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November 3, 2020

Acting Chief
Transportation Fuels Branch
California Air Resources Board
P.O. Box 2815
1101 I Street
Sacramento, CA 95814

Re: NBB Comments on Potential LCFS Regulation Revisions

To Whom It May Concern:

Thank you for the opportunity to provide comments on potential Low Carbon Fuel Standard (LCFS) regulation revisions, which were discussed at a workshop held by California Air Resources Board (CARB) staff October 14-15, 2020. As the U.S. trade association representing the entire biodiesel and renewable diesel value chain, including producers, feedstock suppliers, and fuel distributors, the National Biodiesel Board (NBB) is pleased to offer the following comments for your consideration.

NBB has been fully supportive of efforts to address climate change and has been a strong partner in California, Oregon, and many other jurisdictions that have developed or are developing programs to reduce climate impacts from the use of petroleum fuels. We applaud CARB's efforts to update the LCFS program to correct errors, address concerns, and reflect learnings gained since the regulation was last amended in the 2018 rulemaking. We continue to appreciate CARB's commitment to using the most robust and up-to-date science in the LCFS program. Further, we understand and support CARB's intent to develop post-2030 carbon intensity (CI) reduction targets, either in this rulemaking or the next, pursuant to Governor Newsom's Executive Order N-79-20 and California's climate goals of a 40% reduction in greenhouse gas (GHG) emissions by 2030 and 80% by 2050 (both relative to a 1990 baseline).

As discussed at the October 14th workshop, CARB staff is seeking to update the Oil Production Greenhouse Gas Emissions Estimator (OPGEE), create additional simplified tier 1 calculators, and update existing ones.[1][2] Given the complexity of those proposed updates, we believe it is

[1] https://ww2.arb.ca.gov/sites/default/files/2020-10/101420presentation_stanford_opgee.pdf.
[2] https://ww2.arb.ca.gov/sites/default/files/2020-10/101420presentation_carb.pdf (slide 14)

appropriate to incorporate less complex updates for biofuels, specifically updates to the datasets for modeling indirect land use change (ILUC) and calculations for direct CI emissions pertaining to biodiesel and renewable diesel production (biomass-based diesel or BMBD). We are requesting that CARB staff update, as part of this rulemaking, the datasets underpinning the GTAP-BIO and AEZ-EF models, as well as make other updates to direct CI calculations for biomass-based diesel, as discussed in more detail below.

Updates to Underlying Datasets for GTAP-BIO and AEZ-EF

As noted, we are requesting CARB staff to update the underlying datasets for GTAP-BIO and AEZ-EF for soy, canola, and other crop-based fuels. CARB last updated these datasets in its 2015 rulemaking, using data that was already four or more years old at that time, much of which was not based on scientific observation. Since 2015 significant advances have been made in the literature to update the underlying datasets. Many of these advances allowed GTAP-BIO to reflect scientific observation, rather than solely modeled projections. Updating the databases associated with these models would demonstrate CARB's commitment to using the most up-to-date and robust scientific data. To be clear, we are asking for an update of those datasets, not the modeling tools themselves, to ensure the LCFS continues to reflect the latest scientific developments and data generated over recent years.

The research communities' GTAP-BIO and AEZ-EF modeling runs, using the updated datasets, indicate the potential for significant corrections to the ILUC scores that would more accurately reflect real-world observations made since 2015 (see Attachment 1).

Updates to Various Inputs for Direct CI Calculations for BMBD Fuels

Over the past several years, our members have worked closely with CARB staff in implementing the LCFS program. During that time, a number of corrections, errors, and other needed adjustments have been identified by our members; most of those adjustments have been noted for CARB staff. Accordingly, we request that the direct CI corrections identified in Attachment 1 be considered for formal incorporation into CA-GREET 3.0 to ensure the LCFS continues to reflect the latest science. These changes are consistent with CARB's proposed workplan outlined in the October 14th presentation[3].

