State of California
Air Resources Board

Staff Discussion Paper

Biomass-Based Diesel as a Transportation Fuel

Updates to February 8, 2017 Discussion Paper for Working Meeting on May 15, 2017

Updated: May 12, 2017
for Working Meeting on May 15, 2017

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PURPOSE

This discussion paper provides an overview of how biomass-based diesel fuels used as transportation fuels are currently treated in the Low Carbon Fuel Standard (LCFS) program and continues the dialogue with stakeholders about initiatives to improve administration of current program requirements, as well as potential future regulatory changes for these fuel types. It is a working document and is expected to evolve over time, based on input from stakeholders.

The first draft of this discussion paper was posted February 8, 2017, in advance of the February 10, 2017, public working meeting focused on Tier 1 pathways for biomass-based diesel. This May 15, 2017, update reflects the continued development of staff's efforts in response to stakeholder feedback, identifies new feedback requests, and introduces new or expanded topics including:

- CI Calculation topics
  - Options for oil extraction energy inputs
  - Accounting methodologies for allocating fuel volumes by feedstock/material balance
  - Feedstock and finished fuel transport distance
  - Defining feedstock sourcing regions and energy mixes
  - Assigning multiple pathways for feedstocks from different sources
  - Co-product allocation
  - Standardization of chemical use inputs
- Enhanced quarterly reconciliation in the LRT-CBTS
- Reporting of fuel exports in the LCFS

INTRODUCTION AND GENERAL PROGRAM BACKGROUND

The LCFS is a market-based, fuel-neutral, performance standard that requires reductions in the carbon intensity of California's transportation fuels over time. Each fuel's carbon intensity (CI) is calculated based on greenhouse gas (GHG) emissions per unit of fuel energy over the fuel's lifecycle—from raw material or feedstock production through end use.[1] Lower-CI fuels produce fewer GHGs per energy unit. Higher-CI fuels, such as traditional petroleum-based fossil fuels, produce more GHGs per energy unit.

In order to reduce GHG emissions, LCFS requires a yearly declining average CI for the pool of California's transportation fuels. Fuels that exceed the mandated average CI generate deficits and those that have CIs below the mandated average CI generate

[1] A fuel's lifecycle emissions intensity is also referred to as its "pathway" or "carbon intensity score" in LCFS documentation. These values are usually expressed in units of grams carbon dioxide equivalent per megajoule (gCO_2e/MJ).

credits. The quantity of credits or deficits generated by each fuel is determined by its fuel-specific CI score, relative to the declining CI standard and the quantity of the fuel used for transportation in California. Deficits created by fuels that exceed the mandated CI must be balanced with credits generated by lower-CI fuels.

The following discussion provides background on the current regulation[2] and reviews potential implementation improvements and amendments for biomass-based diesel. This paper currently focuses on Tier 1 pathways for biodiesel (produced by trans-esterification) and renewable diesel (produced by hydrotreating) fuels derived from used cooking oil (UCO), tallow (and other animal fats such as fish oil), canola, soybean, and distiller's corn oil (DCO). Subsequent updates to this discussion paper will focus on other biomass-based diesel pathways, including cellulosic, and other unconventional or Tier 2 pathways. Although the current LCFS regulation's[3] definition of "biomass-based diesel" includes renewable diesel derived from co-processing biomass with a petroleum feedstock, for the purposes of this paper we use the term to refer to biodiesel and renewable diesel in a dedicated facility; renewable diesel that is produced by co-processing in a petroleum refinery is addressed in a separate fuel-specific paper.[4]

Current Parties Eligible to Generate Credits for Biomass-Based Diesel

The initial regulated party for liquid alternative fuels is the producer or importer of the fuel as defined in section 95483(b) and 95483(c); or the opt-in entities, including out-of-state producers and intermediate entities, as defined in section 95483.1 of the current LCFS regulation.

The initial regulated party can choose to either generate credits themselves or transfer the eligibility to generate credits along with the ownership of the fuel to the recipient, if the two parties agree by written contract.

For biodiesel and renewable diesel used as a transportation fuel, Table 1 lists the different types of initial regulated parties in the LCFS program and the transaction types they report in the LCFS Reporting Tool and Credit Bank & Transfer System (LRT-CBTS).

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[2] California Code of Regulation, title 17, section 95480 et seq. Available at: https://www.arb.ca.gov/regact/2015/lcfs2015/lcfsfinalregorder.pdf.

[3] See definitions of these fuel types and other selected definitions from the 2015 LCFS Regulation in Appendix C in this document for reference.

[4] Refinery Co-Processing of Renewable Feedstocks in the LCFS. February 3, 2017. Available at: https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/020717_staffdiscussionpaper.pdf

Table 1. Initial Regulated Parties for Biomass-Based Diesel (Q1-Q3 2016)

Entity Category	Number of Entities	
	Biodiesel	***Renewable Diesel***
Producers in California *(Entities reporting 'Production in California' in the LRT-CBTS)*	9	2
Out-of-State Producers (includes opt-in entities) *(Entities reporting 'Production for Import' and 'Import' in the LRT-CBTS)*	5	2
Entities Solely Importing *(Entities reporting only 'Import' in the LRT-CBTS)*	8	3

During Q1-Q3 2016, there were nine production facilities in California and 23 production facilities outside of California that provided biodiesel; and two production facilities in California and three production facilities outside of California that provided renewable diesel as a transportation fuel under the LCFS program.

1. LCFS FUEL PATHWAY EVALUATION PROCESS

Current Pathway Application Process

When an eligible party listed above wishes to generate LCFS credits for biomass-based diesel, the first step is to apply for the use of the appropriate CI score (or "pathway").

New fuel pathway applications are evaluated by ARB staff; the evaluation currently includes review of submitted California-modified Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (CA-GREET) model, supporting documentation and the third-party engineering report required under U.S. EPA's Renewable Fuel Standards (RFS) program, when available.

The staff review can range from relatively simple for conventional "Tier 1" pathways to extensive for the most complex "Tier 2" pathways.[5]

Tier 1 biomass-based diesel pathways vary primarily based on the following factors:

- Feedstock type
- Transportation modes and distances (feedstocks and finished fuel)

[5] For more information on application requirements and pathway classifications, see *Guidance Document for LCFS New Pathway Applications.* Nov. 5, 2015. Available at: https://www.arb.ca.gov/fuels/lcfs/fuelpathways/newpathway-11052015.pdf.

- Product yields
- Process energy types and consumption

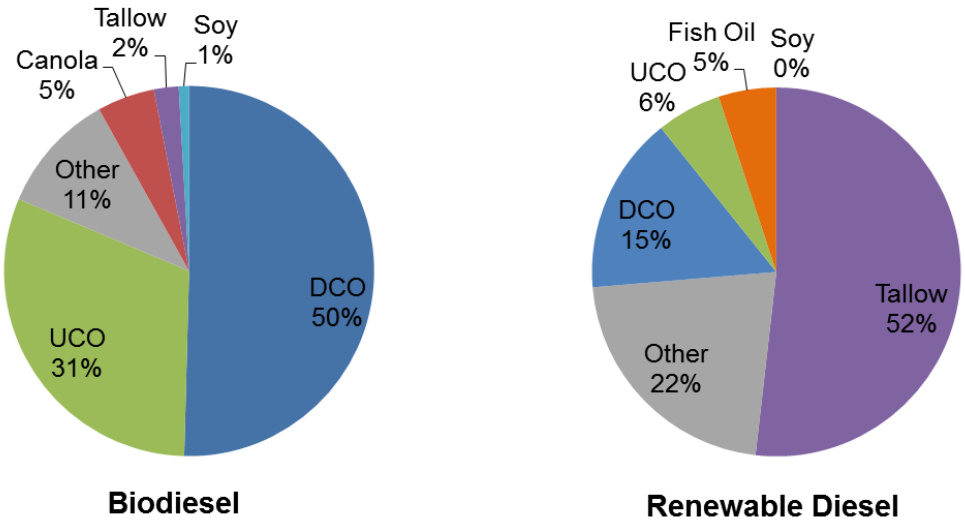
The choice of feedstock, whether crop- or residue-based, typically has the largest impact on CI. If the feedstock is derived from a crop, such as soy and canola, the life cycle includes the upstream emissions resulting from farming activities required to cultivate, harvest and transport the crop, and the extraction process to produce the oil feedstock. If the feedstock is instead the secondary (residual) product of another activity, such as food processing, then the life cycle typically begins with the transport of the feedstock to the fuel production facility. See the table and figures in Appendix A illustrating the life cycle stages involved in typical pathways for biodiesel made from UCO and soybean oil. Most of the upstream (feedstock-related) contributors to the CI score, including land use change scores, agricultural phase parameters, and extraction energy are non-variable standard values applied to all pathways of a given type. As residue-based fuels are incentivized with a lower CI in the LCFS, it is critical to ensure that fuels reported as residue-derived are not derived from purposely produced oil.

