Clean Fuels
ALLIANCE AMERICA

May 31, 2023

Cheryl Laskowski, Chief
Transportation Fuels Branch
California Air Resources Board
1001 I Street
Sacramento, CA 95814

Dear Dr. Laskowski:

Clean Fuels Alliance America (Clean Fuels)[1] appreciates the opportunity to provide comments on the Simplified Tier 1 Calculator for biodiesel and hydroprocessed ester and fatty acid (HEFA) fuels. As you know, biodiesel and renewable diesel continue to provide the lion's share of carbon reductions under the Low Carbon Fuel Standard (LCFS), generating 45% of the LCFS credits in 2022[2], more than electricity, renewable natural gas, and hydrogen combined. We are, therefore, keenly interested in ensuring all calculators CARB uses for conducting greenhouse gas lifecycle assessments (LCA) reflect the latest science and real world data.

For your consideration, we have included a number of comments, suggested edits, and questions to help improve the calculators. Attachment 1 includes a memo from our consultant, Don O'Connor of (S&T)[2] Consultants, with detailed comments on the calculators. In Attachment 2, we include and reiterate the comments on the CA-GREET and ILUC models we made on December 21, 2022, in response to the November 2022 CARB workshop, to the extent the suggested changes have not already been addressed. Since CARB has requested feedback on updating and enhancing the tools it uses for lifecycle assessments (LCA), we reiterate our repeated requests for CARB to update the underlying datasets for the GTAP ILUC modeling. Substantial parts of the underlying ILUC datasets are well over a decade old and thus do not reflect the significant scientific developments and data improvements that have occurred since the 2015 CARB rulemaking.

Further, we encourage CARB staff to review the biodiesel and HEFA calculators for opportunities to incorporate book-and-claim for encouraging the use of renewable natural gas (RNG) to make renewable feedstocks and process inputs for biodiesel (e.g., renewable

[1] Clean Fuels (formerly the National Biodiesel Board) is the U.S. trade association representing the entire supply chain for biodiesel, renewable diesel, and sustainable aviation fuel. Our members are producing fuels that power the most difficult to electrify sectors, including on- and off-road vehicles, marine, rail, aviation, and home and commercial heating.

[2] LCFS Quarterly Data Spreadsheet, dated April 28, 2023.

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methanol) and renewable diesel and sustainable aviation fuel (e.g., renewable hydrogen). The use of such book-and-claim attributes is allowed under the current LCFS regulatory language and is consistent with CARB's aim to find additional markets for RNG use.

Thank you for your consideration. We look forward to continuing our long and productive collaborative relationship with CARB in the years to come.

Regards,

Floyd Vergara, Esq., P.E.
Director of State Governmental Affairs

Attachment 1

(S&T)² Consultants Inc.

Memo

To: Floyd Vergara

From: Don O'Connor

Date: 2023-05-26

Re: Review of CARB Proposed Biodiesel and HEFA Calculators

We have reviewed the proposed Biodiesel and Hefa calculators that CARB has made available for public comment. We have some general comments that apply to both calculators and then some specific comments on each calculator.

General Comments

It is not stated which set of GWPs are being used in the calculators. In one of the biomethane calculators the methane GWP is hardcoded as 25, which is the value from the IPCC 4th assessment report, so presumably the calculators are still using the 4th AR GWPs.

Most GHG reporting programs are moving to use the GWPs from the IPCC 5th Assessment Report. The US EPS National Inventory Report released in April 2023 uses the GWPs from the 5th AR. This would be an ideal time for the LCFS to make the change to using the GWPs from the 5th Assessment report. GREET 2022 has the option of generating emission factors using the GWPs from the 4thm 5th and 6th Assessment Report so generating the emission factors for using the calculators should not be an issue.

The only emission factors that have been changed are the e-grid factors, the emission factor for natural gas, for hydrogen, and for UCO. While GREET 2022 is cited as the reference for the other emission factors in the calculators, in fact they have not changed from the factors that were developed using GREET 2016. Presumably the next release of the calculators will have updated emission factors for other parameters.

Updating the electricity factors is definitely required to reflect the general greening of the American grid over the past six years or more however there is a lack of transparency regarding how some of the emission factors were developed. The electricity factors are inferred to come from the EPS e-grid but the values are not aligned with the 2021 e-grid data. The EPA e-grid factors are also not lifecycle factors as the fuel production emissions are not included and there is no allowance for distribution losses so some adjustment to those factors is required to get the appropriate lifecycle emission factor. The EPA e-grid factors are based on generation which would not account for any imports from outside of the region so the CARB factors make also factor in those emission factors as well. CARB should be more transparent in how the values were developed.

