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July 5, 2018

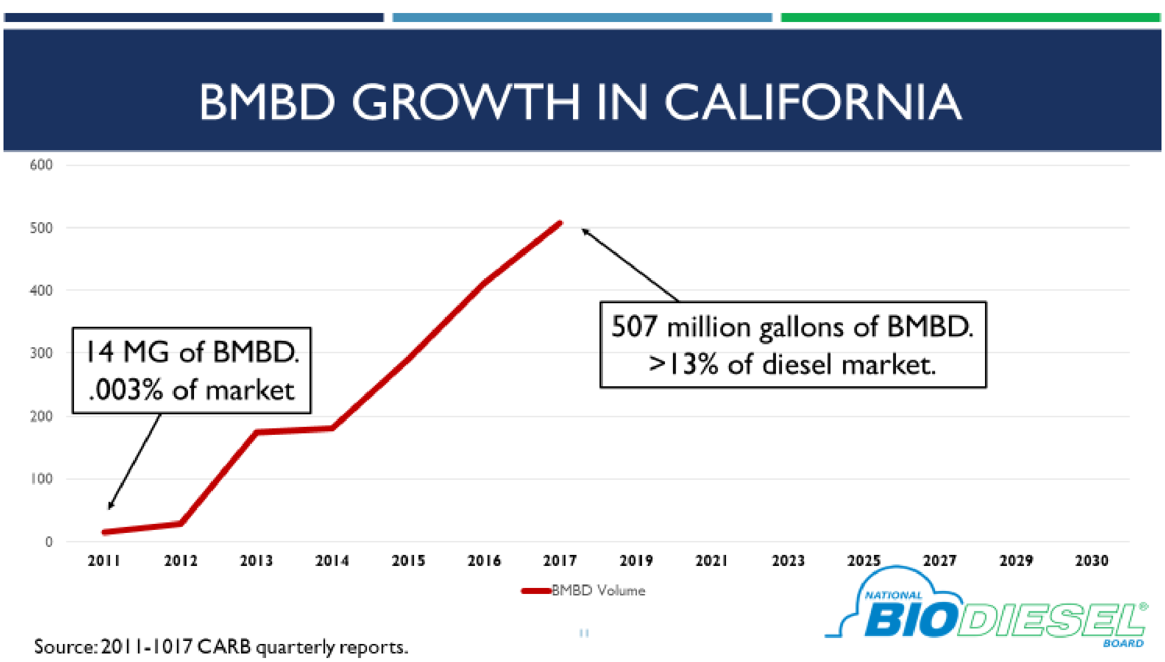
Clerk of the Board
California Air Resources Board
P.O. Box 2815
Sacramento, CA 95812

Re: Proposed 15-Day Modifications to Low Carbon Fuel Standard Regulation.

Dear Air Resources Board Members and Staff:

Thank you for the opportunity to comment on this proposed regulation. The National Biodiesel Board (NBB) and the California Advanced Biofuels Alliance (CABA) continue to appreciate the tremendous job you and CARB staff do on behalf of the clean fuels industry and all Californians. It has been a pleasure to work with you over the years.

Biodiesel and renewable diesel continue to perform well under the low carbon fuel standard (LCFS). Biomass-based diesel volumes have increased from 14 million gallons in 2011 to 507 million gallons in 2017 and are expected to reach 1 billion gallons in 2020. Similarly, biodiesel and renewable diesel have transitioned from modest credit generators to mainstays of the program, accounting for 44% of LCFS credit generation in 2017. The chart below illustrates this progress.



On this and following pages, we have briefly detailed comments on selected portions of the regulatory package. Thank you for considering our views on these matters.

Alternative Diesel Fuel (ADF) Regulation

We are pleased to see the amendments regarding bifurcation of the on- and off-road diesel markets in the Alternative Diesel Fuel regulation. We believe these changes are in the best interest of the state's carbon reduction and public health goals.

Co-Processed Renewable Diesel

We understand CARB's desire to facilitate the near-term ability of obligated parties to generate LCFS credits. However, due to the immense scale of refining operations and their astonishing level of complexity, we believe more time is needed to study this subject before carbon intensity pathways are issued. Specifically, we recommend that CARB restart its Co-processing Workgroup to help ensure pathways are promulgated in a manner that is 100% accurate for each refinery project and carried out in a manner fully consistent with the long-term goals of the LCFS program. We further believe that no pathways should be approved until the Co-processing Workgroup has reviewed key issues and developed a set of recommendations.