Important Role BMBD Serves in the LCFS Program

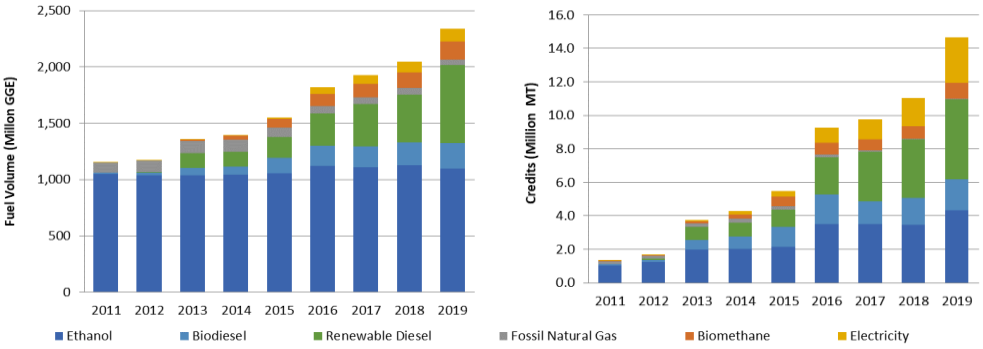
Biomass-based diesel reduces GHGs by upwards of 86%[4] or more and has reduced emissions by over 27 million metric tons in California since 2011 and by 6.6 million metric tons in 2019 alone,

[3] Ibid

[4] Depending on the feedstocks used, BMBD have been scored in California with carbon intensity as low as 8-16, CA LCFS certified "Current Fuel Pathways,"

equivalent to removing more than 1.4 million cars off the road last year. These substantial GHG reductions have helped California reach its 2020 GHG targets four years ahead of schedule[5]. Biomass-based diesel has also helped diversify California's fuel pool and made the diesel fuel pool significantly more sustainable (Fig. 1).

Fig. 1 Growing Diversification of California's Fuel Pool Under the LCFS[6]



Biomass-based diesel has played a key role in the LCFS, providing nearly half (45%) of the LCFS carbon reductions over the last two years and 41% overall since 2011[7] (Fig. 2). These sustainable diesel replacements have grown from a mere 14 million gallons in 2011 to 830 million gallons in 2019[8] (nearly 6000% growth), so that nearly a quarter (22%) of the diesel fuel pool now comprises biomass-based diesel. And that growth is expected to continue as California progresses toward its 20% carbon intensity reduction target in 2030. Indeed, the University of California at Davis has identified the need for up to 60-80% of the diesel fuel pool in California to be replaced by biomass-based diesel if California is to achieve its 2030 target[9].

https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/current-pathways_all.xlsx, accessed Oct. 31, 2020.

[5] California Air Resources Board press release, https://ww2.arb.ca.gov/news/climate-pollutants-fall-below-1990-levels-first-time, accessed Oct. 31, 2020.

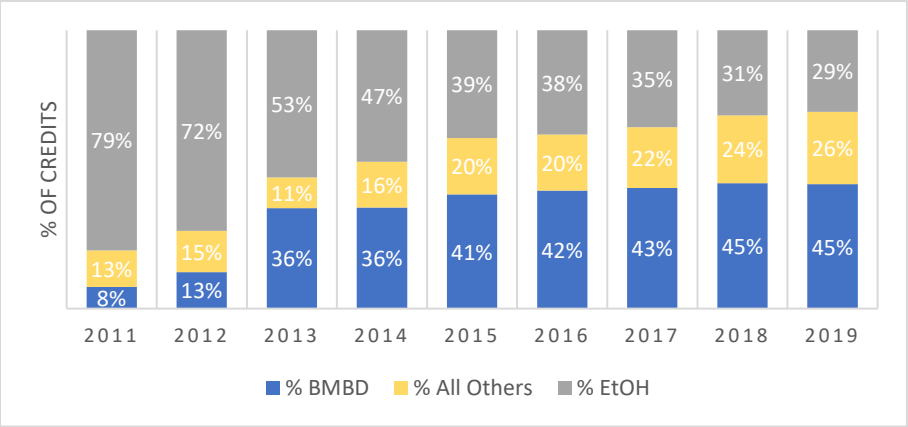
[6] California LCFS Dashboard, July 2020, https://ww3.arb.ca.gov/fuels/lcfs/dashboard/dashboard.htm.

[7] Ibid.