The factors from the CA 3.0 calculators are compared to the 4.0 calculators and the EPA 2021 factors in the following table.

Region	CA GREET 3.0	CA GREET 4.0	2021 EPA e-grid	% change 3.0 to 4.0	e-grid divided by 4.0 calc
	g CO_2eq/kWh				
AKGD	610	307	487	-50%	1.59
AKMS	748	573	221	-23%	0.39
AZNM	162	432	374	167%	0.87
CAMX	461	314	242	-32%	0.77
ERCT	370	449	371	21%	0.83
FRCC	639	473	380	-26%	0.80
HIMS	602	880	519	46%	0.59
HIOA	680	650	747	-4%	1.15
MROE	1,128	780	723	-31%	0.93
MROW	892	517	455	-42%	0.88
NEWE	684	167	247	-76%	1.48
NWPP	357	349	290	-2%	0.83
NYCW	477	365	371	-23%	1.02
NYLI	357	460	553	29%	1.20
NYUP	627	383	106	-39%	0.28
PRMS	231	949	710	311%	0.75
RFCE		520	307		0.59
RFCM	463	625	555	35%	0.89
RFCW	786	558	478	-29%	0.86
RMPA	738	571	529	-23%	0.93
SPNO	851	523	454	-39%	0.87
SPSO	793	512	471	-35%	0.92
SRMV	795	450	352	-43%	0.78
SRMW	614	812	706	32%	0.87
SRSO	924	318	407	-66%	1.28
SRTV	929	500	426	-46%	0.85
SRVC	682	512	292	-25%	0.57

The structure of the new calculators is simpler than the previous ones and that should make them easier to use.

Biodiesel Calculator

The only new feature that impacts the CI of the fuel is an adjustment factor for losses. This is cell E24 on the CA-GREET 4.0 tab. The value is 1.0000387. It is not apparent where this value comes from but it is so small that it will never impact the CI at the second decimal point, so why is it included?

There are a number of issues with the operation of the calculator that are identified below and presented by tab.

Feedstock Inputs Tab

We have the following comments and suggestions with respect to the feedstock tab.

1. Cell D16 has a drop down menu with only #name? in it. What is the intent here? (default or user defined?)

2. Is the intent for cell D17 to be completed automatically? Perhaps if D16 is user defined?

3. Ocean transport. Why not include the emission factors for different size vessels in the calculator and have cell D21 populated with the appropriate emission factor rather than have applicants calculate it themselves using GREET 2022?

4. Is ten feedstocks enough for biodiesel plants that have a number of joint pathways with feedstock producers?

5. The drop down menu (G2) to navigate to a different feedstock does not work.

6. The provision for the site specific emission factors for oil extraction should be welcomed by the industry.

The feedstock transport emissions are being calculated based on all of the feedstock used rather than the feedstock delivered, this is a significant improvement over version 3.0.

Biodiesel Production Inputs Tab

There are some plants that have additional co-products such as soap stock to slop oil. Can a button be added for a user defined co-product?

There is no provision for the use of RNG instead of fossil natural gas.

There is no provision for low CI methanol use.

Pathway Summary Tab

There are a number of issues with this tab.

1. The biodiesel dispensed would be better called the biodiesel distributed. There is a loss factor that is applied to get the BD dispensed. Where did this value come from?

2. D18 and F18 are not used in any calculation and can be removed.

3. There is no allocation of the chemicals and the methanol to the co-products. There should be. This correction needs to be included in cells C23 and D24.

4. The allocation factor is inconsistently applied to the feedstocks. Feedstocks 6 to 10 do not have the factor applied to the feedstock transportation. N17 to R17.

5. The chemicals are not applied to feedstocks 6 to 10.

6. The formula in D24 has an error. =SUM('Biodiesel Production Inputs'!J7:J30,'Biodiesel Production Inputs'!K7:K30,-'Biodiesel Production Inputs'!L7:L29). The last term should be L7:L30.

7. Cell D25, D26, D27, and D28 all have an error. =IFERROR(SUM('Biodiesel Production Inputs'!R7:R30,'Biodiesel Production Inputs'!Q7:Q30,-'Biodiesel Production Inputs'!P7:P29)*'Biodiesel Production Inputs'!C26,). P29 should be P30 in every case. However, all of these should also be based on the sales and not on production.

CA GREET 4.0 Tab

This tab has many of the emission factors. While it is stated that GREET 2022 is the source for all of the emission factors except the ILUC factors very few of the emission factors have changed. The feedstock emission factors are shown in the following table.

