

October 6, 2017

Sam Wade
Chief, Transportation Fuels Branch
California Air Resources Board
1001 I Street
Sacramento CA, 95814

Dear Mr. Wade,

Thank you for the opportunity to comment on the Preliminary Draft Regulatory Text for the proposed Low-Carbon Fuel Standard (LCFS) re-adoption for 2020-2030. The LCFS has been a key element of California's efforts to reduce greenhouse gas (GHG) emissions, improve air quality and incentivize the deployment of advanced technology within the transportation sector. The LCFS now has over a half-decade of successful operation, during which time it has reduced GHG emissions by over 28 million metric tons and displaced 8% of statewide petroleum consumption with alternative fuels.¹ The success of this program is also reflected by the choice of other jurisdictions, notably Oregon and British Columbia, to model their fuel carbon policies after the LCFS. We applaud ARB for committing to continue the historic success of this program to help the state meet its goal of reducing GHG emissions by 40% from 1990 levels by 2030. We believe, however, that ARB can and should set more ambitious carbon intensity reduction targets than suggested in the preliminary draft.

We commend staff for their commitment to releasing draft regulatory language, discussion papers and supporting materials in a very timely fashion, which has helped stimulate a robust and valuable discussion which has laid the groundwork for rulemaking. We recognize that the materials discussed at the September 22 workshop represent preliminary positions and we look forward to engaging constructively in the rulemaking process over the coming months.

In general, the proposed regulatory amendments reflect thoughtful consideration grounded in strong science. The single most critical area for improvement concerns the setting of the 2030 CI reduction target and the timeline of reductions to get there. The 18% carbon intensity reduction target ("CI target") specified in the Preliminary Draft reflects an excessively conservative approach and would, if adopted, compromise California's ability to meet broader GHG reduction targets. Additionally, the pause in CI target increases

¹ https://itspubs.ucdavis.edu/wp-content/themes/ucdavis/pubs/download_pdf.php?id=2634

from 2020-2022 reflects a valid concern regarding the sufficiency of banked credits after the rapid ramp-up of CI targets from 2017-2020, however a three year pause over-corrects for the problem and mutes critical market signals which would bring advanced clean fuels to the market.

We support the addition or revision of additional credit-generating pathways, such as refinery investment credits, renewable electricity charging for EVs and alternative jet fuels, but care must be taken to ensure that these pathways reflect sound science and do not compromise the critical market signals which incentivize progress in the on-road fuels sector, which comprises most of California's transportation emissions.

18% CI Reduction Target Compromises the State's Ability to Meet GHG Reduction Targets

The selection of 18% as the 2030 CI reduction target is unnecessarily conservative and may compromise the state's ability to meet the 40% GHG reduction target, compared to a 1990 baseline, by 2030, as specified by SB 32 (Chapter 249, Statutes of 2016), as well as longer-term mid-century decarbonization targets, such as the 80% reduction in GHG emissions by 2050 specified in Executive Order B-30-15. The 18% value was supported by the analysis done for the draft scoping plan² released in January, 2017. This plan envisioned several policies which would contribute to the attainment of the 40% GHG reduction goal which are no longer authorized due to provisions in AB 398 (Chapter 135, Statutes of 2017). Specifically, direct GHG reduction measures from refineries are prohibited and the Industrial Assistance factor is frozen at 2015 levels through 2030. The proposed 20% refinery reduction measure was expected to reduce emissions by 2-5 million metric tons in 2030, those emissions must be made up through other programs if the state is to hit its 2030 GHG reduction targets. A higher CI reduction target under the LCFS, as estimated by the Draft Scoping Plan, could make up some or all of the deficit from losing the Refinery rule. In addition, if the re-adopted LCFS includes credit generation measures for refinery investments, as the Preliminary Draft indicates it would, the LCFS would effectively incentivize many of the reductions which would have occurred under the direct Refinery Reduction rule. This helps ensure that all sectors of the economy contribute their fair share towards meeting GHG reduction targets, and also fulfills the intent of AB 197 (Chapter 250, Statutes of 2016), which called for significant reductions in emissions from major industrial sources in disadvantaged communities, such as oil refineries.

² https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf

A conservative CI target within the LCFS also mutes the market signals which promote the development and deployment of advanced technologies in the energy and transportation system. Meeting mid-century decarbonization goals will require transformation of our energy, industrial and transportation systems, all of which will be greatly aided by the availability of advanced clean technology. It is imperative that the state maintain the market signals which bring such technology to market at commercial scale.

