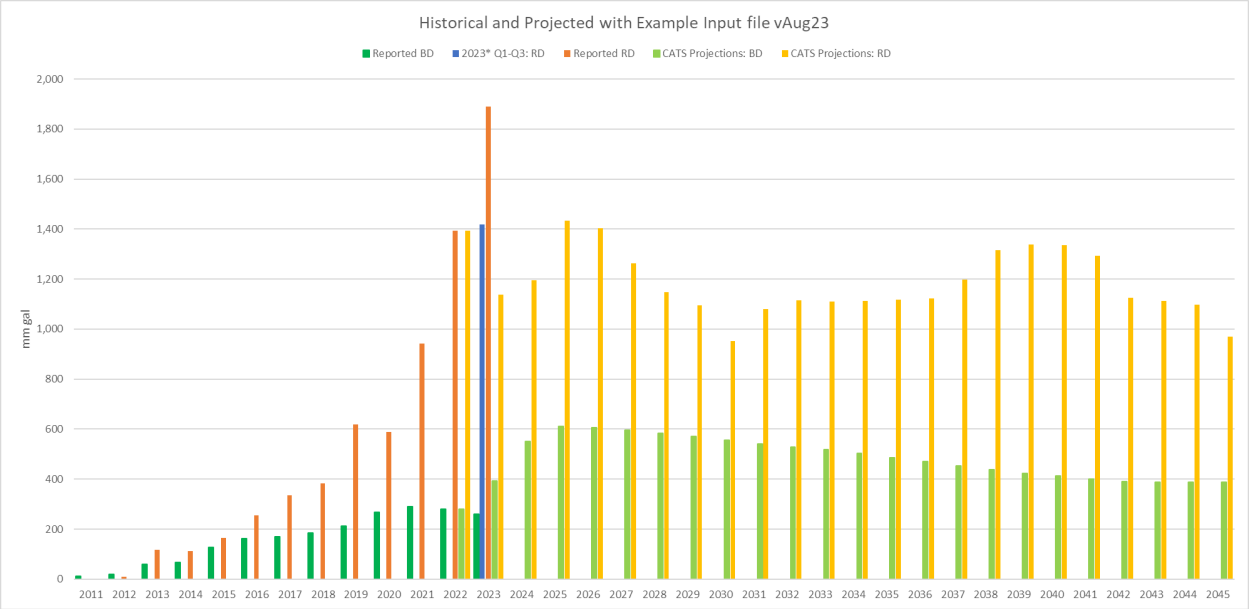
The attribution approach, from the 2018 rulemaking in Appendix F Table F-12 at page 12, suggests that only emissions reductions below the thresholds set by the federal RFS should be attributed to the LCFS. For instance, all emissions reductions from bio-based diesel fuels down to a carbon intensity of 50g/MJ are attributed to the RFS, while only emissions reductions below the 50g/MJ threshold are attributed to the LCFS. For example, an additional gallon of bio-based diesel at 40g/MJ could be said to contribute an additional 10g/MJ of emissions reduction from what would have occurred under the RFS alone.

This provides a simplistic but defensible approach that should be taken and explicitly outlined in this rulemaking. However, attributing all emissions reductions from the diesel standard to the carbon intensity of BD or RD overstates the role of the LCFS, and would contribute to misleading conclusions in evaluating the impact and cost-effectiveness of the policy.

In sum, more transparent discussion of ARBs approach to accounting for the interactions between the LCFS and RFS is required to assess how ARB accounts for emission reductions. Otherwise, the possibility cannot be ruled out that ARB has overstated the emissions contribution of the revisions to the LCFS program.

(b) The ISOR does not consider the rapid increase in RD supply that has already occurred and which is projected to occur in the next few years. This rapid growth in supply throws into question the relatively low estimates of ILUC emissions that were developed a decade ago for the LCFS.

In early workshops associated with the development of this amendment package, ARB staff indicated concern about the growth of crop-based biofuels in the RD supply. This growth has continued to far outstrip expectations. Shown below are comparisons of actual BD and RD supply to LCFS markets as compared to CATS estimates of their supply. Evidently, the data model fit is strong for 2022, but 2023 data significantly exceeds model projections for any time to 2045. Meanwhile, two biofuel conversions underway in Martinez, with refineries set to come online in 2024, have the potential to add 1.7 billion gallons of RD to the LCFS supply, roughly doubling supplies of liquid biofuels in the near term.