We suggest the following areas for further consideration by CARB and/or the Co-processing Workgroup:

- Lifecycle models. CARB suggests that "Evaluating co-processing pathways using a Tier 2 framework is consistent with the goal of streamlining the pathway application and certification process."[1] At this point in time, we disagree that this is an appropriate approach because models for each respective refinery technology do not exist—they still need to be developed by CARB. And since the Tier 2 framework is usually masked in redacted statements, that process alone will not afford the level of public review necessary to provide confidence to stakeholders that carbon intensity values are accurate.
- Public information. Refineries should be required to provide the same level of operational detail that has been made available by and for other industries. If co-processing is allowed to generate LCFS credits, the technology must go through a public process that provides sufficient information for the public to validate the accuracy of carbon intensity pathways. In addition, data marked as "confidential business information" submitted on Tier 2 applications should be reviewed by CARB legal staff to ensure it meets the criteria set forth under California law.
- Verification of renewable content. It is believed that a very small fraction of renewable feedstock inputs become renewable diesel fuel through co-processing. Therefore, it is critical that renewable content in finished fuel be measured via C14 radiocarbon dating

[1] https://www.arb.ca.gov/regact/2018/lcfs18/isor.pdf, page III-72.

rather than a mass-balance approach, which would overestimate renewable content. ASTM test method D6866 has been approved for this analysis.

- Limitation on co-processing. If co-processing is allowed under the LCFS, boundaries for this type of credit generation should be considered. We recommend the Refinery Investment Credit Pilot Program (RICPP) as a sensible model. Under RICPP, projects are of limited duration, refiners are not allowed to generate more than 20% of their obligation through the program, and credits cannot be traded. Given the incredible complexity and scope of refinery operations—and the corresponding potential for outsized errors—we believe moving forward in a methodical way is justified.
- Additional processing. Carbon intensity pathways should account for energy used when (and if) refineries isomerize co-processed fuels to improve cold flow performance.
- Emissions. We have not been able to find published literature regarding emissions and public health impacts for co-processed fuels. Since the technological process is the same as that which creates CARB diesel and the finished product is chemically indistinguishable from CARB diesel, we are not convinced that the environmental and public health impacts of co-processing should be assumed to be positive.
- Technical properties. Potential concerns about cold-flow performance, stability, and incomplete refining could require additional test parameters and limits to be included.
- Indirect effects. When bio-based feedstocks are comingled with fossil feedstocks, refiners should supply CARB with enough verifiable information to enable a full assessment of the indirect effects of co-processing on other refinery operations. This information should be made available in the same manner that Tier I framework biofuels have made information publicly available.
- Alternative Diesel Fuel (ADF) regulation. Co-processed renewable diesel is a new fuel that should go through the ADF process like biodiesel has—and other renewable diesel replacement fuels will in the future. This step would ensure that emissions, public health, and operability data is available to CARB and the public for evaluation.

Comments on CARB Lifecycle Models

CARB released revised versions of CA GREET 3.0 and the simplified Calculators for a 15-day comment period. The revised models address some of the comments provided earlier but have also introduced new issues. These comments address the latest versions of the models and focus on the biodiesel and renewable diesel pathways.

CA GREET 3.0

There are two aspects of the CA GREET 3.0 that have issues, the tallow rendering energy and the changes that CARB as made to the transportation energy use and resulting emission factors.

Tallow Rendering Energy

The tallow rendering energy in GREET 2017 was significantly reduced as the pervious versions had misinterpreted the data in the peer reviewed paper that was used as the data source. The issue is discussed in the GREET memo which can be found here (https://greet.es.anl.gov/files/beef_tallow_update_2017). This is a simple correction of an error in GREET 2016 and it should be incorporated into CA GREET 3.0 and the BD/RD Simplified Calculator. It has a significant impact on the tallow pathways.

Transportation Emissions

There have been changes made to the transportation energy use for feedstocks and fuels after it was pointed out that in the previous version of CA GREET 3.0 a medium duty truck in the model was more efficient than a heavy-duty truck, which is not true. Unfortunately, CARB has made a number of other adjustments that have introduced new issues.

Rail

For the Rail energy use, CARB has added the same amount of energy as backhaul energy for rail movement. This is not necessary as the energy use for rail is calculated by taking the total fuel used for class 1 railroads and dividing that by the ton-miles of freight moved by those railways. This calculation automatically includes the energy used for back hauls and thus it is not necessary to double the value. However, even if it was not already included, it would not be the same value as the energy for a loaded car. There is really no justification given for adding the backhaul energy in Attachment C.

The ORNL Transportation Energy Data Book edition 36 reports (Table 9.8) that the total freight moved in 2015 was 1.744 million ton-miles and the energy used by the railroads was 516.4 trillion BTU for a total energy use of 294 BTU/ton-mile which would include the movement of empty cars. CA GREET 3.0 has 274 BTU/ton-mile for loaded and the same energy for unloaded movements. This is not correct and the back haul energy for rail should be removed from the model. The methodology is reported in section 6.2 of Appendix A.

