Clean Fuels ALLIANCE AMERICA

CALIFORNIA ADVANCED BIOFUELS ALLIANCE

September 19, 2022

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

Dear Dr. Laskowski:

The Clean Fuels Alliance America (Clean Fuels)[1] and California Advanced Biofuels Alliance (CABA)[2] appreciate the opportunity to provide comments on the August 18th Low Carbon Fuel Standard (LCFS) workshop to discuss potential changes to the LCFS program. Clean Fuels and CABA have been longtime supporters of the state's overall climate and air quality improvement goals and have collaborated frequently with CARB staff toward achieving those goals. We continue to support California's efforts to decarbonize its economy, especially the transportation sector, with a comprehensive all-of-the-above suite of measures.

Our California member producers and marketers support over 3,900 well-paying jobs in the state and about $960 million in economic activity each year. Further, the biodiesel, renewable diesel, and sustainable aviation fuel supplied to the state by our California and national members are collectively the single largest source of GHG reductions in the LCFS, providing nearly half (44-45%) of the carbon reductions) since 2017, more than any other fuel including electricity, and 42% since the start of the LCFS. Our fuels have grown to the point where fully a third (33%) of each gallon on average of diesel fuel consumed in the state in 2021 – and 44% of the diesel pool in Q1 2022 – consisted of our industry's low-carbon fuels.[3] Our sustainable replacements for petroleum diesel have been a major factor in driving California's continuing large-scale transformation of transportation from petroleum based toward a carbon neutral system. More to the point, our liquid diesel replacement fuels remain the only viable,

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[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. The name change reflects our embrace of all the products Clean Fuels members and the U.S. industry are producing, which include biodiesel, renewable diesel, sustainable aviation fuel, and Bioheat® fuel for thermal space heating. Our membership includes over 100 farmers, producers, marketers, distributors, and technology providers, and many are members of environmental organizations supportive of state and local initiatives to achieve a sustainable energy future.

[2] California Advanced Biofuels Alliance is a not-for-profit trade association promoting the increased use and production of advanced biofuels in California. CABA represents biomass-based diesel (BMBD) feedstock suppliers, producers, distributors, retailers, and fleets on state and federal legislative and regulatory issues.

[3] See LCFS Quarterly Data Spreadsheet (dated July 31, 2022).

commercial scale alternatives to petroleum for the next several decades in the most difficult-to-decarbonize sectors: heavy duty on- and off-road, marine, rail, and aviation.

We may have additional comments on other aspects of the staff's presentation in the coming days but wanted to focus our comments in this letter on CARB staff's request for suggested updates to the lifecycle assessment emission factors.

Strong Support for More Aggressive Pre- and Post-2030 Carbon Intensity Reduction Targets

As an initial matter, we continue to support adoption of more stringent pre- and post-2030 targets. Increasing the stringency of the LCFS targets will bolster the market signal that has incentivized innovations and billions of dollars in investments by the alternative fuels industry.[4] We reserve further comment on specific targets pending publication by CARB staff of the underlying modeling, data and assumptions in support of any such proposed targets. With that said, we have supported and continue to support LCFS targets that facilitate the complete displacement of roughly 3.4 billion gallons of petroleum displacement with biomass-based diesel within the 2030-2035 timeframe.[5] Governor Newsom's recent signing of AB 1279 (Muratsuchi)[6], which codified an even more aggressive GHG reduction target of 85% by 2045 relative to 1990, underlines the importance of an even more stringent set of CI reduction targets in the LCFS than perhaps CARB has already considered in its Scoping Plan modeling done to date.

Strong Opposition to Suggested Cap on Vegetable Oil Feedstocks

Since CARB has not yet responded to comments received on the July 7th workshop, we continue to object strongly to any notion of capping vegetable oil feedstock volumes. Not only is such a cap based on unsupported speculation rather than real-world data, it would fundamentally and detrimentally alter the LCFS from a market-based, performance standard to a government mandate/prescriptive standard with a strong bias against crop-based biofuels. Moreover, CARB staff have suggested no similar caps on any other fuels, even though significant concerns have been raised with other fuels without a similar response from CARB staff. For example, the AB 32 Environmental Justice Advisory Committee (EJAC), convened to inform the Scoping Plan process, has repeatedly raised concerns about the lack of a true accounting of the environmental harm associated with lithium extraction for EV battery production.[7] Yet, that full lifecycle assessment has not been conducted to our knowledge, nor has any cap or similar mitigation been suggested by CARB staff for EV lithium battery production based on the recommended lifecycle assessment.