Historically, RD has been predominantly sourced from used cooking oil and other byproducts that do not impact global crop markets. Corn ethanol has long been known to interact with global commodity markets and through that, land use decisions. For that reason, in 2015, ARB incorporated Indirect Land Use Change (ILUC) emissions into its CI life cycle accounting. The ILUC estimates that were included for crop-based biofuels were based on a perturbation scaled to US biofuel consumption at that time.

Today's RD growth has far outstripped that assumption and calls into question the validity of the ILUC calculation that relies upon it. Recently, US EPA surveyed ILUC estimates from a variety of sources – finding a range of 11 to 260 CO2e/MJ.[16] ARB's current ILUC value, 29 CO2e/MJ, is in the very low range of these estimates. This fact, combined with the age and outdated assumptions that underpin this value, suggests that the ILUC estimate used to calculate CI for crop-based biofuels is too low – and perhaps significantly too low. This in turn will lead to overestimation of emissions reductions associated with the massive growth of RD in the fuel mix in California, by claiming benefits while causing harm elsewhere as forests are cut and peatlands are converted to support oil seed agriculture. We recommend that either ARB pause this rulemaking until ILUC values that reflect the possible scope and scale of RD supply coming to market can be developed, or incorporate a lipid-based biofuels cap consistent with its current ILUC calculation into the proposed LCFS amendments.

V. Criteria pollutant emissions benefits of the proposed LCFS amendments are likely overestimated by the ISOR in two different ways.

[16] US EPA, "Model Comparison Exercise Technical Document" (EPA-420-R-23-017, 2023); https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P1017P9B.pdf.

The ISOR provides a detailed assessment of the criteria pollutant benefits of the proposed LCFS amendments. We have concluded that the analysis is flawed in at least two ways. Both lead to substantial overestimation of criteria pollutant benefits.

(a) The ISOR assumes criteria pollutant benefits from older diesel trucks, but ARB's own science shows that those benefits do not exist for newer diesel trucks which now predominate in the sector.

The SRIA's analysis of particulate matter benefits includes the following explanation:

> PM emissions changes for biodiesel relative to conventional diesel were based on testing using pre- 2007 engines without diesel filters. CARB (2015) indicates that, for 2007 and later engines equipped with PM filters, there were no meaningful differences in PM emissions between conventional diesel and biodiesel. However, Durbin et al. (2011) indicates that PM emissions for these engines were essentially at the limit of detection, and the level of efficiency of the diesel particulate factor would have masked any fuel differences. *For these reasons, staff believes that PM emissions changes for biodiesel use in pre-2007 engines without diesel particulate filters relative to conventional diesel use was also applicable to 2007 and later engines with diesel filters*.[17]

As we understand this language, ARB's analysis assumed that as post-2007 engines with diesel filters shifted to biodiesel from the reference fuel, $PM_{2.5}$ emissions would decline to a similar extent as they did when pre-2007 engines switched fuels. However, more recent work – prepared by the same author for ARB in 2021 – found no statistical difference between $PM_{2.5}$ emissions from biodiesel and ARB's reference fuel for post-2007 engines.[18]

We recommend that ARB integrate the best currently available science on the impact of newer diesel engines into its analysis of criteria pollutant benefits of the proposed LCFS amendments. In doing so, ARB should rely on its own pre-existing quantification of the fraction of the on-road diesel fleet today that lack emission controls relative to the fraction that has both selective catalytic reduction and diesel particulate filters.[19] ARB should then ascribe benefits for older diesel engines consistent with the analysis in the ISOR while ascribing a much lower or negligible criteria pollutant benefit to newer advanced diesel engines or retrofitted engines. On net, we believe that this change will significantly reduce the benefit of RD and so reduce the loss of benefits from RD associated with a cap on liquid biofuels.

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[17] SRIA at B-10 n.119 (emphasis added).

[18] Thomas D. Durbin *et al.*, Final Report: Low Emission Diesel (LED) Study: Biodiesel and Renewable Diesel Emissions in Legacy and New Technology Diesel Engines, xviii-xix (Nov. 2021), https://ww2.arb.ca.gov/sites/default/files/2021-12/Low_Emission_Diesel_Study_Final_Report_12-29-21.pdf.

[19] *See*, Air Resources Board, Sunset Estimation for Biodiesel In-Use Requirements, *at* https://ww2.arb.ca.gov/resources/documents/sunset-estimation-biodiesel-in-use-requirements#footnote1_1yzdw61.