In Q1 through Q3 2016, approximately 109 million gallons of biodiesel (BD) and 183 million gallons of renewable diesel (RD) were reported; these volumes generated 44% of the total credits in the program over that time period.[6] Figure 1 shows the breakdown of these volumes by feedstock type. Current approved pathway CI values[7] for biodiesel range from 9 (UCO) to 60 gCO_2e/MJ (soy oil), while all biodiesel reported in Q1 to Q3 2016 achieved a volume-weighted average CI of 16 gCO_2e/MJ. The range of CI scores for renewable diesel range from 17 (UCO) to 37 gCO_2e/MJ (DCO), with a weighted average of 36 gCO_2e/MJ. The volumes categorized as "other" feedstock type in the RD chart includes deficit and credit-generating fuels, whereas the "other" section of the BD chart includes no deficit-generating fuels. Volumes in "other" section of the RD chart which are generating deficits are likely derived from palm or an unknown source and are assigned a CI equal to the Lookup Table value for petroleum diesel, 102.01 gCO_2e/MJ.

[6] See 2016 data from LRT Quarterly Summaries. Available at: https://www.arb.ca.gov/fuels/lcfs/lrtqsummaries.htm.

[7] See table of all approved pathways. Available at: https://www.arb.ca.gov/fuels/lcfs/fuelpathways/pathwaytable.htm Also note that a change has been implemented in 2016 in the system of fuel pathway codes (FPC). Historically, FPCs indicated the fuel using a prefix (BIOD- for example) but did not provide any information about the feedstock. New FPCs that have been issued in 2016 and going forward indicate the fuel and feedstock. For example, an FPC for biodiesel derived from UCO is now assigned an FPC beginning with "BDU-," where the "U" indicates that the feedstock is UCO. The prefix for a renewable diesel made from tallow is "RDT-".

Figure 1. Volumes of Biomass-based diesel by feedstock type reported in Q1 to Q3 2016



The current pathway CI certification process requires applicants to register their facilities in the Alternative Fuels Portal (AFP). Once registered, applicants select the appropriate pathway application type (Tier 1 or 2; Method 2A/2B) and upload a completed version of the CA-GREET 2.0 workbook and a data sheet summarizing commercial operational data for 24 months[8] along with supporting documentation including invoices and receipts – see Table 2 for an example of the current operational data requirements for a Tier 1 biomass-based diesel pathway.

[8] For pathways with less than 24 months of operational data, a provisional CI may be considered.

Table 2. Current Operational Data Requirements for Tier 1 Biomass-Based Diesel Pathway Applications

	Biodiesel	Renewable Diesel
Feedstock	• Soybean (bushel), Canola (dry metric ton) or Raw Oil (lbs.), and • Extracted Oil or Rendered Oil (lbs.)	
Process Energy	• Electricity (kWh) • Fossil NG (MMBtu) • Coal (tons) • Biogas (MMBtu) or Biomass (dry tons) directly supplied to the facility • Other (e.g. Bottom Pitch) (lbs.)	
Chemical/Material Inputs	• Methanol (Btu) • Sodium hydroxide (grams) • Sodium methoxide (grams) • Hydrochloric acid (grams) • Sulfuric Acid (grams) • Phosphoric acid (grams) • Citric acid (grams)	• Hydrogen (Btu) • Phosphoric acid (grams) • Citric acid (grams)
Co-Products	• Glycerin (lbs.)	• Propane or purge gas (scf)
Feedstock Transport	• Transport mode and distance (miles) from extraction mill/collection/rendering facilities to fuel production facility.	
Finished Fuel Transport and Distribution	• Transport: mode and distance (miles) from fuel production facility to California (a standard value is applied for California distribution from port/rail to blending terminals to fueling facilities).	

Once the pathway has been certified, the applicant may begin reporting transportation fuel transactions in the LRT-CBTS. In order to access any credits generated, the applicant must also currently complete a one-time fuel transport mode (FTM) demonstration verifying that fuel can be transported by the modes claimed in the pathway.

The following section explores potential changes to the LCFS fuel pathway application and evaluation processes.

Potential Changes for Consideration

New Definitions for Tier 1 Pathway CI Application Input Values

For the purposes of this discussion paper, and potentially to improve clarity in application requirements, staff suggests the following to distinguish among values that would be used in determining the CI of Tier 1 pathway applications:

- Site-specific: An input value, or the raw operational data used to calculate an input value, which is required to be unique to the facility, pathway, and feedstock. All site-specific inputs that appear in the simplified CI calculator must be measured, metered or otherwise documented, and be verifiable, e.g., consumption of utility natural gas or grid electricity at a fuel-production facility must be documented by invoices from the utility. Under this potential framework, an application might be rejected as incomplete if a site-specific input value cannot be determined.

- Conditional default: A conservative input value established by ARB staff that may be used under specified conditions, which is not subject to further conformance review. In a situation in which an applicant cannot provide the necessary information to determine and validate site-specific values, a conditional default may be used as a necessary substitute for the site-specific value. The conditions under which this value must be used are specific to each situation and would be defined by ARB staff accordingly. Conditional default values may be subject to validation that the specified conditions are met, but would not be subject to further verification, with the rationale that the value is based on reasonable assumptions and is sufficiently conservative to encourage use of site-specific values when feasible.

- Standard: An input value that would not appear in the simplified CI calculator and could not be modified to a site-specific value unless the applicant receives permission from the Executive Officer. These values are intended to be the same for all applicants of a given fuel type, and therefore would not be subject to CI conformance evaluation by ARB or third-party verifiers, e.g., the pipeline transmission distance for fossil natural gas; much of the background data used in CA-GREET, including emission factors, truck capacities, and farming inputs.
Potential Simplification of the Tier 1 Calculator for Biomass-based Diesel Pathways

To further streamline pathway CI application, evaluation, and verification for Tier 1 biomass-based diesel pathways, staff is considering additional simplification to the Tier 1 pathway application forms (as a replacement for the current CA-GREET 2.0 Tier 1 Calculator and operational data summary template). Similar to the current Tier 1 Calculator, the simplified CI calculators would provide automated calculations using factors from the Board-adopted version of CA-GREET, but increase simplicity and transparency of these calculations.

Details of a draft simplified CI calculator for biodiesel/renewable diesel are discussed in Appendix B and an Excel version is posted for stakeholder review of the suggested input fields.[9] The calculator collects summarized monthly operational data, which is then

[9] The draft simplified CI calculator is available for download at:

automatically translated to the user-defined inputs needed for the CI calculation. Using life cycle inventory data, emission factors, and certain default parameters from CA-GREET, the calculator performs the needed CI calculations. This allows staff to automate any unit conversions that are currently performed by applicants, in order to simplify the application process and facilitate a direct comparison of the inputs to meter readings, data loggers, invoices, and other types of records. The draft simplified CI calculator offers a simplified, transparent and standardized method of demonstrating how operational data impacts CI, and may be useful to producers on an ongoing basis to monitor variations and mitigate risk of exceeding their certified CI.

Staff is seeking stakeholder feedback on development of the simplified CI calculator. Please download and review the draft simplified CI calculator. See specific requests for feedback in Appendix B.