In the absence of a direct refinery rule or other mechanisms for making up the lost GHG reductions, the cap-and-trade market would be expected to increase the amount of emissions cuts it provides. This expectation may be difficult to fulfill due to several independent exogenous forces which combine to increase the stress on the cap-and-trade program. The cap-and-trade program will already have to make up emissions cuts which would otherwise have come from improved post-2025 Federal fuel economy standards, more rapid adoption of the Short-Lived Climate Pollutant Plan, improved Federal heavy-duty vehicle efficiency standards, the Clean Power Plan and other policies which were expected at the time the Draft Scoping Plan was being developed. Individually, none of these effects are likely to present an insurmountable obstacle to efficient and cost-effective functioning of the cap-and-trade market, but together, they increase the risk of elevated cap-and-trade permit prices.

AB 398's provisions relating to the industrial assistance program exacerbates this risk. The industrial assistance program allocates free permits to certain sectors of the economy based on the risk of emissions leakage to unregulated jurisdictions. ARB, along with independent researchers, determined that a substantial fraction of this assistance could be gradually phased down over time, which effectively increased the permit supply to the economic sectors which were not part of the industrial assistance program. Freezing the industrial assistance factors effectively guarantees that the permits allocated for industrial assistance, 15% of total permits allocated in California by the cap-and-trade system, will be reserved for protected industries through 2030. Of those permits, over three-quarters, or about 12% of the total cap-and-trade permits, are reserved for petroleum extraction and refining. This insulates the petroleum industry from permit price shocks, but increases the exposure of the entities with a compliance obligation but which are not in the industrial assistance program.

The LCFS helps address this risk by incentivizing cost-effective emissions reductions within the transportation space, reducing the number of permits fuel suppliers must buy at auction to cover the carbon

embodied in their fuel. Research by ICF International on behalf of CalETC estimated that the LCFS could reduce cap-and-trade permit prices by up to \$29 per metric tonne in 2030 depending on CI target levels and market factors.³ Using a higher LCFS target to take pressure off the cap-and-trade market reduces the risk of excessively high cap-and-trade permit prices.

A higher LCFS CI reduction target gives CA an opportunity to recover some of the potential emissions cuts lost when direct refinery measures were prohibited by AB 398, especially if Refinery Investment Credit options are part of the readopted program. It also takes significant pressure off the cap-and-trade market which reduces the risk of high credit prices inflicting unnecessary costs on entities which must rely on the cap-and-trade permit auctions.

Likely Supplies of LCFS Credits Support a Higher CI Target

Staff has requested that proposed amendments be accompanied by a supply assessment demonstrating how such amendments would affect the portfolio of fuels used to comply. NextGen plans to submit an assessment of potential low-carbon fuel supplies to California which will quantitatively demonstrate that there are multiple realistic future supply scenarios which are compatible with attaining a higher CI target. This assessment will be used to justify a specific recommended CI target number and schedule.

Currently existing evidence, however, imply that there are likely to be ample supplies of fuel to support CI reduction targets well above 18%. Several independent research groups including the International Council on Clean Transportation,⁴ ICF International,^{5,6} Promotum,⁷ and your own agency⁸ have evaluated low-carbon fuel supply and concluded that ample supply exists to support significant substitution of low-carbon alternatives for gasoline and diesel to 2030. The supply assessment we intend to submit will build upon these works and others to quantitatively assess likely fuel supplies, but a cursory examination of several of the major pathways indicate ample supplies of low-carbon fuels to support a higher target.

³ <http://www.caletc.com/wp-content/uploads/2016/08/Final-Report-Cap-and-Trade-LCFS.pdf>

⁴ <http://www.theicct.org/potential-low-carbon-fuel-supply-pacific-coast-region-north-america> NextGen funded and contributed to this report.

⁵ <http://www.ucsusa.org/clean-vehicles/california-and-western-states/west-coast-oil>

⁶ <http://www.caletc.com/wp-content/uploads/2016/08/Final-Report-Cap-and-Trade-LCFS.pdf>

⁷ <https://www.nrdc.org/file/2547/download>

⁸ https://www.arb.ca.gov/newsrel/petroleum_reductions.pdf

Note that these numbers represent highly abstracted estimates based on conservative assumptions of future activity. They are not meant to be predictions, rather an exercise to demonstrate that sufficient LCFS supplies are likely to exist under reasonably-likely future conditions. NextGen will present a more comprehensive supply assessment in future comments.