[8] Ibid.

[9] Bushnell et al. (Feb. 2020), "Uncertainty, Innovation, and Infrastructure Credits: Outlook for the Low Carbon Fuel Standard Through 2030," University of California Institute of Transportation Studies, at v.

Fig. 2 Biomass-based Diesel's Share of LCFS Carbon Reductions



The growth in California of biomass-based diesel translates to displacement of over 3.3 billion gallons of petroleum diesel since 2011. This represents a reduction in the state's carbon emissions of over 27 million metric tons since the LCFS began, or equivalent to removing about 5.5 million cars off the road since 2011.

Requested Updates Yield Significant GHG Benefits

Significant advancements have been made in expanding and updating the database which supports GTAP-BIO as well as to the direct emission calculations. Nearly all the updates we are suggesting in our written comments and in the attachment were peer-reviewed and published as part of Argonne National Lab's 2018 review of several biodiesel pathways[10]. Adopting the most modern database would be consistent with CARB's stated approach of using the most up to date science and literature.

The 2015 rulemaking was the last to cover indirect land use change, since then researchers have included additional, critical functionality to the database, including agricultural intensification[11] [12]. Additional functionality was also included to recognize the environmental contribution of feed-land substitution[13]. Most critically, the 2015 CARB modeling relied on 2004 economic data. GTAP's database is now updated to reflect economic data from 2011 and shortly will reflect 2014. It is also important that CARB runs GTAP-BIO as it is intended to be run. As noted in a 2016 report to the Coordinating Research Council, CARB adjusted the default

[10] Chen, R., Qin, Z., Han, J., Wang, M., Taheripour, F., Tyner, W., . . . Duffield, J. (2018). Life cycle energy and greenhouse gas emission effects of biodiesel in the United States with induced land use change impacts. Bioresource Technology, 251, 249-258.

[11] Taheripour, F., Cui, H. and Tyner, W.E., 2017. An Exploration of agricultural land use change at the intensive and extensive margins: implications for biofuels induced land use change. Bioenergy and Land Use Change, pp.19-37.

[12] Taheripour, F., Zhao, X. and Tyner, W.E., 2017. The impact of considering land intensification and updated data on biofuels land use change and emissions estimates. Biotechnology for biofuels, 10(1), p.191.

[13] Taheripour, F. and Tyner, W.E., 2020. US biofuel production and policy: implications for land use changes in Malaysia and Indonesia. Biotechnology for Biofuels, 13(1), p.11.

GTAP yield price elasticities (YDEL) to be based on short-term elasticities which was inconsistent with the medium-term time horizon of GTAP. In addition, the total cropland addition results were interrupted incorrectly, CARB calculated the average result of five YDEL cases, rather than running the model once, how its intended to be run, with a average YDEL scenario.[14]

Running updated ILUC scenarios with the additional data and functionality will allow the model to more accurately reflect the world that is unfolding, rather than the world that was predicted by Searchinger. NBB has modeled that if GTAP-BIO and AEZ-EF were updated to reflect the current literature (2011 economic data), soy oil- and canola oil-based biofuel's ILUC penalty would be reduced to 17.5 and 11.7 g CO2e/MJ respectively[15].

Incremental Credit Generation from 1,000,000 Gallons with Revised ILUC (MT CO2e)		
Feedstock	**Biodiesel**	**Renewable Diesel**
Soy Oil	1,463	1,504
Canola Oil	353	363

In addition to updating GTAP-BIO and AEZ-EF, NBB is also requesting that CARB update the tier 1 BD-RD calculator and GREET 3.0 model to both reflect the current state of the literature and to correct a few minor mistakes. We ask that CARB update the tallow (animal fat) pathway to reflect the current literature, which corrected an 96.2% overestimation of energy consumption currently reflected in CARB models[16]. NBB is also requesting that CARB correct the double counting of corn oil extraction emission which is reflected in the biodiesel corn oil pathway. The current pathway within the tier 1 BD-RD calculator charges corn oil with a 2.81 g CO_2e/MJ debit associated with extraction energy at the ethanol plant. These emissions are improperly double counted as the ethanol plant is already charged for the energy consumption associated with corn oil extraction.