Consideration of Options for Feedstock Upstream Processing Energy Values

The draft simplified CI calculator uses standard parameters for oil yield and energy consumption when calculating the CI impact related to upstream feedstock production processes such as treatment of raw UCO and rendering of tallow, and extraction of soy and canola oil and DCO. Staff is considering allowing applicants to apply for facility-specific upstream processing energy of feedstocks using the Tier 2 pathway framework. The improvement criteria for Tier 1 fuels produced using innovative methods would apply to the Tier 2 application, meaning that applicants would need to demonstrate that the upstream processing facility achieves the minimum reduction in "source-to-tank" CI required in the LCFS regulation.[10] Applicants using facility specific upstream processing energy with the Tier 2 pathway framework would provide complete operational data for the upstream processing facility. Based on feedback received, staff's preliminary proposal is to offer two options for Tier 1 feedstock treatment:

1. Either accept standard values for treatment energy (including UCO treatment, tallow rendering and/or vegetable oil extraction), or

2. Accept a site-specific zero-treatment energy (typically applicable to used cooking oil transported directly to a fuel producing facility without an intermediate treatment step).

[10] The reduction is described in LCFS Regulation Section 95488(b)(2)(F)4: "Production process innovations that improve production efficiency such that resulting CI is at least 20 percent lower due to the process innovation." Source-to-tank means all the steps involved in feedstock production and transport, and finished fuel production, transport, and dispensing. A source-to-tank CI does not include the carbon intensity associated with the use of the fuel in a vehicle.

Staff is seeking stakeholder input on giving the option to use standard processing energy inputs (covering UCO treatment, tallow rendering and vegetable oil extraction processes) instead of facility-specific data. Standard values would not be subject to verification and would be fixed in the CI calculator. Would stakeholders accept standard treatment energy values if the options were offered?

Staff is seeking input on tracking shipment/collection of feedstock directly to a fuel production facility without transferring to a collection/treatment facility?

Staff is seeking input on the suggestion to require modeling of CI for facility-specific feedstock processing energy to be performed under Tier 2 classification.

Accounting Methodologies for Allocating Fuel Volumes by Feedstock

Producers are increasingly turning to feedstock blending as a means to reduce their dependence on sometimes unpredictable supplies of single feedstock. The ability to purchase and run feedstock oils interchangeably across a wide range of blend proportions reduces the likelihood of production disruptions caused by price volatility or shortages of individual feedstocks. A facility processing multiple feedstocks in varying proportions can yield fuel associated with two or more Fuel Pathway Codes (FPC). The current version of the draft simplified CI calculator requires the applicant to enter monthly feedstock quantities for all feedstocks (even those with corresponding fuels which are not delivered to California). The CI score for each pathway is determined using the overall facility average yield. Based on this yield, the calculator determines a feedstock specific volume of fuel generated. This is calculated for all feedstocks entered in the calculator. Each of the feedstock volumes are mapped to corresponding CI values calculated from all user-inputs and embedded standard inputs in the calculator. A fuel producer must be able to unequivocally associate specific quantities of feedstock consumed with specific volumes of fuel.

In order to clarify compliance requirements, staff is considering requiring the fuel producer to ensure that the reported quarterly production amounts for a given FPC do not exceed the estimated production amount, based on the average yield as determined during the pathway certification.

The estimated production amount for a given FPC is calculated using the amount of individual feedstock consumed and the average facility yield as determined during the pathway certification.

$$\boldsymbol{Estimated\ production\ amount} = average\ yield\ as\ determined\ during\ fuel\ pathway\ certification \times amount\ of\ feedstock\ consumed$$

If the actual total amount of fuel produced during a quarter is greater than the estimated production amount summed across all feedstocks consumed in that quarter, the excess fuel amount should be allocated to the FPC with the highest CI value. In cases where some of the feedstocks consumed do not have certified CI's under LCFS, a temporary FPC should be requested. See Appendix D for an illustrative example.

If a producer is using any other FPC allocation accounting methodology then it must be approved by the Executive Officer during the pathway certification process. For verification purposes, staff is considering requiring producers to provide records that associate all the fuel volumes reported in a quarter with specific quantities of feedstock consumed within that quarter.

Staff is seeking stakeholder input on the suggested accounting methodology for allocating fuel volumes by feedstock.

Multiple Pathways for Feedstocks from Different Regional Sources

Fuels produced from different regional sources may have significantly different CIs due to differences in electricity mix and transportation distances. In these cases, staff suggests that applicants could disaggregate instances of the same feedstock and apply for separate pathways for feedstocks from different sources. For instance, if a biodiesel facility in California is sourcing UCO from both California and Canada, then the applicant could enter these feedstocks into two different feedstock columns in the simplified CI calculator to determine separate CI scores for each UCO feedstock. For fuel producers where the facility sources feedstock both with ARB-defined rendering/treatment energy and facility-specific rendering/treatment energy, staff suggests applicants enter these feedstocks into two different feedstock columns in the calculator.

Staff is seeking stakeholder feedback related to allowing disaggregation of a single feedstock type sourced from multiple regions to account for varying energy mixes and transport distance, rather than aggregating the feedstock and requiring conservative energy mixes and transport distances. Staff is also seeking feedback on allowing disaggregation of feedstock based on differences in upstream processing energy (e.g., UCO and tallow).

If offered, are stakeholders likely to take advantage of this option?

Could substantiality thresholds be used to limit the number of distinct pathways that an applicant may apply for? For example, the difference in the CI scores must be at least X gCo2e/MJ, or Y%, to disaggregate by feedstock source. In this case feedstocks could be grouped by region (those within a transport radius) to meet the threshold.

Consideration of Facility-Specific Co-products

Currently, the Tier 1 calculator for biodiesel only accounts for glycerin as a co-product in biodiesel production, and propane as a co-product in renewable diesel production. Some applicants claim the production and sale of additional co-products not considered in the current model: distillate bottoms (may be used as fuel) and free fatty acids (may be used as feed) created during the biodiesel production process; in renewable diesel production, co-products may include naphtha and purge gas. Staff is currently considering crediting the above mentioned co-products. This may be considered only if they are supported with evidence of sales and final disposition. Staff suggests that gaseous co-products should be reported at +/-5% accuracy using calibrated gas chromatography. If supporting information for any of the co-products is deemed insufficient, staff may disallow credits for one or more of the co-products from biodiesel or renewable diesel production.

Staff is seeking stakeholder feedback on whether distillate bottoms, free fatty acids, naphtha or purge gas should be considered co-products and suggestions for requirements to ensure yields and reported volumes associated with each of these co-products are verifiable.

Staff is also seeking feedback regarding current uses for co-products of BD/RD production. Is the requirement for demonstrating sales (invoices and receipts) a feasible option?

Staff is seeking stakeholder feedback on the CI allocation methodology for co-products.

Lastly, staff is also seeking stakeholder feedback regarding density values for co-products and feedstocks. For every input listed in pounds, what are the preferred density values for converting gallons to pounds for co-products and feedstocks? Stakeholder input will be considered when standardizing conversion factors to be applied in all gallon-to-pound calculations for these CI inputs.

Consideration of Standard Values for Fuel Process Chemical Inputs (Excluding Methanol and Hydrogen)

The Tier 1 calculator based on CA-GREET 2.0 requires applicants to enter the quantities of process chemicals, such as hydrochloric acid and others as shown in Table 2 (excluding methanol and hydrogen), used in biomass-based diesel production processes. Because these chemical inputs result in a small contribution to CI and staff has observed minimal variability in CI due to process chemical input quantities across producers, staff is considering applying standard values to reduce the need for recordkeeping and compliance review of these inputs. In this case the values would not appear in the simplified CI calculator, but would be factored into the CI determination as background data. Staff suggests that values which do not appear in the simplified CI

calculator as user-modifiable inputs should be exempt from compliance requirements. Staff could determine the values by analyzing real world data that applicants have submitted in support of their pathway applications and by choosing representative quantities that would be applicable to the majority of pathways.

Staff is seeking stakeholder feedback on the suggestion to remove process chemical inputs from the CI application and apply standard values to determine the CI impact.

Consideration of Adding New Regions/Countries for Feedstock and Finished Fuels and Regional Energy Mixes to the Draft Simplified CI Calculator

The proposed draft simplified CI calculator would require applicants to input the region/country from which they source their feedstocks and produce finished fuel as well as the electricity mix, crude mix and natural gas sources. The regions available currently cover the US, Canada and Brazil. For regions and countries not included in the calculator, staff would work directly with applicants to add specific regions to the available list of options. The same approach may be considered if transport options or emission factors have to account for regional energy mixes or emission factors. Energy mixes for such regions may be derived from data available from the IEA,[11] EIA,[12] and/or country-specific official government websites. Other equivalent sources acceptable to the Executive Officer may also be used to develop appropriate factors for regional energy mixes. Staff will consider adding regulatory language permitting the addition of region-specific data regarding electricity, crude and natural gas sources for applicants from regions not included in the calculator. Appendix B lists specific information that may be proposed to be required from applicants in order to add new regional mixes and emission factors to the simplified CI calculator.