- The CEC projects 2030 in-state gasoline demand around 12.5 billion gallons and diesel demand around 4 billion gasoline-equivalent gallons⁹. For the purpose of these estimates, we will assume that baseline CARBOB has a 2030 carbon intensity of 95 g CO₂e / MJ, which would reflect incremental efficiency improvements and/or a slight shift towards lighter crudes.
- **Light-Duty Vehicle Electrification:** If the state is able to shift 15% of the gasoline demand to electricity,¹⁰ that would yield a 9% CI reduction just from this one pathway. This number assumes that the electricity used to supply these vehicles is produced by a grid which meets the 50% RPS mandate of SB 350 (Chapter 547, Statutes of 2015) which yields a LCFS carbon intensity score of approximately 18 g CO₂e/MJ¹¹.
- **Conventional Ethanol:** Continued use of E10 as the dominant retail fuel for spark-ignition internal combustion engines yields a 2% CI reduction, even if the ethanol imported into the state is largely similar to that which is currently used - predominantly from corn, with an average CI of 66 g CO₂e/MJ.¹²
- **Displacing Diesel With Bio-Gas:** The near-term conservative estimate of renewable natural gas potential for vehicular use produced by Parker and Jaffee was 14 billion cubic feet per year, with potential of up to 83 billion cubic feet per year if additional tipping fees or policy support were

⁹http://docketpublic.energy.ca.gov/PublicDocuments/17-IEPR-05/TN219810_20170620T141018_Transportation_Energy_Demand_Forecast_20172030.pdf

¹⁰ California currently has approximately 28 million registered light duty vehicles. If we assume that the light-duty vehicle population grows at the same rate as the overall population (based on PPIC estimate from http://www.ppic.org/content/pubs/report/R_116HJ3R.pdf) that will imply 33 million light duty vehicles in 2030. If the state hits the 5 million ZEV target by 2030 and those consume energy proportionately to conventional vehicles, that implies about 15% of total light duty vehicle energy use, adjusted for energy efficiency ratio, will be electric. This is a conservative estimate since some light duty vehicles are diesel fueled and EVs will likely accumulate more VMT per vehicle due to lower operational costs and relative age compared to the conventional fleet.

¹¹ Approximation based on current CA Grid mix comprises 26% RPS compliant sources and 51% natural gas and non-specified power sources, which are responsible for the overwhelming majority of the emissions which yield the current 105.16 g CO₂e/MJ LCFS pathway carbon intensity. Assuming that the increase to 50% RPS reduces the contribution from natural gas and unspecified sources, a proportional reduction in carbon intensity yields approximately 56 gCO₂e/MJ carbon intensity in 2030. Adding 10% for margin of error and applying the Energy Efficiency Ratio of 3.4 specified by the LCFS rule results in an approximately 18 g CO₂e/MJ electricity pathway score.

¹² Based on 2015 Average CI of ethanol receiving credit under LCFS, as reported in 2016 LCFS status update (https://itspubs.ucdavis.edu/wp-content/themes/ucdavis/pubs/download_pdf.php?id=2634), correcting for revised iLUC value and assuming a 7% improvement in CI from 2016-2030, based on an the 7% improvement in CI from 2011-2015.

added¹³. If we assume that 2030 biogas production is 20 billion cubic feet with the same proportional contribution from landfills, dairies, municipal solid waste digesters and wastewater treatment, and the carbon intensities referenced in the Jaffe and Parker paper, the total GHG reduction from displacement of diesel is approximately 3 million metric tons, or 1.5% of total carbon from fuels regulated by the LCFS.

- **Displacing Diesel With Renewable Diesel and Biodiesel:** VISION 2030 baseline modeling scenarios predict about 30% of the total diesel fuel pool will be displaced by biodiesel or renewable diesel.¹⁴ If we assume that these fuels have an average CI of 34 g CO₂e/MJ, the non-weighted average of all current biodiesel and renewable diesel pathways, then these diesel alternatives will reduce carbon by 5%.

Taken together, these four pathways can supply LCFS credits sufficient to meet a 17.5 % CI target, which indicates that with an 18% reduction target the LCFS would not generate substantial emission reductions beyond those already expected as result of other state programs and market forces. This figure does not include potential credit generation from advanced biofuels, mid or high-ethanol blend fuels in light duty vehicles, electrification of heavy-duty vehicles, co-processing of low-carbon feedstocks in refineries, credits from charging of vehicles with renewable energy, carbon capture and sequestration, alternative aviation fuels, hydrogen fuel cells, refinery efficiency improvement credits or other LCFS credit generation pathways. In addition, each of these four pathways have opportunities to exceed the relatively conservative scenarios described above.