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[4] See, e.g., $2B investment to expand World Energy's Paramount facility to include sustainable aviation fuel (SAF). Green Air News, accessed August 8, 2022.
[5] See Clean Fuels & CABA joint comment letters dated May 3, 2022 and June 17, 2022.
[6] AB 1279, https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=202120220AB1279.
[7] See EJAC Recommendation NF5, https://ww2.arb.ca.gov/sites/default/files/2022-08/EJAC%20reccs%20Sept1%20version.pdf, Sept. 1, 2022.

More importantly, as we have noted, a vegetable oil feedstock cap would be unwarranted since the LCFS is already designed to account for the concerns ostensibly driving such a suggested cap via the incorporated indirect land use change (ILUC) provisions. The ILUC provisions were extensively vetted through a public and peer review process in the early years of the LCFS, unlike the suggested concept of a vegetable oil cap.

We strongly reiterate and incorporate by reference our comments on the suggested vegetable oil cap concept from the July 7th workshop.[8]

Critical Updates Needed for Emission Factors

We very much appreciate CARB staff's invitation for feedback on updates to the emission factors used in CARB's lifecycle assessments. This is a very timely solicitation, as it recognizes that the current data and modeling used in CARB's lifecycle assessments are, for crop-based feedstocks like surplus and co-processed soybean and canola oil and non-crop waste oil feedstocks, very outdated and substantially overstate the direct and indirect emission impacts from these important feedstocks for low-carbon biodiesel and renewable diesel. We are deeply concerned that CARB has continued to use ILUC modeling and datasets for soy and canola feedstocks that date back to 2004 and other assumptions/data that date back to 2006. It goes without saying that a robust and scientifically-valid LCFS requires a solid and up-to-date scientific basis.

Argonne GREET vs. CA GREET Underlying Assumptions and Data

As an initial matter, we believe that the Argonne GREET (adjusted for California conditions and real world experience gained since 2011) is the most appropriate model to calculate the direct life cycle carbon intensity of alternative transportation fuels. We believe this model is the best choice for several reasons:

1. Is capable of modeling a wide range of traditional and alternative transportation fuels and modes.
2. Argonne's (not CARB's) GREET model is updated annually, incorporating the best available science from a combination of industry surveys, process modeling, and literature reviews.
3. The model is constructed in a fairly consistent manner, ensuring that related biofuel systems (i.e. corn ethanol and corn oil biodiesel) are estimated in a consistent fashion. By contrast, CARB's adaptation has introduced double counting (double debits) for certain pathways.

A critical issue with wholesale continuation of CA-GREET is the vintage of the data included. It is critical to note that while California adopted and modified the 2016 version of GREET, crucial data sources in that model were already several years old at the time. For example, the 2016 version of CA-GREET relies on 2012 agricultural data for soybean processing. This data, which is