Feedstock Transport Distance Calculations

<u>Proposed feedstock transport requirements for feedstock produced from oilseeds:</u>
Current staff thinking is to potentially propose requiring applicants to input a monthly weighted average transport distance from oilseed processing facilities. Staff is aware that for certain biofuel producers who source such feedstocks from brokers/traders, feedstock sourcing data may be unavailable to enable estimating transport distances. For instances in which feedstock sources are unavailable, staff suggests the use of a conditional default value for all quantities of the feedstock type (for each month when upstream feedstock information is unavailable). This conditional default value would only apply for oilseed-derived feedstocks assumed to be sourced from North America by a fuel production facility located in North America. If a facility uses a mix of two feedstock sourcing options, staff suggests that the applicant enter these feedstocks into

[11] https://www.iea.org/
[12] https://www.eia.gov/

two different feedstock columns in the simplified CI calculator to determine separate CI scores for the same feedstock type.

Staff is seeking stakeholder feedback regarding the preliminary proposed feedstock transport distance estimation methodology. For known sources of oilseed derived feedstock, is calculating a weighted average feasible? For the same feedstock from unknown sources, what are reasonable conditional default transport distances for truck and rail for vegetable oil feedstocks?

Suggested potential feedstock transport requirements for UCO:
Two scenarios are possible regarding transport of UCO as outlined below:

Scenario 1 (most common): UCO is collected from collection/treatment facilities and transported to a fuel production facility. For this scenario, staff proposes that applicants could input a monthly weighted average of transport distance from each collection/treatment facility to the plant. For broker/trader-sourced feedstock, the location of collection/treatment facilities and quantities will be required to calculate and validate monthly weighted average distance used in the pathway CI calculation. Staff is considering how best to assign transport emissions from the point of origin to the treatment facility.

Scenario 2: UCO is collected from restaurants and directly transported to the fuel production facility. In this situation, staff proposes that applicants could provide the total monthly distance driven to collect the feedstock and deliver it to the fuel production facility. Staff is considering how best to assign transport emissions from the point of origin directly to the fuel production facility.

Suggested feedstock transport requirements for tallow:
Current staff thinking is to potentially propose requiring applicants to provide a monthly weighted average transport distance for all tallow used as a feedstock. Actual distances from each tallow rendering facility could be required to establish weighted average distance. For broker/trader-sourced feedstock, invoices specifying point of origin and quantity will be required to calculate and validate a monthly weighted average distance used in the pathway CI calculation.

Suggested feedstock transport requirements for other potential future feedstocks:
Current staff thinking is to potentially propose requiring applicants to provide a monthly weighted average transport distance for other feedstocks used as a feedstock. Actual distances from the sourcing facility could be required to establish weighted average distance. For broker/trader-sourced feedstocks, invoices specifying point of origin and quantity may be required to validate weighted average distance used in the pathway CI calculation.

Feedstock transport modes and distance estimation references:
The draft simplified CI calculator provides four different modes of transport for feedstock and includes: truck, rail, ocean tanker and barge. Truck transport uses heavy-duty

vehicles and transport distance between two points may be determined using a publicly available web-based driving distance estimator. For rail transport, mileage should be based on the rail network maps from either BNSF Railway[13] or Union Pacific.[14] For facilities which are not on the BNSF or UP rail network, applicants may use a publicly available web-based driving distance estimator for the distance between the facility and the nearest rail depot. For regions outside the United States, appropriate rail network maps from that region may be used to estimate mileage for rail transport. For transport by ocean tanker, transport distance may be determined using a publically available web-based nautical distance calculator.[15] Barge distance may be determined using similar tools. Nautical miles should be converted to miles before entering distance into the calculator, and applicants should clearly list the conversion factor used. All inputs related to transport are additive in the calculation of CI for feedstock transport.

Staff is seeking stakeholder feedback on the preliminary proposed feedstock transport distance estimation methodologies. Are there any unintended consequences from applying these strategies?

What is the current practice for sourcing feedstocks from vegetable oils? Do most fuel providers source directly from the processing facility, or is it common to purchase from traders/brokers? How likely are traders/brokers to withhold listing locations of feedstock sources on bill of ladings?

Is it reasonable to require information on point of origin for UCO and tallow?

Staff is seeking stakeholder feedback on a methodology for calculating upstream transport emissions for UCO from the point of origin to the treatment facility or directly to the fuel production facility.

Finished Fuel Transport

Staff proposes that applicants enter the total distance to transport finished fuel to the California blending terminal. As with feedstock transport, the available transport modes are heavy duty diesel truck, rail, ocean tanker and barge. The same tools referenced in the previous section may be used to calculate trucking, rail and marine transport distance. Nautical miles should be converted to miles for input into the form. As with feedstock transport, miles entered for each mode of finished fuel transport are additive. This feature ensures that emissions from total pathway transport mileage is accounted for, including trucking distance to and from rail cars, ports, and other loading facilities. Applicants may be shipping fuel using more than one method. For example, a fuel producer may be shipping some of its fuel to California by rail (with truck transport to and from rail yards), while also shipping some of it to California by ocean tanker (with

[13] BNSF railway system: http://www.bnsf.com/customers/where-can-i-ship/
[14] Union Pacific system: https://www.up.com/aboutup/usguide/index.htm
[15] Nautical distance calculator example: https://www.marinetraffic.com/en/voyage-planner

truck transport to and from ports). Staff suggests that applicants inform ARB staff of all their transport mode combinations. Staff suggests that the most conservative of these options be picked for the pathway, from a CI perspective.

Other Potential Changes to Pathway Application Requirements

Staff is considering proposing to remove the requirement to submit to ARB supporting documentation substantiating the information found in the simplified CI calculator. Instead, the documentation supporting the operational data would be maintained according to recordkeeping requirements and reviewed and validated by an independent third-party verifier before a pathway could be certified. Staff is also considering proposing requiring ongoing verification of fuel shipments to California and eliminating the existing current requirement of a one-time fuel transportation mode demonstration to ARB.

No other changes are being suggested for the staff evaluation process; however, once the simplified CI calculator is submitted as part of a complete pathway application, staff will review the calculator and application for completeness. If the application is complete, applicants will be advised to proceed with the validation step conducted by the independent verifier. Validation should occur after staff reviews the application for completeness and before it can be certified by the Executive Officer. If the application package is deficient, the application will be rejected and deleted from the AFP, requiring the applicant to reapply with complete and updated information.

2. REPORTING REQUIREMENTS

After an entity has been approved to use an LCFS pathway to generate credits for liquid alternative fuels (i.e., biodiesel, renewable diesel, and ethanol), they must report the amount of fuel produced or imported for intended use in California to receive LCFS credits.

Existing Reporting Requirements

Regulated parties must register in the LRT-CBTS to establish a reporting account. This process is simple and primarily includes providing the organization name, organization address, and organization federal employer identification number (FEIN), and account administrator information.

Regulated parties for liquid alternative fuels are subject to the reporting requirements set forth in section 95491(a) and the recordkeeping requirements set forth in section 95491(b) through (e) of the LCFS regulation. Pursuant to section 95483, in case of ownership transfer of fuel, a regulated party must provide the subsequent owner of the fuel Product Transfer Documents (PTD), with the information specified in section 95491(c)(1).

A reporting party generates credits quarterly after the quarterly report has been

reconciled with counterparties and submitted in the LRT-CBTS.[16] The quarterly report includes the amount of fuel transacted in the quarter (gallons), corresponding FPC, and the vehicle application[17] (e.g. light duty/medium duty, heavy duty). This information is used for LCFS credit calculation. Reporting parties are also required to submit an annual compliance report for the prior calendar year. The quarterly and annual reports must be submitted in the LRT-CBTS by the deadlines specified in section 95491(a)(1).

