



Submitted Via CARB Comment Submittal Form

March 14, 2023

Dr. Cheryl Laskowski
California Air Resources Board
1001 I Street
Sacramento, CA 95812

Re: Valero Renewable Fuels Comments on Proposed Low Carbon Fuel Standard Amendments: February 22, 2023 Workshop

Dear Dr. Laskowski:

On behalf of the Valero family of companies (representing operating subsidiaries of Valero Energy Corporation—collectively “Valero”), I appreciate the opportunity to provide these comments regarding proposed amendments to the California Low Carbon Fuel Standard (“LCFS”). In addition to being the nation’s largest independent refiner of petroleum fuels, Valero is one of the top producers of domestic biofuels. Valero was the first traditional petroleum refiner to enter large-scale ethanol production and is now the second largest ethanol producer in the U.S., with 12 ethanol plants in the U.S. and a total annual production capacity of 1.6 billion gallons per year. Valero is among the leading producers of ultra-low-carbon cellulosic ethanol and we are aggressively pursuing measures to reduce the carbon intensity of our ethanol production through carbon sequestration. Meanwhile, Valero continues to supply the California market with both traditional refined fuels and renewable fuels. With innovation in feedstocks and production processes and carbon capture opportunities, Valero’s low-carbon liquid fuels have outperformed, and have the continuing potential to outperform, the mandated technology choices of the California Air Resources Board (“CARB”) in its 2022 Scoping Plan, on a full life-cycle carbon intensity basis as well as on a cost basis.

Comments on CARB’s LCFS Workshop

I. Comments on Introductory Prices

The staff presentation for the February 22 workshop included a slide outlining the scope of the proposed LCFS rulemaking effort, including an item for providing incentives for zero emission vehicle (“ZEV”) infrastructure capacity buildout. Given that CARB has

approved its ACC II rule that will require 100% ZEV sales by 2040, and is poised to adopt the Advanced Clean Fleets rule in April, it is unnecessary and redundant to use the LCFS as a tool to incentivize ZEV adoption. In fact, continuing to use the LCFS to create ZEV incentives risks flooding the market with credits and is likely to undermine the objective discussed in the workshop to reinforce credit values. On the other hand, the “Scope of Rulemaking” slide did not appear to include any reference to supporting adoption of carbon capture and sequestration or direct air capture technologies. These technologies are important aspects of the 2022 Scoping Plan and directives from Governor Newsom, and it would be appropriate for CARB to consider LCFS incentives to support these measures.

The presentation also included a slide describing the rulemaking development process, including evaluation of economic impacts. Any evaluation of economic impacts should include consideration of the rule’s impacts on environmental justice (including access to affordable transportation), small businesses, and socioeconomic impacts.

II. Self-Ratcheting Mechanism and Credit Prices

Valero is concerned that a “self-ratcheting mechanism” could create a negative incentive for project investors to delay project announcements or investments. If there is a known upcoming “ratchet” downward with an implied forecasted credit price increase, it is likely that this information would impact low carbon fuel projects – as opposed to standard market fluctuations.

Responding to feedback suggesting that some mechanism is needed to bolster LCFS credit prices in order to send a price signal to incentivize future investments, CARB discussed potential self-ratcheting mechanisms including a near-term step-down in compliance target stringency and a self-executing compliance target acceleration mechanism. In general, Valero recommends that if a self-ratcheting mechanism is incorporated into the LCFS, the mechanism must be clearly-defined, stable, transparent, predictable, and based on verified data submitted to the agency via LCFS reporting procedures. CARB must not include in the mechanism any subjective variable that could create a potential for benchmarks to be ratcheted arbitrarily – for example, in response to political inquiries, public opposition, or other factors not linked to objective and verifiable data that is transparent to market participants. Furthermore, the mechanism must be included in CARB’s modeling and subsequently published for public comment.

Valero is also strongly opposed to any mechanism that cannot be reversed. Should the mechanism over-correct the market, it must be able to revert back to the baseline case scenario. Additionally, maintenance of a viable credit bank is critical to the LCFS program, and Valero is concerned that a self-ratcheting mechanism could hinder this.