GREET 2022 values

	GREET 2022 AR 4 GWP	GREET 2022 AR 5 GWP	4.0 Calculator	3.0 Calculator
Soy oil	226	215	223	231
Canola oil	401	384	411	393
Tallow	117	119	304	304
UCO	105	106	112	90
Corn Oil			225	225

The tallow value from GREET 2016 had a calculation error which was corrected in GHREET 2017 but was not implemented in CA GREET 3.0. This error doubled the emission intensity of tallow and is one reason why there have been a number of site specific tallow emission factors developed by the producers.

It is very unlikely that these are the only changes required for the emission factors. If natural gas and electricity emissions factors decreased then most of the other emission factors should change as well.

Natural gas will have a direct impact on the methanol. The GREET 2022 methanol value is 99,704 with the AR4 values. The calculator value is 113,521.

HEFA Calculator

There is no change in the calculation methodology used for the HEFA calculator. They are now asking for the use of the light HC co-product and only giving a displacement factor if it is used for hydrogen production, otherwise it is treated by modified energy allocation where an average value is calculated and the applied to all feedstocks

This fuel cannot be used for transportation purposes and cannot generate any LCFS credits. The treatment by energy allocation will result in some emission reductions from the system not being included in the calculation of the CI of the fuels that can generate credits.

Facilities that can use this fuel to displace natural gas will effectively get the natural gas displacement credit but facilities that sell the product across the fence to displace natural gas will get a lower credit. This is not equitable.

We recommend that as long as this fuel is being used it generate a displacement natural gas emission credit. We support other commenters that are making the same point.

Feedstock Inputs Tab

1. The drop down menu in D14 does not work, the only options are #name?
2. Same comment as on the biodiesel calculator with respect to the options for the drop down menu for ocean transport.
3. The “navigate to” drop down in G2 doesn’t work.

HEFA Production Inputs Tab

1. There is no formula for Matchable RNG in cell L8

Pathway Summary Tab

1. Cells F20, F21, and F22 are not required, they are not used in the calculations.
2. The chemical use is the same as BD now (0.65 vs 0.03), what data has been used to support this?
3. The RD transportation is being calculated by the miles times the RD plus RN plus RP plus RJ gallons divided by the RD energy. This is incorrect. It should be the miles times the RD gallons divided by the RD energy. The same value would apply to the RN and the other fuels. Although it is possible that the transportation distance for all of the products may not be the same.
4. The Hydrogen emission factor is now reported per kg rather than per MM BTU. The value has been reduced to 102,046 g CO_2/MM BTU from 105,612 g CO2/MM BTU.

Attachment 2

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

DIRECT/ INDIRECT EMISSIONS	MODEL	FEED STOCK	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. A number of 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 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	CARB has also accepted this change. Existing value includes 150 miles of hydrogen pipeline transportation, which is not applicable in most cases.
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.

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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

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	Crop Feedstocks	Change in soil carbon due to changes in land management	0	Impact will vary with crop and producing region.	ISO 13065. Sustainability criteria for bioenergy. https://www.iso.org/standard/52528.html "When the process under assessment causes changes in carbon stocks compared to the reference land use, the GHG emissions and GHG removals associated with these changes shall be documented and assigned to the bioenergy product." ARB includes soil carbon losses as part of the ILUC calculations but so far has not included soil carbon gains in the direct emissions. Some land management practices such as increased cropping frequency and reduced tillage can result in soil carbon increase. Some governments report these changes in their National GHG Inventory reports and have regional data available. There are a significant number of peer reviewed reports available for impacts by crop and producing region. One example is; Gan, Y., Liang, C., Campbell, C., Zentner, R., Lemke, R., Wang, H., Yang, C. 2012. Carbon footprint of spring wheat in response to fallow frequency and soil carbon changes over 25 years on the semiarid Canadian prairie, European Journal of Agronomy, Volume 43, November 2012, Pages 175-184, ISSN 1161-0301, http://dx.doi.org/10.1016/j.eja.2012.07.004 .
INDIRECT	AEZ-EF	Crop feedstocks	Carbon Stocks, emissions from peat soils, soil carbon loss from cropland pasture		Uncertain but probably variable with feedstock.	Follow-On Study of Transportation Fuel Life Cycle Analysis: Review OF Current Carb AND EPA Estimates OF Land Use Change (Luc) Impacts http://crcsite.wpengine.com/wp-content/uploads/2019/05/E-88-3b-Final-Report-2016-08-23_v2.pdf The report identifies three areas (carbon stocks, peat soil emissions, and cropland pasture soil carbon losses) that the results are sensitive to and the data used in the AEZ model is either different from other accepted values or is not well supported by data.