Incremental Credit Generation from 1,000,000 Gallons with Revised CI (MT CO2e)		
Feedstock	**Biodiesel**	**Renewable Diesel**
Tallow (Animal Fats)	1,009	1,037
Distillers Corn Oil	355	364

If CARB were to adopt the changes proposed in our written comments and attachment 1, we calculate the LCFS program could generate an additional 17,000,000 incremental credits between 2021 and 2030 if the California fuel pool were to become 100% biomass-based over that timeframe. In 2030 assuming the entire diesel pool is biomass-based, the outlined changes

[14] http://crcsite.wpengine.com/wp-content/uploads/2019/05/E-88-3b-Final-Report-2016-08-23_v2.pdf
[15] Current iLUCs are 29.1 and 14.5 for soy oil and canola oil respectively.
[16] https://greet.es.anl.gov/publication-beef_tallow_update_2017

are adopted, and the feedstock mix remains relatively constant, biodiesel and renewable diesel would generate approximately 27,000,000 credits annual, nearly enough to cover the entire gasoline obligation if the current gasoline pool remains unchanged. Even if biodiesel and renewable diesel do not replace all fossil diesel, it is clear that absent dramatic increases in light duty electrification, biodiesel and renewable diesel will continue to be foundational in fulfilling the overall GHG reduction target of the program.

Additional updates to the GREET model are included in attachment 1. We hope that CARB will consider including these updates in addition to those outlined above as soon as possible so that the LCFS program can continue to have a solid foundation based on the best available science.

Support for Bifurcating Clean-Up and Post-2030 Target Setting Rulemakings

At the workshop, CARB staff requested stakeholder input on whether to incorporate the post-2030 target setting effort into this current rulemaking, which was originally intended to address relatively minor cleanup and corrections such as the updates and adjustments discussed in this letter. The effect of including the post-2030 target setting in this rulemaking would likely be to extend a 1 year rulemaking to 1.5-2 or more years, with an implementation date even further down the road. This would significantly delay the updates we are requesting, thereby adversely harming the biofuels industry. Accordingly, we request that CARB staff pursue a two-rulemaking process, with the current rulemaking effort focused on implementing program updates and corrections, including the ones we have requested in this letter, while tackling the post-2030 target in a separate rulemaking after the current one.

Support for True Up Credits

NBB supports staff's consideration of a true-up provision[17]. This provision will help provide certainty to biofuel producers who are on the verge of having their currently approved CIs retired at the end of 2020 due in a large part to a delay in validation and verification under the new 3rd party audit scheme. Absent adoption of this provision, biofuel producers and the LCFS program stand to lose significant credit generation opportunities for an unknown period. If producers are required to transition to conservative, temporary carbon intensities they lose the ability to capture large portions of their credit value for an unknown amount of time. This could put producers in financially precarious position as their revenue may sharply decline while their input costs would likely remain constant.

Expansion of Book-and-Claim Accounting

We encourage CARB staff to expand the current book-and-claim accounting provisions. Specifically to allow for low-carbon intensity electricity and biomethane to be indirectly

[17] https://ww2.arb.ca.gov/sites/default/files/2020-10/101420presentation_carb.pdf (slide 15)

accounted for when used to reduce the emissions associated with the production of transportation fuels that are supplied to California. This expands on the existing language[18] which allows for book-and-claim accounting of electricity and biomethane when supplied as vehicle fuel or to produce hydrogen. We hope revised and expanded language would create more opportunities for low carbon fuels to participate and would also alleviate challenges with the existing rules.

The current language is restrictive, holding back the deployment of ultra-low carbon intensive fuels. While the current regulation allows biofuel producers to produce renewable electricity onsite and recognize an environmental benefit, this option is often impractical due to several factors including city ordinances, proximity to airports, and local availability of land. Allowing producers additional flexibility to procure offsite renewables, while also maintaining additionality, would be the desired outcome. NBB believes this is possible by requiring the use of a virtual power purchase agreements or similar agreements to ensure the emissions reductions are not double counted and additionality is achieved. In addition to allowing for new end uses, we ask that CARB clarify in the regulation the term 'local balancing authority'[19]. We encourage CARB to consider a more commonly understood system boundary such as local RTO or ISO when designating where qualifying low-carbon electricity can be *booked* relative to the entity wishing to *claim* the low-carbon electricity.