Finally, the figure provided during the Workshop projecting future LCFS credit prices¹ is misleading when combined with CARB's statement that consideration is not currently being given to increasing the maximum credit price. Given the model output, it appears that in order to meet the goals of the program, projects would be required that are beyond the maximum price of \$200 per credit in 2016, adjusted for inflation.²

III. California Transportation Supply Model

Valero appreciates CARB presenting results from its California Transportation Supply ("CATS") model of "Scenario B" during the recent Workshop. CARB should also provide modeling for all three potential scenarios and allow ample time for the public to comment.

Additionally, CARB should be more transparent regarding development of the inputs into the CATS model. Since the model outputs are highly driven by the assumptions underlying the inputs, and CARB is using the model outputs to drive policy, it is critical that the model inputs are reasonably forecasted. It appears to Valero that CARB may be forcing selective fuel types in the CATS input file, which is not a technology-neutral policy.

Finally, Valero agrees with the commenter from the Renewable Fuels Association who noted during the Workshop that CARB should model gasoline blended with 15% ethanol ("E15") in CATS, as the necessary certification for E15 is underway in California.

IV. Book-and-Claim for Low CI Hydrogen

During the Workshop, CARB proposed on Slide 61 to expand the permissibility of book-and-claim accounting to align with low-CI hydrogen production incentive eligibility under the Inflation Reduction Act ("IRA"), but then went on to propose that "fossil gas derived hydrogen cannot participate in B&C." However, the eligibility criteria established in the IRA for claiming "qualified clean hydrogen" tax credits are based on lifecycle greenhouse gas (GHG) emissions from the well-to-gate production of the hydrogen, regardless of feedstock or production process.³ Similarly, the Bipartisan Infrastructure Law ("BIL") defines clean hydrogen based on conformance with established GHG emissions criteria, "including production from any fuel source."⁴ The U.S. Department of Energy ("DOE"), in its development of a Clean Hydrogen Production Standard ("CHPS") under the BIL, states:

¹ Low Carbon Fuel Standard, Public Workshop: Potential Regulation Amendment Concepts. (2023, February 22). Page 51. https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/lcfs_meetings/LCFSpresentation_02222023.pdf

² See Title 17 CCR § 95487(a)(2)(D).

³ Inflation Reduction Act, Pub. L. No. 117-169, tit. I, § 13204, 136 Stat. 1935, 1937 (2022) (codified at I.R.C. § 45V (2022)).

⁴ Bipartisan Infrastructure Law (BIL), also known as the Infrastructure Investment and Jobs Act (IIJA), Pub. L. No. 117-58, Division D, tit. III, § 40312, 135 Stat. 1006, 1006 (2021) (codified at 42 U.S.C. § 16152 (2021)).

“Fossil fuel systems that employ high rates of carbon capture or other thermal conversion processes such as pyrolysis, electrolysis systems that primarily use clean energy (e.g., renewables, nuclear), and certain biomass-based systems (e.g., gasification, reforming of renewable natural gas) are all generally expected to be capable of achieving 4.0 kgCO₂e/kgH₂ on a lifecycle basis using technologies that are commercially deployable today.”⁵

CARB’s proposal to exclude fossil gas-derived hydrogen from participating in book-and-claim accounting under the LCFS is neither aligned with the intent nor consistent with the implementation of the clean hydrogen tax credit program established under the IRA. Furthermore, selective incentivization of hydrogen that is produced from sources other than fossil gas would run counter to the binding directive in Assembly Bill No. 32 (“AB 32”) that CARB must “[d]esign the regulations . . . in a manner that is equitable, seeks to minimize costs and maximize the total benefits to California, and encourages early action to reduce greenhouse gas emissions.”⁶

a. Book-and-Claim for Low CI Feedstocks

CARB should expand book-and-claim accounting to other uses and feedstocks; this expansion would aid in further decarbonization of the electrical grid and further encourage investment in low-CI fuels. CARB should allow for book-and-claim for low-CI hydrogen, electricity, and renewable natural gas (“RNG”) for use to lower the CI of *all* transportation fuels.

These low-CI utility feedstocks should also include carbon capture and sequestration (“CCS”) projects at the utility-producing facility. Book-and-claim applicability for utility feedstocks should be based on:

1. Regional hydrogen networks (public or private, as long as the attributes can be controlled by contract and audited annually);
2. Regional electricity grid as defined by CARB and the EPA;
3. The national natural gas pipeline network to replace traditional utility use without a direct connection requirement; and
4. Low-CI, dispatchable power (which is critical to the continued decarbonization of the grid).