Road

The road energy use in GREET is calculated by taking the vehicle fuel consumption and load and from that calculating the BTU/ton-mile. There is no equivalent data set as exists for the railways in which the total fuel used and the total freight moved is available, so the approach in GREET is reasonable. In this version of CA GREET, CARB has changed the load size and the fuel economy. As a result of these changes, the energy use for a HD truck for soybeans has been reduced from 3231 BTU/ton-mile to 1574 BTU/ton-mile and the energy use for the back haul is 79.3% of the loaded energy use. The US DOE report that a loaded class 8 truck typically weighs three times the unloaded vehicle weight (https://www.energy.gov/eere/vehicles/fact-621-may-3-2010-gross-vehicle-weight-vs-empty-vehicle-weight). The back haul energy use should be closer to the ratio of the weight of unloaded vehicle to the fully loaded vehicle, that is 33%. There is no explanation for the new fuel economy values used by CARB.

While the energy use for the heavy-duty trucks decreased, the values for the medium duty trucks increased from 3088 BTU/ton-mile to 6231 BTU/ton-mile. The primary reason for this is that the load size was cut almost in half along with a reduction in the miles per gallon. No source for the data is provided and the back haul energy is the same 79.3% of the loaded energy, which is again too high a value. The DOE reports that the medium-sized trucks (truck classes 3-6) have payload capacity shares between 50% and 100% of the unloaded weight, which suggests that the back haul energy use should be 50 to 66% of the loaded energy use.

<u>Barge</u>
CARB has not changed the barge energy use in the latest version of CA GREET 3.0. We previously submitted comments regarding the fact that the barge energy use is higher than rail energy use and that this is not supported by the literature. Our previous comments are repeated here.

The rail and domestic water energy use in CA GREET is compared to the data from the Transportation Energy Data Book in the following table.

	CA GREET	Transportation Energy Use Data Book
	BTU/ton mile	
Rail	274	292
Barge	735	214

In both cases the methodology is to take the total energy consumption for the mode and the total ton-miles of freight moved. This automatically accounts for the "back-haul" and there is no need to add additional energy for this movement as is done in CA GREET. It appears that the barge transport emission factor in CA GREET is too high by a factor of 3.4.
This is confirmed by the recent National Academies publication "Funding and Managing the U.S. Inland Waterways System: What Policy Makers Need to Know (2015)". In appendix G[2] where it is stated that:

> *Some studies show barge to be more energy efficient, while others show rail as the more energy-efficient mode. In terms of British thermal units per ton-mile, Davis et al. report that rail (294 Btu/ton-mile in 2012) is 40 percent more energy intensive than barge (210 Btu/ton-mile in 2012), nearly the same percentage difference as reported by Kruse et al. (2013).[1] These average energy intensity values represent the two-way transport average of upstream and downstream transport (upstream transport may require more energy to account for barge movement against downstream current velocities, and downstream*

[2] Appendix G. https://www.nap.edu/read/21763/chapter/15

transport energy may benefit from the river current). Alternatively, Dager (2013) reports even lower energy intensity for inland barge transport on the basis of independent data and fuel use modeling, corresponding to about 196 Btu/ton-mile, or about 60 percent better energy intensity than average rail.

<u>Biodiesel/Renewable Diesel Simplified Calculators</u>

The BD/RD calculator has most of the previous errors removed, but there are still some issues that remain, which lead to incorrect results.

There are also some inconsistencies in how the same data is moved from the EF sheet to the calculation sheets. For example, on the Tallow tabs, cell G11 is zero and the calculator is pulling the standard value from the emission factors sheet, whereas other feedstocks move from the emission factor sheet to G11 and then into the calculations.

The most serious error is on the RD Production sheet in cell M158. This cell does not have an equivalent value on the previous version of the calculator. Zeroing it out in the current version gets the RD production emissions much more in line with the previous version. The previous version had those rows there but nothing in column M. The value in this cell should be removed as it is not clear what it is trying to calculate and clearly shouldn't be there.

On the canola sheet, the standard value for oil production (G11) is ~0.27 instead of the ~118 it should be.

BD Production!J101 points to corn oil production, not UCO oil production. It should be changed to reference EF Tables!C44.

BD Production!J122 points to a tallow oil production value that is not equal to the one on RD Production. This is just more inconsistency where all oil production values really should be aiming at the same place. Setting it to equal to the formula used on RD Production J127 will bring the CI value for that stage in line.

On RD Production: M81:M84 use Fuel_Specs!$D$79 which is for soy oil, they should use Fuel_Specs!$D$81 instead. Similarly, on BD production M70:M85 uses the B79 instead of B81, Although these do not impact the results.

There is a discrepancy between BD and RD tallow is that BD tallow has an additional value for raw tallow transport, which is not included in the RD calculation.

The distance that feedstock is moved by heavy truck is hardcoded in most cases. For canola, it is moved 40 miles if being crushed for an oil that will become BD and 50 miles if being crushed for an oil that will become RD. They should be set to the same distance.

Conclusion

Thank you for considering our views. Our members have greatly enjoyed the opportunity to partner with CARB to help meet shared climate goals and we look forward to continuing this collaboration for years to come. If board members or staff have any questions, please feel free to contact us at any time.

Sincerely,

Jennifer Case
Chair
California Advanced Biofuels Alliance

Shelby Neal
Director of State Government Affairs
National Biodiesel Board