Second, we ask that staff expand the book-and-claim provisions for biomethane, allowing biomethane to offset emission associated with the production of transportation fuels, such as running a steam boiler. The current biomethane provision faces similar challenges to the electricity book-and-claim provision, requiring liquid biofuel producers to build biomethane production facilities behind the fence. This too is often infeasible for similar regulatory and economic reasons. Expansion of this provision will allow additional, critical market opportunities for biomethane production is it is quickly outstripping the current California transportation market. Additionally, expanding qualifying end uses would have the benefit of significantly simplifying the existing biomethane book-and-claim provision for hydrogen production which requires reactor feed methane and boiler feed fuel to be calculated and metered separately when biomethane is used.

EER

We appreciate staff's desire to simplify and clarify the regulation where possible. We are under the impression that simplification and clarification is the intent of the proposed changes to the EERs in the regulation[20]. While simplicity is appreciated, our members have expressed concern

[18] 85488.(i)
[19] 85488.8(i)(1)(A)
[20] https://ww2.arb.ca.gov/sites/default/files/2020-10/101420presentation_carb.pdf (slide 19)

that removal of the default EER of 1 would lead to a requirement that biodiesel and renewable diesel go through an EER certification for each mode of transit they serve. Imposing this new requirement would be impractical now that biodiesel and renewable diesel are approximately 24% of California's diesel fuel pool and there has been no research or anecdotal evidence to show that fuel economy has been affected. We ask that CARB clarify their intent with the removal of the default EER of 1, specifying how it will impact commercially available biofuels who rely on that EER.

Conclusions

We applaud California's efforts to address climate change and strongly encourage CARB to continue updating the LCFS so it reflects the best available science, including direct observational data such as updates we requested. We appreciate the good working relationship we have developed with CARB over many years and look forward to working cooperatively and productively to address the concerns we raised above. Adoption of these recommendations will help ensure that biomass-diesel fuels will continue to play the strong role they have played historically and must continue to play while California works toward a much lower carbon future.

Sincerely,

Matt Herman

Matt Herman
Director of Environmental Science

Attachment 1
(Summary of LCA Updates)

POST-2015 UPDATES TO DIRECT AND INDIRECT CARBON INTENSITY VALUES AND PARAMETERS

DIRECT/ INDIRECT EMISSIONS	MODEL	FEEDSTOCK	UPDATE NEEDED	CURRENT VALUE/CI	UPDATED VALUE/CI	REFERENCE/COMMENTS
DIRECT	CA-GREET	Tallow	Rendering Energy	3944 BTU/lb. This is about **18 g/MJ**	2211 BTU/lb. This is about **10 g/MJ** (GREET 2019)	Chen, R., Qin, Z., Han, J., Wang, M., Taheripour, F., Tyner, W., O'Connor, D. and Duffield, J., 2018. Life cycle energy and greenhouse gas emission effects of biodiesel in the United States with induced land use change impacts. Bioresource Technology, 251, pp.249-258. https://www.sciencedirect.com/science/article/pii/S0960852417321648/pdfft?md5=768c9ac49614fbb7252d0ff821fa3ea9&pid=1-s2.0-S0960852417321648-main.pdf Updates on the Energy Consumption of the Beef Tallow Rendering Process and the Ratio of Synthetic Fertilizer Nitrogen Supplementing Removed Crop Residue Nitrogen in GREET. https://greet.es.anl.gov/files/beef_tallow_update_2017
DIRECT	CA-GREET	Uncooked UCO	Rendering Energy	1073 BTU/lb This is about **5.3 g/MJ**	300 BTU/lb This is about **2 g/MJ**	A new pathway with a default values is recommended for this feedstock. Several renderers have supplied ARB with data on energy use for uncooked UCO rendering operations and these are conservative values. This would restore one of the default pathways that was present in the original regulations.
DIRECT	CA-GREET	Hydrogen	Energy Density	290 BTU/lb	274 BTU/lb	The current value is temperature corrected at 32F whereas the standard for measurement is 60F. CARB has accepted this change but only in approved Tier 2 applications.
DIRECT	CA-GREET	Hydrogen	Carbon Intensity	106,907 g/mm BTU	105,612 g/mm BTU	Existing value includes 150 miles of hydrogen pipeline transportation, which is not applicable in most cases. CARB has also accepted this change on a petition specific basis.
DIRECT	CA-GREET	Corn Oil	Extraction CI	**13.27 g/MJ**	**10.46 g/MJ**	2.81 g/MJ for corn oil extraction is improperly double counted as both an ethanol debit and a biodiesel feedstock debit.