By extending book-and-claim accounting to all feedstock sources to produce low-CI utilities and as a process input to low-CI fuel production, CARB could expedite technology development and deployment of low-CI fuels while remaining technology-neutral.

⁵ U.S. Department of Energy Clean Hydrogen Production Standard (CHPS) Draft Guidance, DEP’T OF ENERGY, Sept. 23, 2022, at 3, <https://www.hydrogen.energy.gov/pdfs/clean-hydrogen-production-standard.pdf>

⁶ California Health and Safety Code §38562(b)(1)).

V. Phase Out Crediting of Petroleum Projects by 2040

CARB should not arbitrarily eliminate any means for producers of petroleum products to generate LCFS credits, which would be counterproductive to California’s GHG reduction goals. As noted in the Scoping Plan, fossil fuels will continue to be used for transportation for “some time”:

“Conventional ICE vehicles from legacy fleets will remain on the road for some time, even after all new vehicle sales have transitioned to [zero-emission vehicle (ZEV)] technology. In addition, some equipment types are only now in the initial stages of development of ZEV technology for propulsion, such as commercial aircraft or ocean-going vessels.”⁷

Allowing fossil fuel producers to generate LCFS credits by any technologically feasible means will continue to foster innovation and investment in lower-carbon technologies. Even though CARB is proposing to not fully phase out such projects until 2040, any phase-out discourages near-term investment and is not technology-neutral. Furthermore, it is not aligned with the following statements in the Final 2022 Scoping Plan:

“The challenge before us requires us to keep all tools on the table.”⁸

VI. Biomethane Crediting

CARB should equitably allow for book-and-claim of biomethane, regardless of the type of transportation fuel that it is used to produce. Although CARB projects that long-term compressed natural gas (“CNG”) demand will decline, it is critical that CARB remain technology-neutral in its policies to drive innovation. Additionally, allowing for book-and-claim of biomethane used to produce any type of transportation fuel ensures that greenhouse gas reductions can be achieved while infrastructure is built out for other fuels, such as renewable hydrogen. The ability to use book-and-claim accounting should be based on science and the opportunity to realize reductions in CI for transportation fuels, rather than on arbitrary incentives for any particular fuel type. As stated above, CARB must align with AB 32 and draft a regulation “in a manner that is equitable.”⁶

VII. Crop-Based Cap

There is neither a credible basis nor a feasible approach to establish a cap on crop-based biofuels.

Valero also questions how CARB would manage the delay in credit generation from crop-based fuels. Given the LCFS reporting scheme, initial data submittal to CARB and subsequent credit generation is delayed by a time period between three and six months.

⁷ 2022 Scoping Plan for Achieving Carbon Neutrality. (2022, November 16). Page 190.
<https://ww2.arb.ca.gov/sites/default/files/2022-12/2022-sp.pdf>

⁸ 2022 Scoping Plan for Achieving Carbon Neutrality. (2022, November 16). Page 11.

Therefore, CARB's implementation of a cap would be infeasible and any sort of arbitrary cap will likely always be exceeded by actual production due to this delay that is built into how the system is administered.

Valero also questions how CARB would manage the delay in credit generation from crop-based fuels. Given the LCFS reporting scheme, data submittal to CARB and subsequent data generation is delayed by a time period between three and six months. Therefore, CARB's implementation of a cap would be infeasible due to this delay.

Furthermore, current flexibility within the LCFS program (which does not cap crop-based biofuels) allows the market to adjust naturally in the case of unforeseen circumstances. For instance, during the COVID-19 pandemic in 2020, animal fat production and used cooking oil collection rates significantly fell as countries locked down and restaurants closed. The closing of restaurants not only impacted used cooking oil production (which is a renewable diesel feedstock), but also reduced both the demand for finished animal proteins and the amount of animal fat supply. To exacerbate this, distillers' corn oil overall production fell in line with ethanol and gasoline consumption. To fill in this supply gap, soybean oil increased as a renewable diesel feedstock; however, its use declined again starting in 2021. Such unexpected volatility in the market can recur and with any arbitrary cap imposed by CARB would only serve to exacerbate any feedstock supply bottlenecks that could occur.