If a fuel that has been reported to the LCFS program is subsequently exported out of California, the exporting party is obligated to report the amount under the transaction type "Export" in the LRT-CBTS and will incur deficits or credits for the fuel amount exported. In cases when the FPC or biofuel production facility is not known or not available to report, then the exporting entity should use the substitute FPCs provided in LCFS Regulatory Guidance 16-01.[18]

Pursuant to section 95491(a)(6), a reporting party must maintain a non-negative value for each FPC's Total Obligated Amount (TOA) as summed across all quarterly data.[19] Any negative TOA for a FPC will result in an error message at the time of quarterly report submission.

Potential Reporting Implementation Improvements

Staff is considering implementing the following administrative improvements starting in the Q1 2017 reporting period.

Reporting Standardized Volumes for Liquid Alternative Fuels

The volume of biodiesel and renewable diesel, along with other liquid alternative fuels, depends on the temperature at which it is measured. To ensure the accuracy

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[16] Note that even if no fuel was transacted, a quarterly report with zero amounts must be submitted to remain in good standing in the system.

[17] The vehicle application determines the Energy Economy Ratio (EER) used in the credit calculation, which accounts for the difference in alternative vehicle (such as natural gas, hydrogen, or electric) powertrain efficiency relative to conventional gasoline and diesel vehicles they replace. Biomass-based diesel is considered a heavy-duty diesel replacement with EER equal to 1 and therefore vehicle type does not need to be tracked or reported. See EER values for each vehicle-fuel combination in Table 4 of the LCFS regulation.

[18] LCFS Regulatory Guidance 16-01 available at: https://www.arb.ca.gov/fuels/lcfs/guidance/regguidance_16-01.pdf

[19] Obligated Amount is the amount of transportation fuel or blendstock used for calculation of credits (or deficits) in the LRT-CBTS. It is the sum of fuel amounts reported with transaction types that carry a positive obligation (such as import, production, or purchased with obligation, etc.) minus the sum of amounts reported with transaction types that carry a negative obligation (such as sale with obligation, export, or loss in inventory, etc.). Refer to LCFS regulation for a complete listing and definitions of transaction types. The obligation indicators used in the LRT-CBTS to indicate whether the associated obligation for each uploaded fuel transaction is positive, negative, or neutral, are '+', '-', and 'o' (o=no change), respectively.

of data and credit calculation in the program it is important that all biodiesel and renewable diesel volumes reported in the LRT-CBTS are adjusted to standard temperature conditions. The current LCFS regulation does not provide clarification on standardizing the volume of liquid alternative fuels at standard conditions for the purpose of reporting in the LRT-CBTS.

Staff would clarify that any biodiesel and renewable diesel volume reported in the LRT-CBTS should be adjusted to standard temperature conditions of 60°F.[20] ARB has issued guidance which suggests methodologies for adjusting fuel volumes to account for temperature corrections; please refer to Draft LCFS Regulatory Guidance 17-01.[21]

Quarterly Reconciliation with Counterparties in the LRT-CBTS

Per the LCFS regulation, reporting parties are required to upload the fuel data for quarterly reports in the LRT-CBTS within the first 45 days after the end of the quarter. During the subsequent 45 days, reporters shall reconcile the fuel data reported in the LRT-CBTS with counterparties prior to the submission of quarterly reports.

Fuel data reconciled with counterparties and submitted in a quarterly report before the stipulated deadline may generate LCFS credits. However, if there remain any unreconciled fuel data at the time of quarterly report submission, no credits pertaining to the fuel amounts under contention should be issued. Table 3.1 below shows the amount of liquid alternative fuels that were not reconciled in the LRT-CBTS during 2015 and 2016. It also shows the number of credits associated with the unreconciled fuel amounts and their total market value.

[20] Note that this aligns with the standardization of volume requirements for Renewable Identification Number generation in CFR §80.1426.
[21] Draft LCFS Regulatory Guidance 17-01 available at: https://www.arb.ca.gov/fuels/lcfs/guidance/regguidance_17-01.pdf

Table 3.1. Unreconciled fuel amounts and associated credits in 2015 and 2016

2015				
Fuel Type	**Fuel Volume (gal)**	**Credits**	**% of Total LCFS Credits**	**Value[22]**
Biodiesel/ Renewable Diesel	2,735,952	18,936	0.3%	$1,174,032
Ethanol	21,783,654	126,647	2.3%	$7,852,114

2016				
Fuel Type	**Fuel Volume (gal)**	**Credits**	**% of Total LCFS Credits**	**Value**
Biodiesel/ Renewable Diesel	4,909,351	51,413	0.6 %	$5,192,713
Ethanol	13,837,872	28,814	0.3 %	$2,910,214

Currently, the LRT-CBTS flags all such unreconciled data for reporting parties and their counterparties. Staff is now planning to modify the LRT-CBTS system to issue credits only for the fuel data reconciled in the quarterly report submission. After the reporting deadline, any credits or deficits associated with the unreconciled fuel amounts will remain in account of upstream entity. Table 3.2 below illustrates the different scenarios for enhanced reconciliation in the LRT-CBTS.

Table 3.2. Scenarios for enhanced reconciliation in the LRT-CBTS.

	Reporting party's (RP) quarterly report submission	**Business partners' (BP) quarterly report submission**	**LRT-CBTS Reconciliation**
1	Includes sale of credit/deficit generating fuel with obligation	*No counter report*	Credits/deficits are not issued in the BPs account ledger and remains in the RP's account
2	*No counter report*	Includes purchase of credit/deficits generating fuel with obligation	

This enhanced reconciliation functionality should eliminate the need for third-party verification of fuel transactions reported downstream from the initial regulated party in the LRT-CBTS. This will limit the scope of the future third-party verification of fuel transactions to only transactions reported as production, import, or export out of California.

[22] **Volume weighted average credit price of $62 for 2015 and $101 for 2016. Source: ARB's Monthly LCFS Credit Transfer Activity Reports* http://www.arb.ca.gov/fuels/lcfs/credit/lrtmonthlycreditreports.htm

Staff is seeking stakeholder feedback on enhancing LRT-CBTS reconciliation capability to eliminate the need for third-party verification of fuel transactions reported downstream of an initial regulated party.

Reporting Exports of Neat Biomass-Based Diesel or Fuel Blends Containing Biomass-Based Diesel

As mentioned above, if fuel that has been reported to the LCFS program is subsequently exported out of California, the export must be reported to ARB. Fuels may generate LCFS credits or deficits only if they are used as transportation fuel in California; if reported fuels are exported out of California they are no longer eligible to generate credits or deficits in the LCFS program. To balance the number of credits or deficits generated for the amount of fuel which gets exported, an equivalent number of credits or deficits must be deducted from the LRT-CBTS account of the entity reporting the export. Table 4 below attempts to clarify which entity should be responsible for reporting exports of diesel fuel in the LCFS program in various export scenarios.

Table 4. Entities responsible for reporting diesel fuel exports in the LCFS.

Scenarios	Entity responsible for reporting the export
Fuel sold or delivered above the rack for export[23] This refers to delivery or sale of fuel for export at pipeline origin points, pipeline batches in transit, and at terminal tanks before the diesel has been loaded into trucks or other means of non-bulk transfer.	The entity holding the title of the fuel as it crosses the border on its way toward the first point of sale/delivery is responsible for reporting the export in the LRT-CBTS.
Fuel sold at the rack for export This refers to the sale of fuel for export at the terminal through truck or other means of non-bulk transfer for which the out-of-sate delivery destination is known at the time of sale.	The entity holding the title of the fuel as the fuel crosses the rack is responsible for reporting the export in the LRT-CBTS.
Fuel diverted out-of-state below the rack This covers the sale of fuel at the rack with a California destination which later gets diverted out of state through truck or other means of non-bulk transfer or any other export scenario not covered above	The entity holding the title of the fuel, as it crosses the border, is responsible for reporting the export in the LRT-CBTS.

[23] Refer to LCFS regulation section 95481 (a)(1)

Currently, ARB allows significant flexibility for the purposes of the initial LCFS reporting and a reporting party may choose to report biomass-based diesel blends as 100% Ultra Low Sulfur Diesel (ULSD) when the blend percentage is not labeled as per FTC requirements.[24]

For example, it is acceptable within the requirements of regulation for the entity that blended renewable diesel into a batch of product to attribute the entirety of the renewable product in the batch to the volumes controlled by their company, and attribute the non-renewable gallons to fuel sold downstream. This approach could be used to claim that exports containing some renewable product are one hundred percent petroleum-derived.