(b) The ISOR assumes that reductions in fossil fuel demand caused by the LCFS will result in equal reductions in oil production in California. This is incorrect.

In its SRIA, ARB makes an assumption that incorrectly inflates the air pollution benefits associated with the proposed rule from the upstream oil and gas sector. ARB's "Assumption 1" is that "[o]il extraction operations in California decline at the same rate that demand for petroleum products declines."[20] While such a relationship is theoretically possible, there is also substantial evidence that suggests that these dynamics may be more complex than assumed in the SRIA.

California's production of crude oil has been declining for several decades, whereas diesel demand in California has stayed relatively stable over the last 40 years.[21] And even if the two figures are related, the rate of decline may be different for crude oil production than for diesel demand, particularly in light of the many other factors that may influence both oil extraction and demand – including out of state activities and actors.[22] In particular, the most important factors influencing oil demand in California are the cost to extract California's remaining crude oil resources and the global oil price. Given favorable market conditions, there is no reason to think that crudes from California will not be exported. Given the prevailing conditions, extraction is likely to continue its seemingly inexorable decline, whatever the design of the LCFS. We recommend that ARB eliminate its reliance on this assumption in evaluating the benefits of the proposed LCFS amendments and reduce the criteria pollutant benefits accordingly.[23]

[20] SRIA at B-1; *see also id.* ("It is reasonable to expect that the crude oil extracted in California may ramp down in tandem with declining demand for finished petroleum products.").
[21] *Contrast* Figure 1 *with* Figure 2 *infra*.
[22] *See, e.g.,* Figure 3, *infra* (portraying California imports of diesel over time, including an increasing proportion of foreign imports).
[23] Moreover, while the ISOR states that the reduction in demand associated with the COVID-19 pandemic appears to have reduced emissions associated with oil and gas extraction, there are several reasons that such a relationship may not carry over to this context. ISOR at 56. First, the pandemic constituted a comparatively limited window of time; the longer trends of state diesel consumption and California oil extraction displayed in Figures 1 and 2 below suggest the opposite (or no) relationship between those two numbers. Second, because the COVID19 pandemic was a global phenomenon, out-of-state actors may have been acting in parallel with California actors. Because the LCFS applies to diesel use in California rather than diesel use in other states, that coordination would not apply here.