In essence, an excessively conservative assessment of potential fuel supplies, which omits many significant LCFS credit generating pathways can almost meet an 18% reduction target on its own. An assessment which includes all likely credit generation opportunities and allows for more ambitious technology penetration will likely be able to exceed the 18% target without risking structural deficits of LCFS credits relative to demand.

Given the strong history of the LCFS as a technology-forcing policy, it is reasonable to assume that some of the pathways beyond the four considered above would deliver significant LCFS credit generation in the

¹³ <https://www.arb.ca.gov/research/apr/past/13-307.pdf>

¹⁴ http://docketpublic.energy.ca.gov/PublicDocuments/17-IEPR-05/TN219810_20170620T141018_Transportation_Energy_Demand_Forecast_20172030.pdf

2020-2030 time period, which would support a CI reduction target above 18%. The LCFS CI reduction target should be designed to promote innovation and drive the market towards low carbon solutions, not simply ratify business as usual. NextGen plans to submit a comprehensive supply assessment in the coming months to better characterize and quantify likely credit generation pathways and develop a more accurate assessment of what CI target strikes the most appropriate balance between ambition and the limitations of likely future fuel supplies.

The Freeze in CI Targets in 2021 and 2022 Lacks Sufficient Analysis or Rationale

Slide 19 in the staff presentation from the September 22 workshop¹⁵ indicates that Staff's current thinking on CI target schedules includes a two-year pause in CI target increases in 2021 and 2022. The rationale for this is that obligated parties will probably not have been able to deploy sufficient production in 2020 to meet the 10% CI reduction target and will have been obligated to substantially deplete their reserve of banked credits. We agree that the aggregate supply of banked credits is likely to significantly decline in 2019 and 2020, however most of this decline is due to the multi-year freeze in CA targets required by State courts, which interrupted the effective functioning of LCFS market signals. The court-ordered freeze added substantial uncertainty into the LCFS market and chilled investment. That uncertainty is substantially resolved at this point. Had the CI target increased on the original trajectory, it is likely that investments into credit-generating capacity would have proceeded at a more rapid pace, leading to a fuels industry capable of meeting current LCFS targets without the need to draw down banked credits. The gradual depletion of banked credits represents rational investment decisions by firms in the transportation fuels sector, not a structural barrier to producing sufficient fuels to meet yearly targets.

Maintaining the two-year freeze of CI targets risks self-inflicting another similar injury to the program. The LCFS market needs to be sending strong signals incentivizing investment into low-carbon fuel production and dispensing infrastructure. Holding the target steady mutes the signal and risks delaying needed investments.

ARB needs to better justify why obligated parties need two years to develop sufficient LCFS credit generation capacity, especially since the LCFS re-adoption proceeding anticipates completion in 2018, which gives obligated parties two years before the CI targets included in the re-adopted program come into effect and four years before targets would move above 10%. Staff must justify why sufficient production capacity to resume

¹⁵ https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/092217workshop_presentation.pdf

regular increases in CI targets, with an appropriate margin for safety, cannot be brought on-line before 2023. Otherwise, we recommend that ARB reduce the freeze to, at most, one year.

Renewable Energy Credits Can Benefit the System, But Must Satisfy Strict Tests of Additionality

Staff has asked for feedback about provisions relating to providing additional credits for EVs which are charged by renewable energy sources. This would reflect the lower life cycle GHG impacts of such energy. We support the concept, however are concerned that with California's grid operators generally over-complying with RPS requirements, there is a surplus of renewable energy available on the grid right now, which could be contractually provided to a charging station, granting additional credits to the charging station owner but not yield any additional reductions in GHG emissions.

In our September 6 comment letter on the Draft Proposal,¹⁶ we discussed how additionality is a critical consideration in life cycle analysis, how current conditions on the CA electricity grid make determining additionality challenging and suggested some principles by which ARB could ensure that additional credits issued for charging with renewable energy actually represented real, additional GHG reductions. These included limiting credits to power supplied by generation capacity built after the adoption of the rule creating the renewable credit pathway, prohibiting generation capacity which is used to satisfy RPS or other renewable energy requirements from generating renewable charging LCFS credits and allowing only a one-way transition, from LCFS credit generation to RPS compliance, for renewable energy projects.

We reiterate the need for strict additionality tests as a condition for generating LCFS credits specific to renewable energy charging. These tests are necessary to ensure that the LCFS does not provide financial rewards for past behavior which was unrelated to the LCFS program.