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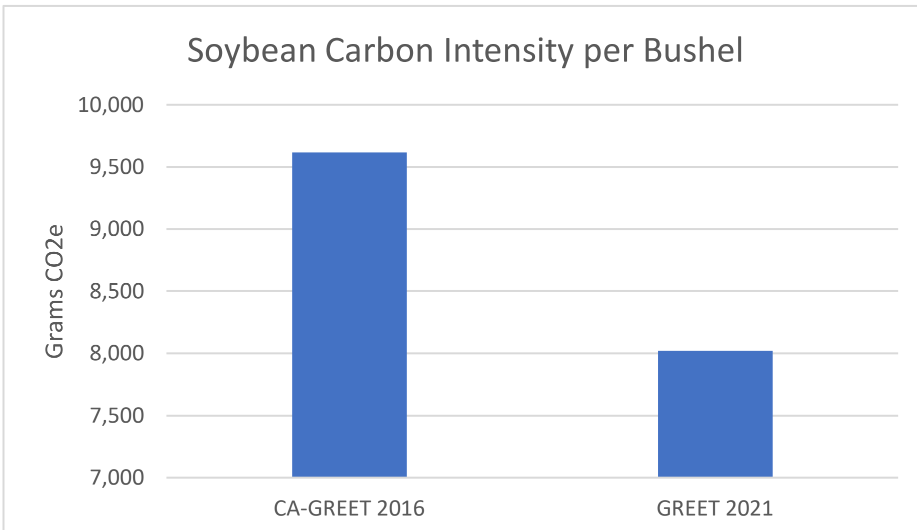
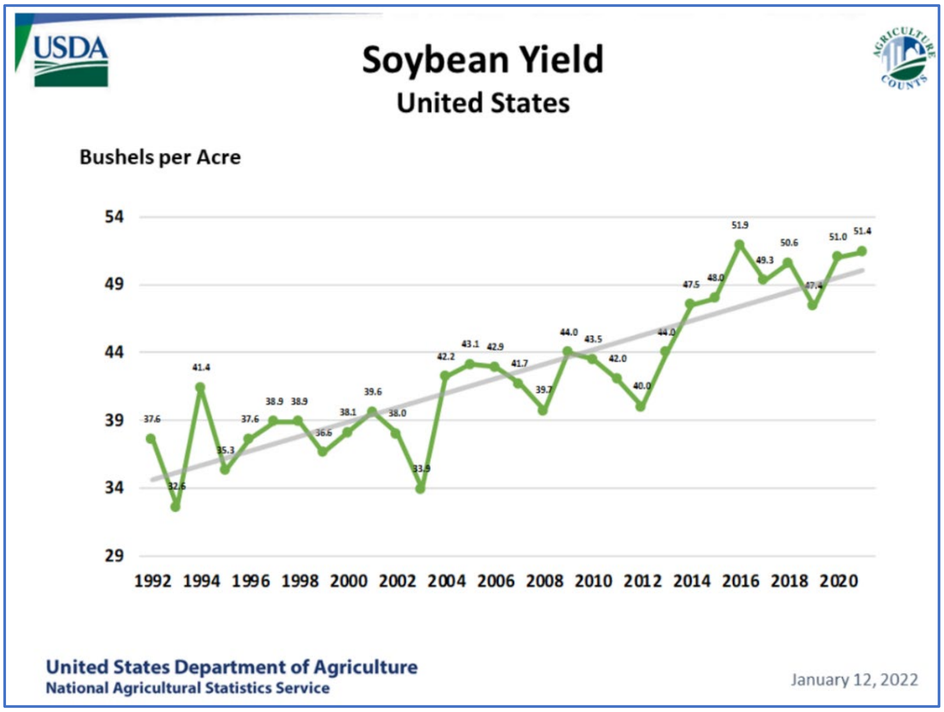
[8] See https://www.arb.ca.gov/lists/com-attach/128-lcfs-wkshp-jul22-ws-AGNVNV09VmRRCFc0.pdf.

now a decade old, fails to account for the continued and significant improvements in efficiency on the farm related to better genetics and higher yields, precision agriculture, and general efficiency. Utilizing the older data overestimates the energy associated with producing soybeans by over 30%.

Energy Per Bushel of Soybeans		
Input	**CA-GREET 2016**	**GREET 2021**
Diesel (Btu)	13,696.64	9,352.51
Gasoline (Btu)	3,061.02	2,064.69
Natural Gas (Btu)	984.20	176.45
LPG (Btu)	765.48	662.03
Electricity (Btu)	935.21	1,468.05
Total Energy Usage (Btu)	**19,442.56**	**13,723.73**

Inputs Per Bushel of Soybeans		
Input	**CA-GREET 2016**	**GREET 2021**
Nitrogen (grams)	44.13	43.73
P_2O_5 (grams)	180.45	207.81
K_2O (grams)	289.01	329.56
$CaCO_3$ (grams)	-	-
Herbicide (grams)	17.34	19.43
Pesticide (grams)	0.34	0.28





The outdated data is not only relevant to the soybean oil to biodiesel and renewable diesel pathway, but other major pathways such as animal fat rendering have been updated and corrected[9] since the 2016 CA-GREET model was adopted by CARB. To date, CARB has not adopted these new figures, even though they are well established in the literature and CARB staff has approved several domestic and foreign producer-specific Tier 2 applications which are documenting rendering energy which meets or exceeds to survey results contained within GREET 2021.

Energy Per LB of Tallow Rendered		
Input	**CA-GREET 2016**	**GREET 2021**
Residual oil (Btu)	1,055.56	-
Natural gas (Btu)	1,611.11	1,052.45
Electricity (Btu)	444.44	306.86
Total Energy Usage (Btu)	**3,111.11**	**1,359.31**

Source: USDA - National Agricultural Statistics Service - Charts and Maps - Soybeans: Yield by

[9] Argonne GREET Publication : 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 (anl.gov)

Critical Updates Needed for More Robust Indirect Land Use Change (ILUC) Assessments

As CARB seeks further incentives to encourage innovation, competition, and more sustainable production while discouraging less sustainable actions, we recommend the following three options for CARB staff to consider:

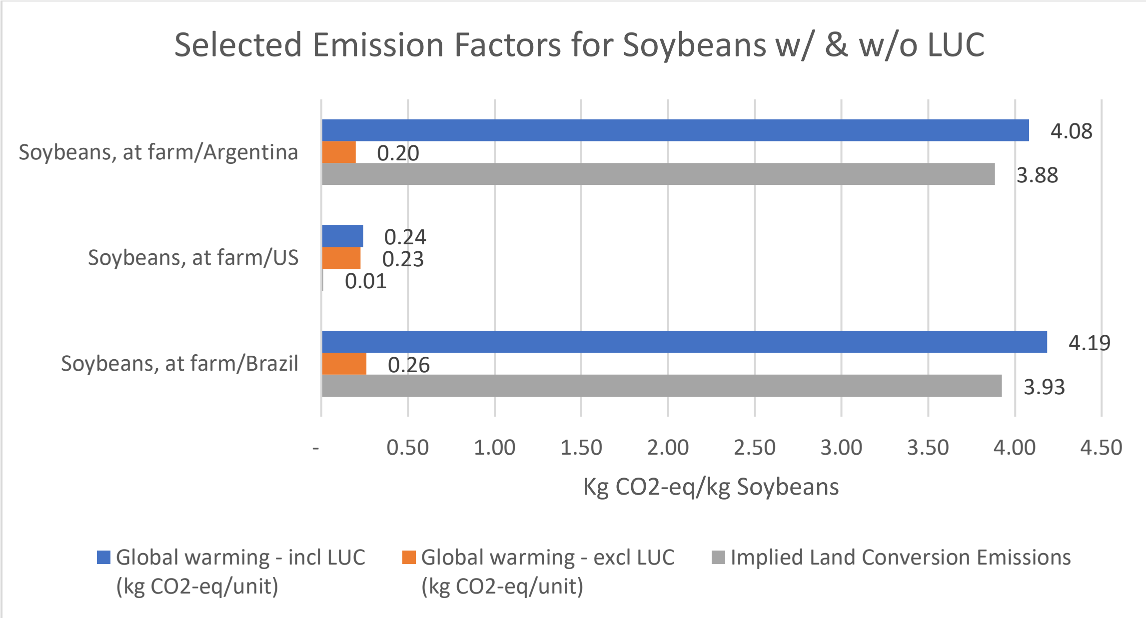
1. **Develop Country- or Regional-Specific Land Use Change Factors**

CARB could draw on the approach established by Canadian jurisdictions such as British Columbia which have prominently incorporated country specific direct land use change into their estimates for major regions or certain crops. This is based on observed changes in land cover type in major growing regions for a specific crop. For example, although British Columbia's Low Carbon Fuel Requirements has no explicit indirect land use change, the LCA for feedstock such as southeast Asian palm oil -- which have historically been grown on high carbon stock land that is converted -- is directly penalized in the model. This results in a carbon intensity for palm oil biodiesel approaching or exceeding that of diesel fuel. This is consistent with the ILUC value for palm oil.

Additionally, if CARB staff is interested in crafting a policy which rewards the sustainability leaders and incentivizes laggards, rather than painting everyone with an unduly broad brush, we recommend you consider using the data from Blonk[10], more commonly known as Agri footprint. Blonk utilizes highly respected data including UN FAO statistics and IPCC calculation rules[11] and follows PAS2050-1[12] to develop country and crop specific emission factors. Critically, for voluntary markets and corporate emission reductions pledges, PAS2050-1 is accepted by the World Resources Institute a global leader in GHG reduction efforts and the founder of GHG Protocol and the Science Based Targets Initiative. Applying a standard that is accepted by WRI will help drive consistency between major regulatory markets like the LCFS program and global voluntary reporting of carbon emissions.

Illustrated below using the Blonk data, the sharp contrast in emission factors becomes apparent for soybeans from markets like the United States and two selected markets in South America. Utilizing more granular and transparent information such as what is outlined below would help the LCFS program reward leaders for highly sustainable practices and encourage laggards to improve. Without clear differentiation between growing regions which is masked by a one-size fits all ILUC penalty, the market will continue to operate in a highly inefficient manner, broadly judging all agricultural commodities of the same type by the least sustainable producer.