Finally, if a cap on crop-based biofuels were implemented, this would conflict with other CARB regulations. Specifically, all California gasoline is currently required to contain 10% ethanol, and California is considering allowing up to 15% ethanol. Caps on crop-based biofuels therefore have the potential to restrict supply of gasoline in California, which could result in shortages and other adverse impacts to consumers as well as suppliers. CARB should consider the long-term impacts of creating a credit program specifically to send a market signal to incentivize significant investment and then arbitrarily changing that incentive structure once investments have been made. The lack of regulatory stability may be viewed as a risk factor that will discourage future projects requiring significant capital investment.

a. Indirect Land Use Change Factors Already Penalize Crop-Based Fuels and Should be Updated

During the Workshop, numerous stakeholders expressed concerns about instituting arbitrary limits, questioned assumptions on use of virgin oil, and asked if a cap on crop-based fuels could delay California achieving its climate goals. Valero agrees that CARB should be leveraging the previous modeling research on factors for indirect land use change ("ILUC"), which is an existing framework within the LCFS for evaluating crop-based fuels. Additionally, using a model such as CARB's California Transportation Supply Model, rather than an arbitrary cap, would be

preferred. Using the existing framework along with science-based modeling would continue to keep the LCFS as a feedstock- and technology-neutral program.

A large opportunity exists for CARB to update ILUC emission factors, resulting in more accurate quantification of emissions reduction. CARB should incorporate into the CA-GREET model *regional* ILUC factors, by crop. Such an action would ensure consistency with the 2022 Scoping Plan:

“California must use the best available science to ensure that raw materials used to produce transportation fuels do not incentivize feedstocks with little to no GHG reductions from a life cycle perspective.”⁹

In the current CA-GREET model, all feedstock-specific crops are treated with the same ILUC factor, regardless of geographic region or how long the land has been farmed. In the example of corn originating from the U.S. Midwestern region, land has typically been farmed for corn intended for ethanol production for generations. However, land used to farm sugarcane in some foreign jurisdictions may have been recently deforested¹⁰. From 2016 onward, California has seen a rapid increase in sugarcane ethanol in the market, while the amount of corn-based ethanol has fallen¹¹. Since CARB currently uses ILUC factors of 19.8 gCO₂e/MJ and 11.8 gCO₂e/MJ for corn-based ethanol and for sugarcane ethanol, respectively, foreign sugarcane-based ethanol can be unfairly incentivized. However, the farming practices in the U.S. Midwest means that corn grown in this region has a very low ILUC – which is in line with CARB’s LCFS program goals.

CARB should update the ILUC factors for all feedstocks to be representative of farming practices by region, similar to how grid electricity is handled in the CA-GREET model. Doing so would continue to fairly examine the land use change effects of various crop-based fuels, but would also serve to further incentivize using feedstocks from regions with more sustainable farming practices.

b. Crop-Based Fuel Production Combined with Carbon Capture and Sequestration

Additionally, CARB should consider that many crop-based fuel projects are currently being developed that involve sequestration of CO₂ emissions. Such projects will drastically lower the CI of the resulting transportation fuels, which is in line with Governor Newsom’s goal to incorporate industrial carbon capture into carbon

⁹ *Id.* at Page 191.

¹⁰ Lima, M., Silva Junior, C. A. da, Pelissari, T. D., Lourençoni, T., Luz, I. M. S., & Lopes, F. J. A. (2020). *Sugarcane: Brazilian public policies threaten the Amazon and Pantanal biomes. Perspectives in Ecology and Conservation*, 18(3), 210–212. <https://www.sciencedirect.com/science/article/pii/S2530064420300262>

¹¹ LCFS Data Dashboard, Figure 10 (updated 9/12/22) - Underlying Data Table. <https://ww2.arb.ca.gov/sites/default/files/2022-09/Fig10.xlsx>

neutrality efforts¹². A cap on crop-based fuels would dramatically reduce the innovation and incentivization of carbon capture and sequestration (“CCS”).

c. Distillers’ Corn Oil from Ethanol Plants

CARB should not consider distillers’ corn oil (“DCO”) from ethanol plants as a “virgin oil feedstock”, since it is inedible and not designed for human consumption.¹³ Its alternative uses, other than as a renewable diesel feedstock, are as animal feed or common industrial products – which is different from both soy and canola oils. DCO is a byproduct of the ethanol production process; corn is not grown strictly to provide DCO, and a different milling process is used to make food-grade corn oil.