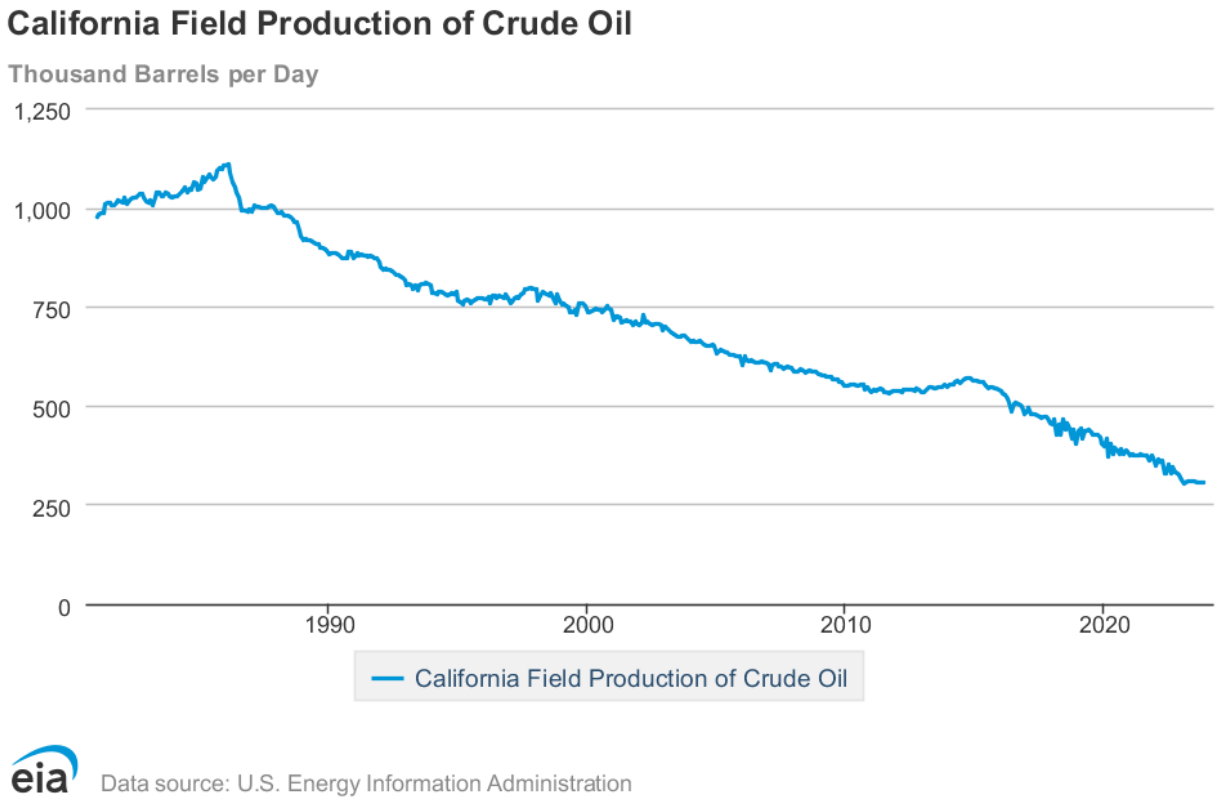

Figure 1. California's production of crude oil over time.[24]

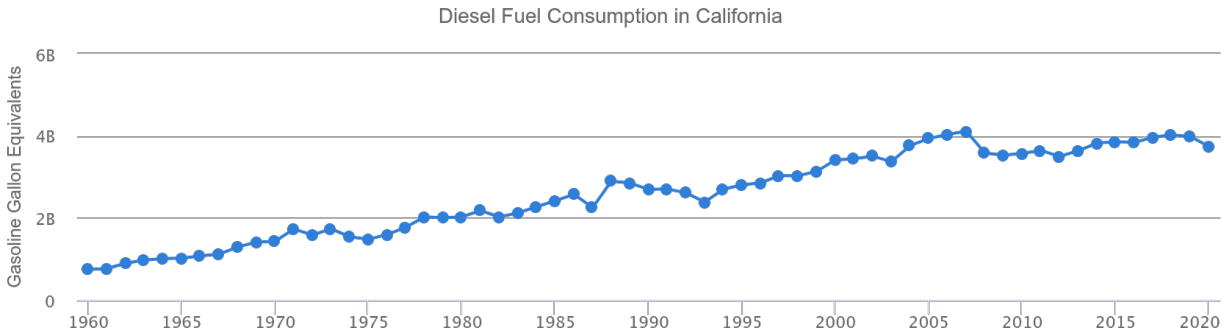

Figure 2. Diesel fuel consumption in California over time.[25]

[24] U.S. Energy Information Administration, *Petroleum and Other Liquids: California Field Production of Crude Oil* (Jan. 31, 2024), https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCRFPCA2&f=M.
[25] U.S. Dep't. of Energy, *Alternative Fuels Data Center – California Transportation Data for Alternative Fuels and Vehicles* (last accessed Feb. 19, 2024), https://afdc.energy.gov/states/ca.

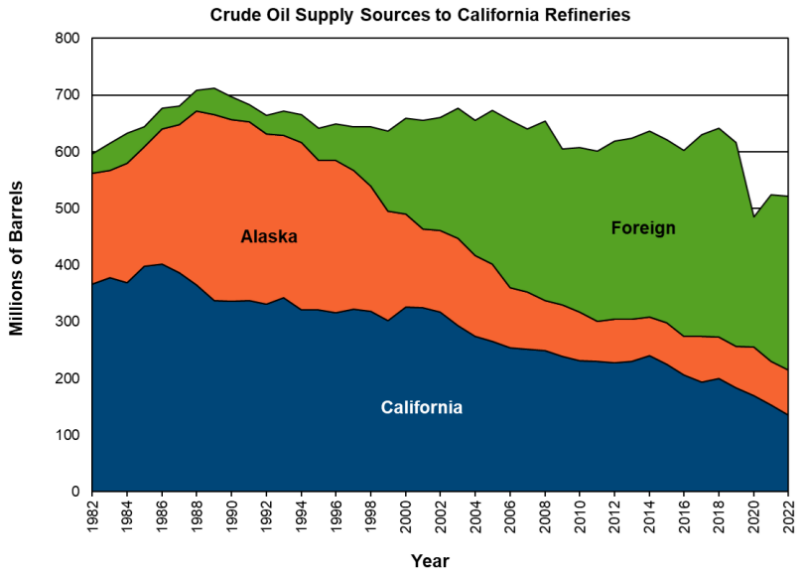

Figure 3. Crude oil supply sources to California refineries over time.[26]

VI. ARB needs to develop a thorough distributional analysis of the likely impacts of the proposed amendments because they are particularly likely to have disproportionate impacts on low-income Californians.