However, in the case where renewable content is claimed in the export blend for LCFS reporting, the amount and FPC of exported biomass-based diesel will be used to calculate the adjustment to the credit balance in the exporting entities' LRT-CBTS account. In cases when the accurate blend percentage or FPC for the purposes of LCFS reporting are not known then default blend percentages (based on FTC labeling requirements)[24] and substitute FPCs provided by ARB should be used to report the fuel exports.

The export of fuel that may contain up to 5% biodiesel or 5% renewable diesel and does not have FTC labeling can be reported in LCFS as 100% ULSD. The default percentage for fuel labeled as "B20 Biodiesel Blend" could be based on the state-wide average blend level as determined using the data reported to ADF. The default percentage for fuel labeled as "20% Biomass-Based Diesel" that may contain up to 20% renewable diesel would be based on the FTC labeling requirements. Substitute FPCs will have the average CIs for that fuel in the prior year.

Table 5 below summarizes potential default blend percentages and substitute FPCs that may be used for reporting export of different diesel blends starting compliance year 2017. ARB plans to post an updated guidance on a regular basis to reflect any changes in the default blend percentages and CI of substitute FPC's.

[24] FTC regulation requires biomass-based diesel that is dispensed from a commercial pump to be labeled distinctly from regular diesel in blends above 5 percent. Specifically it requires labeling of blends between 5 percent and 20 percent of biomass-based diesel as B-20 and blends above 20 percent are required to be labeled by the exact volume percentage of biomass-based diesel. Both, renewable diesel and biodiesel meet the definition of biomass-based diesel and are therefore subject to these labeling requirements. As per 16 CFR 306 available at: https://www.ftc.gov/sites/default/files/documents/federal_register_notices/automotive-fuel-rating-certification-and-posting-16-cfr-part-306/080311automotivefuelratings.pdf

Table 5. Default blend percentages and substitute FPC's for reporting of diesel fuel exports for compliance year 2017.

Diesel Fuel Blend	Default blend percentage by volume*	Substitute FPC (CI in gCO_2e/MJ)*
Diesel fuel with unknown blend levels of biofuel and with no FTC labeling identifying the blend level.	100% ULSD	102.01 for ULSD
Diesel fuel with unknown blend level and labeled as "20% Biomass-Based Diesel Blend"	20% RD	35.86 for RD
Diesel fuel with unknown blend level and labeled as "B20 Biodiesel Blend"	14.3% BD	16.94 for BD
Pure renewable diesel with unknown CI	100% RD	35.86 for RD
Pure biodiesel (B99/B100) with unknown CI	100% BD	16.94 for BD

**BD stands for Biodiesel and RD stands for Renewable Diesel*

As mentioned earlier, substitute FPC's are already available to be used in cases when FPC of exported biodiesel or renewable diesel is not available for reporting in the LRT-CBTS. For more details on using substitute FPCs for reporting exports, please refer to LCFS Regulatory Guidance 16-01.[25] Staff plans to update the existing guidance to clarify the issues discussed above.

Staff is seeking stakeholder feedback on the concept of using average default blend percentages when the biomass-based diesel content in the exported diesel blend is not known for the purposes of LRT-CBTS reporting.

LRT-CBTS System Check for Total Amount (TA) of Fuel for each FPC

Liquid alternative fuels with different FPCs may be commingled at the production facility or throughout the distribution chain, including when they are blended into gasoline or diesel. The reporter of these fuels must use accounting methods that enable them to track the total amount of fuel purchased, sold and produced in their inventory for each FPC. As mentioned above, the reporting parties are currently

[25] LCFS Regulatory Guidance 16-01 available at: https://www.arb.ca.gov/fuels/lcfs/guidance/regguidance_16-01.pdf

required to maintain a non-negative value for TOA of fuel in their LRT-CBTS account. This non-negative balance is critical for ensuring proper compliance and accounting for credits and deficits.

However, to further ensure the accuracy of fuel data in the program, staff would like to introduce a system-wide check to prevent overdraft of total fuel amounts (including both obligated and non-obligated volumes) for each FPC in an LRT-CBTS account. Under this proposal, the system would enforce a non-negative value for Total Amount (TA) of fuel for each FPC, with or without obligation, in each LRT-CBTS account as summed across all reporting periods starting 2016. This system check will be implemented in addition to the TOA check as discussed above. This means the reporting party would need to ensure that the fuel amounts for each FPC reported under transaction types which decrease inventory *(*such as *sold with* or *without obligation,* or *loss in inventory,* etc*.)* do not exceed the amounts reported under transaction types which increase inventory *(*such as *import, production,* or *purchased with* or *without obligation,* etc*.)*. This also means no amount of fuel may be reported as sold prospectively (i.e., no overdraft of fuel amounts from the inventory). This system check would be applicable for all FPCs established pursuant to the 2015 readoption of the LCFS regulation.

As fuel is added to, and withdrawn from, the inventory (with or without obligation) the total amount of fuel for each FPC will be adjusted to account for those additions and withdrawals on a quarterly basis in the LRT-CBTS account. If the total amount of fuel for a FPC is found to be negative at the time of quarterly report submission it would result in an error message. The error would need to be resolved before the quarterly report could be successfully submitted.

The reporters of the fuel should be able to maintain and provide records upon request that unequivocally associate reported fuel amounts with the respective FPCs to those fuel amounts in their physical inventories.

Potential Regulatory Amendments to Reporting Requirements

Staff is considering potentially proposing the following amendments to the reporting requirements for biomass-based diesel and other liquid alternative fuels.

Fuel Obligation Transfer Period

Liquid alternative fuels generate LCFS credits on a quarterly basis after reconciled reports for each quarter are submitted in the LRT-CBTS. The number of credits generated in the LRT-CBTS is based on the amount and CI of fuel reported and the CI standard for the year in which the fuel is reported. Regulated parties can also transfer the obligation of the liquid alternative fuels with the ownership of the fuel downstream.

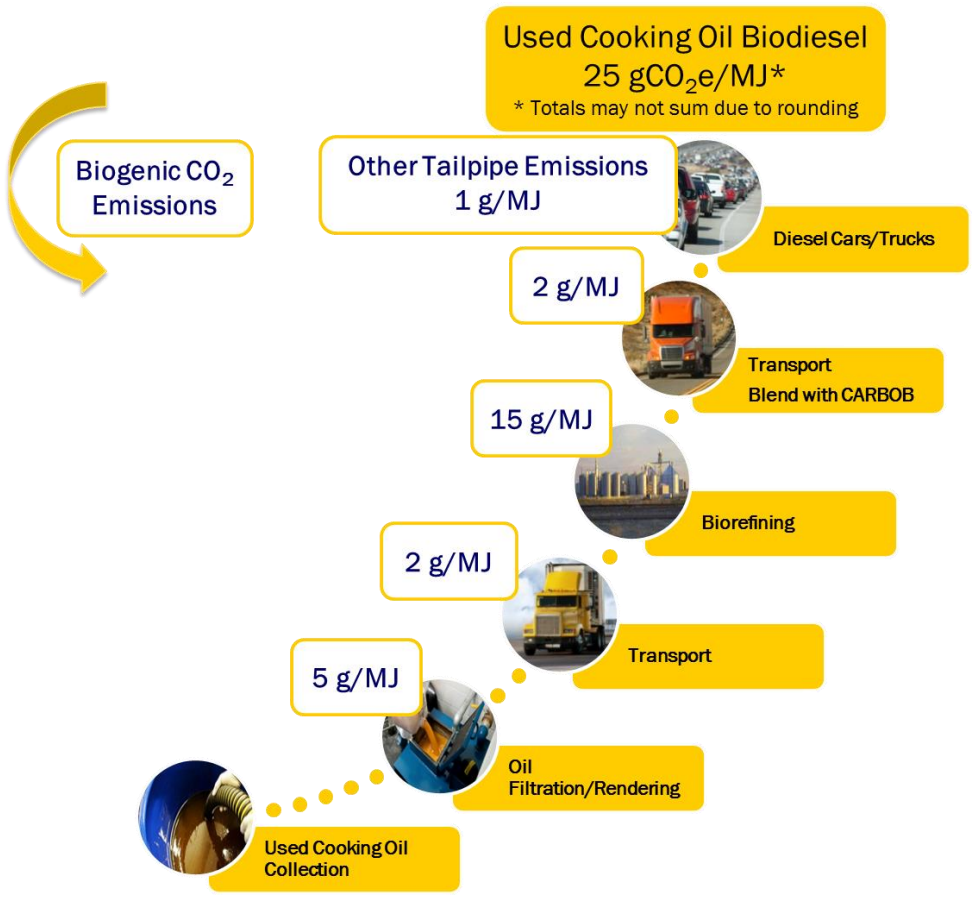
If the annual CI standard changes during the period when the ownership of the obligated fuel is retained by a regulated party, then it can affect the quantity of credits passed along with the fuel's obligation to a downstream entity. To avoid such situations, and to ensure that an accurate balance of credits is maintained in the program, the fuel obligation transfer period would ideally be limited to one reporting quarter. However, sometimes a change in ownership of obligated fuel may span more than one quarter. Therefore, acknowledging the general industry practices, staff is considering proposing a fuel obligation transfer period of two quarters.