POST-2015 UPDATES TO DIRECT AND INDIRECT CARBON INTENSITY VALUES AND PARAMETERS

DIRECT/ INDIRECT EMISSIONS	MODEL	FEEDSTOCK	UPDATE NEEDED	CURRENT VALUE/CI	UPDATED VALUE/CI	REFERENCE/COMMENTS
INDIRECT	GTAP-BIO	Soy	Various, as shown below	**29.1 g/MJ**	**17.5 g/MJ**	
			Using model parameters recommended by GTAP developers	**29.1** →	22.4	Follow-On Study of Transportation Fuel Life Cycle Analysis: Review of Current CARB & EPA Estimates of Land Use Change Impacts http://crcsite.wpengine.com/wp-content/uploads/2019/05/E-88-3b-Final-Report-2016-08-23_v2.pdf
			Updating to 2017 GTAP model (includes intensification changes) and 2011 data base.	22.4 →	18.3	Taheripour, F., Cui, H. and Tyner, W.E., 2017. An Exploration of agricultural land use change at the intensive and extensive margins: implications for biofuels induced land use change. Bioenergy and Land Use Change, pp.19-37. https://doi.org/10.1002/9781119297376.ch2 Taheripour, F., Zhao, X. and Tyner, W.E., 2017. The impact of considering land intensification and updated data on biofuels land use change and emissions estimates. Biotechnology for biofuels, 10(1), p.191. https://biotechnologyforbiofuels.biomedcentral.com/track/pdf/10.1186/s13068-017-0877-y
			Including feed-land substitution in GTAP	18.3 →	**17.5**	Taheripour, F. and Tyner, W.E., 2020. US biofuel production and policy: implications for land use changes in Malaysia and Indonesia. Biotechnology for Biofuels, 13(1), p.11. https://link.springer.com/content/pdf/10.1186/s13068-020-1650-1.pdf

POST-2015 UPDATES TO DIRECT AND INDIRECT CARBON INTENSITY VALUES AND PARAMETERS

DIRECT/ INDIRECT EMISSIONS	MODEL	FEEDSTOCK	UPDATE NEEDED	CURRENT VALUE/CI	UPDATED VALUE/CI	REFERENCE/COMMENTS
INDIRECT	GTAP-BIO	Canola	Various, as shown below	**14.5 g/MJ**	**11.7 g/MJ**	
			Using model parameters recommended by GTAP developers	**14.5**		Follow-On Study of Transportation Fuel Life Cycle Analysis: Review of Current CARB & EPA Estimates of Land Use Change Impacts http://crcsite.wpengine.com/wp-content/uploads/2019/05/E-88-3b-Final-Report-2016-08-23_v2.pdf
			Updating to 2017 GTAP model (includes intensification changes) and 2011 data base.			Taheripour, F., Cui, H. and Tyner, W.E., 2017. An Exploration of agricultural land use change at the intensive and extensive margins: implications for biofuels induced land use change. Bioenergy and Land Use Change, pp.19-37. https://doi.org/10.1002/9781119297376.ch2 Taheripour, F., Zhao, X. and Tyner, W.E., 2017. The impact of considering land intensification and updated data on biofuels land use change and emissions estimates. Biotechnology for biofuels, 10(1), p.191. https://biotechnologyforbiofuels.biomedcentral.com/track/pdf/10.1186/s13068-017-0877-y
			Including feed-land substitution in GTAP		**11.7**	Results have not been published for US canola biodiesel shock but similar percentage reductions can be expected for canola as were found for soy oil