Given this fact, CARB must exclude DCO from any potential crop-based feedstock cap that it is considering, as the conversion of DCO to a renewable transportation fuel would not impact the food supply.

d. Cover Crops

Cover crops, which are a potential crop-based feedstock grown on land typically devoted to another crop and grown during the base crop’s “off-season”, would have no impact to either land-use or to food supply. Cover crops could generate crop-based transportation fuels from a feedstock not currently available. CARB should promote such innovation in farming and fuels manufacturing rather than trying to limit crop-based fuels in California. As noted in the 2022 Scoping Plan, California “must continue to support low-carbon liquid fuels during this period of transition and for much harder sectors for ZEV technology such as aviation, locomotives, and marine applications”.¹⁴ Oils derived from cover crops are primed to be used for renewable diesel production in lieu of other feedstocks, such as soybean oil. CARB should encourage the use of feedstocks derived from cover crops by incorporating these oils into both the LCFS and the Tier 1 calculators.

VIII. Electric Forklifts

Valero agrees that CARB should require metering of power used to charge electric forklifts and to generate credits, which ensures that credits generated by liquid fuels and by electric vehicles (EVs) are equitably held to the same verification standard. Fuel pathway holders and fuel reporting entities are required to undergo an annual third-party

¹² *Governor Newsom Calls for Bold Actions to Move Faster Toward Climate Goals*. (2022, July 23). California Governor. <https://www.gov.ca.gov/2022/07/22/governor-newsom-calls-for-bold-actions-to-move-faster-toward-climate-goals/>

¹³ “Animal, vegetable or mineral (oil)?”. Page 7. <https://theicct.org/wp-content/uploads/2022/01/impact-renewable-diesel-us-jan22.pdf>

¹⁴ 2022 Scoping Plan for Achieving Carbon Neutrality. (2022, November 16). Page 190. <https://ww2.arb.ca.gov/sites/default/files/2022-12/2022-sp.pdf>

verification in which reported data is verified *to the gallon* and where even a late meter calibration can result in a *qualified positive* verification statement.¹⁵

Valero also agrees that CARB should shift credit generation to the metering equipment owner. Shifting the credit generation to the owner of the metering equipment aligns better with other means of credit generation in the LCFS, since credits are typically generated by the provider of a low-carbon transportation fuel.

Valero recognizes that the continued use of an electricity efficiency ratio (EER) greater than one (1) has resulted in credit generation for e-forklifts far in excess of the true GHG emissions avoided.¹⁶ This misrepresentation of GHG reductions is not technology neutral, as it creates excess credits for e-forklifts while depressing the value of credits generated for low carbon liquid fuels. The disparity is especially true when an e-forklift is purchased to replace an existing e-forklift or is purchased as part of fleet expansion. Given that over 50% of the forklift fleet is electrified, the replacement of e-forklifts will become more common. Therefore, the continued use of an EER greater than one (1) will increasingly misrepresent GHG reductions, and CARB should apply an EER of one (1) to all e-forklifts.

Additionally, in the Workshop, CARB proposed adjustments to the calculation of credits for electric forklifts based on their lifting capacity. While Valero appreciates CARB's attempt to adjust for existing fleet electrification, CARB should present data to support its claim that it is appropriate to adjust the EER for smaller forklifts with a lifting capacity of less than 12,000 pounds. Not presenting supporting documentation creates an appearance that CARB arbitrarily reduces credit generation opportunities, which reduces long-term faith and investment in the market.

IX. Streamlining Opportunities

a. Temporary Pathway Credit True-Up

CARB should allow a credit true-up back to the first full quarter of a project's operation, with a corresponding temporary pathway. As discussed above, the ability of a fuel pathway applicant to plan appropriately and to provide economic justification assists in incentivizing projects, which will inherently increase the number of projects in alignment with the following statement in the draft 2022 Scoping Plan:

"Private investment in alternative fuels will play a key role in diversifying the transportation fuel supply away from fossil fuels."¹⁷

¹⁵ See Title 17 CCR § 95481(a)(125).