This would mean that if the ownership of the fuel with obligation is received in one calendar quarter, it could be transferred to a recipient with obligation no later than the end of the following calendar quarter. After the fuel obligation transfer period is over, the ownership of the fuel could only be transferred without obligation (i.e., without the associated credits). However, the credits generated by the seller for the given fuel amount can always be transferred independently in the LRT-CBTS.

Establishing periodical boundaries for the transfer of fuel obligation to better match industry practices would facilitate an accurate accounting of credits and deficits in the program.

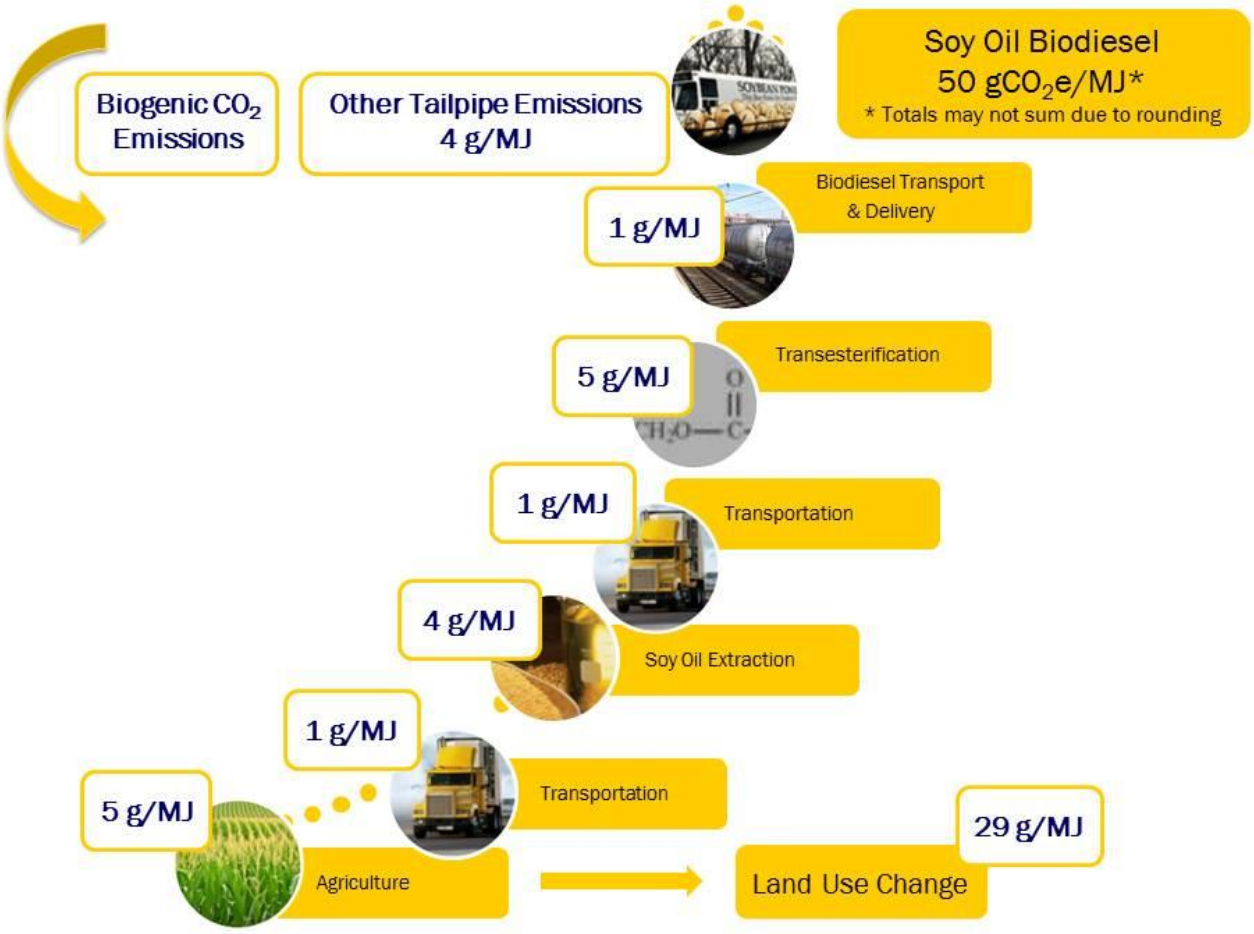
APPENDIX A

Figure A-1. Example Life Cycle Stages for Used Cooking Oil Biodiesel [26]



[26] Low Carbon Fuel Standard. Available at: https://www.arb.ca.gov/fuels/lcfs/background/basics.htm

Figure A-2. Example Life Cycle Stages for Soy Biodiesel [27]



[27] Detailed California-Modified GREET Pathway for Conversion of Midwest Soybeans to Biodiesel (Fatty Acid Methyl Esters-Fame). Available at: https://www.arb.ca.gov/fuels/lcfs/121409lcfs_soybd.pdf

Table A-1. Example Feedstock CI Contributions (gCO2e/MJ) Based on CA-GREET 2.0

BD Feedstock Production	Crop-Based		Secondary Product	Residue-Based	
	*Soy Oil****	*Canola Oil*	*DCO*	*UCO*	*Tallow*
Crop Farming, Agricultural Chemicals, N_2O in Soil	5	23	--	--	--
Crop Transport	1	1	--	--	--
ILUC*	29.1	14.5	--	--	--
Oil Extraction	4	3	5	--	--
Oil Transport	1	3	1	--	--
Treatment/Rendering	--	--	--	5	17
Rendered Oil Transport	--	--	--	3	3
Example Feedstock Upstream CI	40	44	6	8	20
Biodiesel CI Ranges**	49-60	51-57	28-29	9-28	28-41
Considering Upstream Site Visit	NO	NO	NO	YES	YES

** LCFS Regulation, Table 5. Summary of ILUC Values.*
*** LCFS website, Pathway Certified Carbon Intensities (last updated January 10, 2017)*
**** See Figure A-2*
Feedstock CI Data Summary - Information provided by producer:

1) Feedstock type: Soy Oil, Canola Oil, DCO, UCO, Tallow, Other
2) Feedstock region of geographic origin: California, Midwest, U.S., Canada, Brazil, User Defined and Associated regional electricity mix: 1-U.S. Ave Mix, 2-User Defined Mix, 3-CAMX Mix, 4-NWPP Mix, 5-AZNM Mix, ...29-Brazilian Mix, 30-Canadian Mix
3) Monthly data (24 months): Beginning and ending inventory (tons), oil purchased (tons), moisture content (%), transport mode (HDD truck, rail, ocean tanker, barge) and transportation (miles)

APPENDIX B

DRAFT SIMPLIFIED CI CALCULATOR

This Appendix includes an overview of the input fields shown in the draft simplified CI calculator and requests stakeholder feedback. The draft simplified CI calculator for Tier 1 biomass-based diesel pathway applications is available as a spreadsheet download from the LCFS meetings page.