Though ARB staff included a discussion of expected distributional effects in the Supplementary Regulatory Impact Analysis (SRIA) for the proposed amendments to the LCFS, it omitted the qualitative distributional analysis from the ISOR – a widely-circulated and relied-upon document for decisionmakers. The ISOR should, at a minimum, contain a robust discussion of expected distributional effects. To do so is essential, and aligns with the purpose of ISOR documents—to provide comprehensive and accessible information about proposed regulations. Moreover, clarity about distributional consequences improves the regulatory process for decisionmakers and the public. An improved and transparent understanding of these consequences will support CARB in its pursuit of environmental justice.

At minimum, the ISOR should incorporate a qualitative distributional analysis because a key function of the ISOR is to provide comprehensive and accessible information about proposed regulations – including explanations and justifications – to the public and decisionmakers. For the ISOR to be accessible and comprehensive, it must transparently discuss relevant information. Information about the distribution of effects is particularly relevant for the proposed amendments to the LCFS because, as discussed in the SRIA, low-income, disadvantaged, and rural communities may bear a disproportionate share of the costs of the

[26] Cal. Energy Comm'n, *Annual Oil Supply Sources to California Refineries* (last accessed Feb. 19, 2024), https://www.energy.ca.gov/data-reports/energy-almanac/californias-petroleum-market/annual-oil-supply-sources-california.

amendments.[27]

Information about distributional effects of the proposed amendments is also relevant because any social welfare analysis – which is commonly used to justify proposed regulation – should, at a minimum, contain a discussion of likely distributional effects.[28] Social welfare analysis without distributional analysis clouds the understanding of the possible consequences of proposed and alternative regulations for the public and decisionmakers. For example, if a report only contains information about aggregate effects, it could obscure that a historically marginalized group will be uniquely burdened by the costs of a rule. A clear discussion about this in the ISOR makes essential information accessible to the public and decisionmakers.

Moreover, the ISOR should include a distributional analysis because clarity about the possible distribution of effects is beneficial to the regulatory process. To begin, clarity about the full distributional consequences of a proposal allows regulators to evaluate their normative choices. For example, a clear distributional analysis that discusses a likelihood that the proposed amendments will increase the financial burden for low-income, disadvantaged, and rural communities while alleviating their pollution exposure reveals a regulatory choice to prioritize alleviating environmental burdens. (A normative statement that aligns with this choice could be "ARB should prioritize ameliorating pollution exposure").

This transparency about expected consequences also allows regulators to more precisely identify action needed to alleviate inequitable social outcomes. For example, if the expected financial cost to low-income, disadvantaged, and rural communities is estimated to be overly burdensome, then decisionmakers can better prepare to provide material support to these communities.

Moreover, including a clear distributional analysis in the ISOR can provide an accountability mechanism for regulators with the public. For example, if ARB clearly communicates to the public that low-income, disadvantaged, and rural communities may be financially burdened, then the public can advocate for alternatives that avoid this consequence or for remedies to address it.

Finally, the clarity and additional benefits for the regulatory process associated with including a distributional analysis in the ISOR also support the pursuit of environmental justice – a core aspiration of ARB.[29] Environmental justice is defined in state law, which identifies meaningful engagement with the public as central to the pursuit of environmental justice.[30]

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[27] SRIA at 60.

[28] *See* Office of Management and Budget, 2023, Circular A-4, Part 10, *at* https://www.whitehouse.gov/wp-content/uploads/2023/11/CircularA-4.pdf

[29] ISOR at 64.

[30] *See id.* (citing Gov. Code § 65040.12, subd. (e)(1), which states that "[a]t a minimum, [environmental justice includes] the meaningful consideration of recommendations from populations and communities most impacted by pollution into land use decisions.")

Clear communication of the consequences of regulation is necessary for achieving that meaningful engagement.

This inclusive approach also ensures transparency about the full spectrum of expected consequences, facilitates informed decisionmaking and fosters meaningful public engagement. By incorporating distributional analysis into the ISOR, ARB can demonstrate its commitment to equitable regulatory practices and contribute to a more informed and participatory rulemaking process.

In summary, we recommend that ARB staff revise the ISOR to include distributional analysis because distributional analysis aligns with the goals of providing comprehensive and accessible information, improving the regulatory process for decisionmakers and the public, and pursuing environmental justice.