[10] Blonk Sustainability | Agri-footprint
[11] Agri-footprint 5.0 (amazonaws.com)
[12] bsi.shop (bsigroup.com)



2. Simplify the Process by Utilizing One Model

If CARB determines that country-specific emission factors, such as those from Blonk, do not meet the state statutory or regulatory requirements, we encourage CARB staff to take the simplest approach by using the Argonne National Lab's most recent version of GREET, including their land use change emission estimates modeled in the CCLUB module. This would remove a significant burden for CARB staff by eliminating the need to maintain its own unique GREET model and indirect land use change scores. Additionally, it is critical to note that the CCLUB module contained within GREET, which is used to estimate land use change values, is based on results from the GTAP modeling. GTAP was the model used by California years ago to conduct its estimates of indirect land use change.

3. Rely On an Updated Version of GTAP

Finally, if CARB determines that the use Argonne's CCLUB model is impractical, necessitating the need to use a discrete land use change model, we implore CARB to use the most recent version of GTAP, not simply implement the values CARB calculated in 2015. A strict adherence to consistency is neither logical nor warranted; indeed, simply continuing the state's use of the older GTAP results effectively guarantees California's program will be based on flawed and outdated science.

Clean Fuels believes it is inappropriate and inconsistent with state policy goals to use data, methods and results -- which in some cases are well over a decade old -- in a climate-progressive policy which is claimed to be based on the "best available science." Before continuing to use the antiquated results from the 2015 CARB ILUC modeling exercise, we strongly encourage you to look at the literature which has been published relating to GTAP since then.[13,14] Since the concerns underlining the suggestion to cap vegetable oil feedstocks are based largely on claims of extreme substitution between the various crop oils, it behooves CARB to evaluate critically the recent peer-reviewed GTAP publication, which directly questions the elasticity of these substitutions.[15]

Accordingly, we recommend adopting the latest ILUC values for soy and canola from recent work by Argonne and Purdue, which would substantially decrease the current ILUC value in the LCFS (in the case of soy biodiesel, up to about 90% less than CARB originally estimated at the 2009 rulemaking). This would better reflect real world observations showing that ILUC estimates for our crop feedstocks were severely exaggerated in the earlier rulemakings (which, to be fair, were based on the data and assumptions available to staff at the time). It is time to update the ILUC values for soy and canola to reflect the learnings and scientific developments occurring over the past decade.

Critical Updates to Direct CI Factors Based on Real-World Experiences in California and Correction of Existing Errors

In addition to using an updated GTAP-BIO and AEZ-EF, we strongly encourage CARB staff to use updated direct CI inputs that reflect both real-world experience in California as well as errors that have been identified and acknowledged by CARB staff but have not yet been corrected in the LCFS. Using updated direct CI values, inputs, and assumptions will help ensure that the LCFS reflects the most robust and current science available. The specific updates are shown in Attachment 1.[16]

Miscellaneous Provisions

We support the staff's suggestions for streamlining and improving the "Deemed Complete Date" and "Credit True-Up for Temporary Pathways" provisions. These will help address a number of implementations our members and other stakeholders have raised over the years, and we appreciate CARB staff's responsiveness to those concerns.

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[13] The increasing global environmental consequences of a weakening US–China crop trade relationship | Nature Food

[14] Land | Free Full-Text | Dynamic Amazonia: The EU-Mercosur Trade Agreement and Deforestation (mdpi.com)

[15] US biofuel production and policy: implications for land use changes in Malaysia and Indonesia | Biotechnology for Biofuels and Bioproducts | Full Text (biomedcentral.com)

[16] Clean Fuels comments submitted to CARB in response to public workshop to consider potential changes to the LCFS regulation, https://www.arb.ca.gov/lists/com-attach/120-lcfs-wkshp-oct20-ws-WjQCZgBjUV0FYFM8.pdf, accessed April 8, 2022.

Conclusion

We strongly support a more stringent set of pre- and post-2030 CI reduction targets. With that said, we remain deeply concerned with and are strongly opposed to any proposed cap on vegetable oil feedstocks as being unwarranted, not based in sound science, would chill ongoing and future investments, and is counterproductive to California's climate and carbon neutrality objectives. Instead of pursuing this line of inquiry further and introducing more uncertainty into the LCFS market, we strongly encourage CARB to focus on adopting more stringent CI targets and update the science, datasets, and assumptions underpinning the existing LCA framework as expeditiously as possible in the upcoming rulemaking.

Thank you for your consideration of these comments. We look forward to continuing our strong collaboration with CARB and staff.

Sincerely,

Floyd Vergara, Esq., P.E.
Director of State Governmental Affairs
Clean Fuels Alliance America

Rebecca Baskins
Executive Director
California Advanced Biofuels Alliance

Attachment 1

Post-2015 Updates to Indirect and Direct 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.

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

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