¹⁶ Murphy, Colin. *Improving Credit Quantification Under the LCFS: The Case for a Fractional Displacement Approach*. (2022, December 21). <https://escholarship.org/uc/item/0px4m8hz>

¹⁷ CARB Draft 2022 Scoping Plan Update. (2022, May 10). Page 180.
<https://ww2.arb.ca.gov/sites/default/files/2022-05/2022-draft-sp.pdf>

This true-up should be allowed in the event that the temporary pathway is extended, even if retroactive credits would be generated outside of the open reporting period. Extensions to the credit true-up should be automatically granted once the fuel pathway is certified to replace the temporary pathway, as long as the validation of the fuel pathway was continually active (even if the validation was extended past six months with CARB's approval by resubmitting the pathway report to keep the validation active).

b. Align Updates of Emission Factors and California CI for Grid Electricity

Valero requests that CARB update the emission factors for grid electricity for all regions on the same schedule as CARB updates the California CI for grid electricity. After establishing a cohesive timeline, CARB would then update the associated GREET and Tier 1 models to account for the grid emission factor changes.

c. Opportunity to Adopt Carbon Smart Agriculture

Valero sees an opportunity for CARB to be an early adopter of carbon smart agriculture ("CSA") by allowing regionally-collected data to be used in Tier 1 calculators for crop-based fuels. Many third-party farm data collection methods are available to calculate more exact CI scores for crop-based fuels; furthermore, CARB's allowance of such data would encourage feedstock aggregators to purchase from farms using better-than-average climate practices. In turn, CARB would be driving positive climate practices to farms beyond California.

X. Oil Production Greenhouse Gas Emission Estimator/Crude Lookup Table

Valero disagrees with the proposed updates to the "Carbon Intensity Lookup Table for Crude Oil Production and Transport" table in the LCFS, which is based on a revised Oil Production Greenhouse Gas Emission Estimator ("OPGEE") model. CARB's proposed table shows higher CIs for US-based crude oil than is published in the current version of the LCFS, but Valero would expect to see the CIs reduce over time.

CARB should further examine the venting and fugitive emissions estimations outlined in Section 8 of the OPGEE User Guide and Technical Documentation.¹⁸ Fugitive emissions estimations for well pads in the OPGEE are partially based on a paper published in 2015¹⁹; Valero specifically notes that for US-based upstream and midstream oil and gas operations, such science may be outdated. The U.S. EPA has published multiple New Source Performance Standards ("NSPS") requiring controls on upstream and midstream

¹⁸ OPGEE User Guide and Technical Documentation. (2023, February 21).
<https://ww2.arb.ca.gov/resources/documents/lcfs-crude-oil-life-cycle-assessment>

¹⁹ The OPGEE User Guide and Technical Documentation points to a paper by Rutherford, J.a, "Closing the methane gap in US oil and natural gas production emissions inventories" (2021), which is based on data from 2015.
<https://www.nature.com/articles/s41467-021-25017-4>

oil and gas facilities starting in 2012,²⁰ with two additional NSPS regulations being proposed by U.S. EPA on December 5, 2022.²¹

The OPGEE model documentation states that “[t]ypically, in the US, most wells by count are low throughput although most oil and gas production is from high productivity wells”.²² Although the OPGEE model seems to attempt correction of fugitive emissions data to a “per production” basis (rather than “per well”), the model may not be accounting for large US-based crude oil production volumes originating from sites that are both equipped with lower-leak equipment and also included in leak detection and repair programs. Furthermore, these sites are typically restricted from tank venting or flaring due to the NSPS; such activities were historically large contributors to emission profiles.

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Valero appreciates the opportunity to provide feedback at this critical stage of the LCFS amendments development. Should you have any questions, please contact me at 210-345-4239 or via email at Jennifer.Bond@Valero.com.

Sincerely,



Jennifer Bond

Director Fuel Regulatory Planning & Assurance

²⁰ Title 40, Code of Federal Regulations, Subpart OOOO; published August 16, 2012. Title 40, Code of Federal Regulations, Subpart OOOOa; published June 3, 2016.

²¹ <https://www.regulations.gov/document/EPA-HQ-OAR-2021-0317-1551> and <https://www.regulations.gov/document/EPA-HQ-OAR-2021-0317-1552>

²² OPGEE User Guide and Technical Documentation. (2023, February 21). Page 343. <https://ww2.arb.ca.gov/resources/documents/lcfs-crude-oil-life-cycle-assessment>