In addition to the comments in the September 6th letter, we would like to offer one additional consideration. At present, there is a significant amount of solar electricity generation which is routinely curtailed due to insufficient demand in the late morning and early afternoon. Workplace EV charging has been identified as both a solution to the curtailment problem and a critical enabler of EV deployment. We would propose that any charging which occurs during periods in which renewable energy would otherwise be curtailed clearly satisfies

¹⁶ https://www.arb.ca.gov/fuels/lcfs/workshops/09062017_nextgen.pdf

the additionality considerations raised above, provided that there is sufficient transmission and distribution capacity to link curtailed supplies to the charging EV. Charging at times when power would otherwise be curtailed imposes a negligible carbon cost since the power flowing into the vehicle would otherwise have not been used at all. We would support a system in which additional LCFS credits, such as those reserved for renewable energy, were generated when a registered entity could clearly demonstrate that charging occurred at a time when curtailed renewable resources were present on the local grid. We hope to submit a report which outlines the potential scope of this effect over the 2020-2030 time period with future comments.

Refinery Credit Measures Must Clearly Exceed Legal Requirements and Industry Best Practices

The September 22 workshop was not specifically focused on Refinery Investment provisions, however staff reiterated their interest in receiving feedback on this element of the proposed changes to the LCFS and we would like to take this opportunity to provide some thoughts on the subject.

There is clearly a scientific basis for incentivizing GHG-reducing investments at refineries through generating LCFS credits including efficiency improvements, co-processing of renewable feedstocks and using renewable hydrogen. Since the LCFS prudently aggregates conventional petroleum production into a single baseline petroleum fuel CI score, there are limited options for the state to incentivize these valuable, pollution-reducing projects other than provisions like these in the LCFS. Also, as noted above, refinery investment provisions may be the best option available to state and local regulators to achieve the direct emissions reductions sought by AB 197.

ARB must, however, strictly ensure that reductions from refinery investment projects are real, quantifiable and additional before they are given credits. This means that there needs to be a strict test applied to such projects before they are granted LCFS credits:

- To gain credits, refiners must be improving efficiency or performance above both legal standards and industry best practices. Obligated parties should not be rewarded with LCFS credits for merely complying with existing law or operating their facilities according to industry standards. To accomplish this, ARB should identify a set of industry best practices and legal requirements to serve as a baseline. LCFS credits for projects at a refinery must clearly exceed this baseline. When law or

industry standards change, ARB should re-set credit generation from these projects to match the new set of laws or best practices.

- ARB must also verify that the equipment which is being installed to reduce GHG emissions and generate LCFS credits is maintained in good working order in order to continue generating LCFS credits, so any refinery investment provisions must be subject to regular verification procedures, in a similar fashion to other LCFS credit generation pathways.
- Because refining is a complex process with multiple feedback loops affecting many elements of the operation, the analysis of any change to the refining process must consider its effect on the entire refinery. That is, the effect of a given device may not be limited to just the process it directly interacts with, but other processes through changes to temperature, pressure or chemical composition of product and coproduct streams. Simple attributional analysis of the directly impacted stream could easily miss significant impacts, both positive and negative, on other elements of the refinery. Consequential analysis, with system boundaries set at the entire refinery, is the best way to avoid overlooking significant impacts. In the case of a refinery, where all inputs and outputs are routinely measured, consequential analysis with system boundaries set at the facility boundaries does not impose an onerous measurement or analytical burden.

We are open to the idea that aggregation of small projects into a single credit-generating pathway would provide valuable flexibility to refinery operators, provided it meets the tests described above.

Conclusion

In addition to the matters discussed above, we feel that some of the comments we made in previous letters, submitted on August 31¹⁷ and September 6¹⁸ apply to the material presented in this workshop. In particular, we would like to reiterate our support for alternative jet fuels to be included as a credit-generating pathway under the LCFS, provided that doing so does not mute the incentive to deploy advanced technology into the on-road sector, which is a much greater share of total transportation emissions. We would also like to reiterate that since almost every fuel which generates LCFS credits also produces a significant air quality benefit, relative to the conventional fuel it displaces, a higher LCFS target can assist the state in meeting critical air quality goals.

¹⁷ https://www.arb.ca.gov/fuels/lcfs/workshops/08212017_nextgenca.pdf

¹⁸ https://www.arb.ca.gov/fuels/lcfs/workshops/08212017_nextgenca.pdf



We thank Staff for their dedicated work on the LCFS readoption to date and look forward to constructive engagement in the months to come.

Sincerely,

Colin Murphy Ph.D.
Climate Policy Advocate
NextGen California