Download the draft simplified CI calculator:
https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/BD-RD_calulator_updated.xlsm

The draft simplified CI calculator has now been automated to perform CI calculations. The calculator would potentially replace the existing Tier 1 calculator in pathway application packages. All data entered in this calculator would be subject to verification unless specifically exempted. The calculator would require the applicant to add facility information and verifiable feedstock, operational energy use and fuel production data used in calculating the CI of biomass-based diesel pathways. All yellow cells are site specific and staff suggests that they would be subject to verification.

Note- the following inputs to the sheet must be reported within a +/-5% accuracy: feedstock inventory, BD and RD inventory, hydrogen produced on site, and gaseous co-product quantities.

The calculator consists of three sheets: BD RD Feedstock Production, BD-Production and RD-Production. The Feedstock production is used with either biodiesel or renewable diesel production data. The applicant should begin by opening the sheet labeled BD RD Feedstock Production and entering the company name and the physical address of the fuel production facility in the top row.

BD RD Feedstock Production

Beginning at Step 1 for Feedstock 1, in Cell C3, the applicant should select a feedstock from the drop down menu in that cell. The feedstock options from the drop down menu include: Soy Oil, Canola Oil, Corn Oil (referring to DCO), Used Cooking Oil, Tallow, Other and None.[28] Feedstocks will be marked as 'None' until changed by the applicant, and feedstocks marked as 'None' will disable the rest of the inputs for that feedstock in that column. Special instructions apply to applicants selecting the 'Other' option (see next paragraph). After selecting a

[28] The calculator allows for up to 12 feedstock inputs in the calculator. Only feedstocks which are used in the production facility shall be included in the calculator. For all other cells in Row 3 of the calculator, applicants shall use the 'None' option. This is critical since selecting the 'None' option will exclude the consideration of all entries corresponding to this selection in CI calculations in the calculator.

feedstock in Row 3, the applicant may include additional description for this feedstock in Row 4 of the same column (if applicable, particularly to distinguish between feedstocks of the same kind). If additional feedstocks are used at the fuel production facility, the applicant should select Feedstock 2 and complete steps similar to Feedstock 1. This should be repeated for all feedstocks used in the facility (up to twelve are currently available). Once descriptions for all feedstocks have been entered, the applicant should click the Feedstock Selection button located at Cell B3 to update the feedstock selections throughout the calculator.

Applicants with a feedstock not included in the drop-down list in row 3 should select 'Other'. Upon selecting this option, the applicant will be prompted to provide details of the feedstock type in Row 5 of the same column.

If lifecycle inputs and other factors required for calculating CI for 'Other' feedstocks are not available in the Board approved version of the CA-GREET model, the applicant shall petition the Executive Officer to develop site-specific values for this feedstock. Emission factors and other required information shall be developed from data sources published by Government agencies or bodies, peer-reviewed journal articles and other appropriate sources. The Executive Officer reserves the right to determine if site-specific values are appropriate for this feedstock and any decision taken by the Executive Officer is final and binding (including disallowing site-specific values). This decision shall be final and shall not be subject to appeal.

Proceeding to Step 2, the applicant should choose the feedstock processing method from the pull down menu for each feedstock in row 6 and click the "Define Oil Extraction Method" cell in A6. Applicants have the option to choose standard values defined by ARB, or to submit site-specific feedstock treatment/rendering/extraction energy in a Tier 2 platform. Applicants choosing the site-specific option should click the "Define Oil Extraction Method" button at cell A6, and will be prompted to submit the oil extraction data to ARB in a Tier 2 calculator. After developing the site-specific feedstock processing energy with ARB, ARB staff will enter these energy inputs directly into the sheet, including thermal energy usage for oil extraction, electricity usage, and total energy for oil extraction. Applicants conducting oil extraction on site must choose the site specific feedstock processing method. Conditions for using the site-specific option are specified in the *Consideration of Options for Feedstock Upstream Processing Energy Values* section of Chapter 1.

In Step 3, the applicant shall enter the geographical region for feedstock sourcing from the dropdown menu in row 7. If the applicable region is not listed for the applicant, the 'User-defined' option shall be selected. The list of regions is shown below:

Region
None
California
Midwest
U.S.
Brazil
Canada
User-defined

The applicant then selects the corresponding e-grid zone for electricity. The selection is available in a dropdown menu in row 8. The drop down menu includes several e-grid regions as shown in the table below:

No.	Description
1	U. S. Ave Mix
2	User-defined Mix
3-28	E-grid regions within the U. S.
29	Brazilian mix
30	Canadian mix

Note: Applicants who select "user-defined" for the feedstock source shall consult with staff to develop appropriate electricity, natural gas and crude mixes and corresponding emission factors. Details of developing such data and emission factors are described in the Consideration of Adding New Regions/Countries for Feedstock and Finished Fuels and Regional Energy Mixes to the Draft Simplified CI Calculator section of Chapter 1.

Once electricity mixes have been chosen for all feedstock selections from Step 1, the applicant should click the Region Selection button located at Cell A9 to update feedstock source selection (this will auto populate the Crude and Natural Gas Sources for all feedstock selections).

Proceeding to Step 3, the applicant should record 24 months of inventory and transportation related data for each feedstock. Clicking on the "Enter Data" button for each feedstock will navigate to the appropriate data entry area for that feedstock. Data should be entered for each feedstock used in the 24 month operational data period (up to twelve feedstocks can be accommodated in the form), regardless of whether the fuel produced from that feedstock will be used in California. Moving from left to right across the sheet, the applicant should enter total monthly rolling inventories (beginning, purchase, and ending) of that feedstock and its corresponding monthly weighted average moisture content.

Moisture content must be informed by certificates of analysis for each batch with a weighted average value entered into the form for each month. Feedstock quantities must be reported in pounds, with an accuracy of +/- 5%. If invoices are typically in gallons, the applicant should convert these values to pounds using a common density conversion for that feedstock. Staff is seeking input on the preferred density factors to apply for each feedstock.

Finally, the applicant should enter the monthly weighted average transport distances and modes for each feedstock. Available modes of transport include heavy duty diesel truck, rail, ocean tanker, and barge. Applicants should enter the monthly weighted average of feedstock transport, by transport mode. The *Feedstock Transport Distance Calculations* section of Chapter 1 of this document contains details and supporting information regarding the proposed methodologies for calculating transport distances for each mode type. After entering transport details for all feedstocks, applicants should press the Calculate button in cell O6 which will auto populate feedstock information from the Feedstock Production sheet to the BD and RD Production sheets.

Biodiesel Production

Applicants for biodiesel pathways should now open the sheet marked BD-Production. Moving from left to right, the sheet is organized to allow for 24 months of biodiesel and co-product production along with methanol, transportation and energy inputs necessary to determine the CI. When all inputs are complete, the sheet will include CIs for BD produced from individual feedstocks listed in the Feedstock Production sheet with corresponding BD volumes. Each pathway will use the overall facility-average yield, and apply the actual energy use data, as if the facility had been operating on a single feedstock.

The applicant shall first select a regional electricity mix for the biodiesel production region from a drop down menu in Cell H5. The same options as detailed in the feedstock production sheet are available for regional electricity mix. Applicants whose electricity mix is not available in the drop down menu shall follow the same procedure listed for feedstock energy sources (the same would apply to the regional crude and natural gas). As described in the *Consideration of Adding New Regions/Countries for Feedstock and Finished Fuels and Regional Energy Mixes to the Draft Simplified CI Calculator* section of Chapter 1, staff proposes to include regulatory language permitting staff to add regions specified by applicants. After selecting the electricity mix, the applicant shall click the 'Select' button located at Cell J5 which will auto-populate Crude and Natural Gas Sources.

Next, moving from left to right across the sheet, the applicant shall enter rolling inventories and production of biodiesel at 60°F (+/- 5% accuracy). The production and inventory volumes shall be recorded in gallons.

Next, the applicant shall enter appropriate energy inputs to the facility. Only the energy inputs relevant to the facility should be entered. The energy types include fossil natural gas, biomass, biogas, other thermal sources (to be specified by the user if necessary), grid electricity, and other electricity (i.e., wind, solar, etc., to be specified by the user if necessary). Natural gas, biogas and other thermal energy should be reported in higher heating value (HHV) in MMBtu from invoices. Biomass should be reported in dry tons (supported by invoices), and electrical energy in kWh from invoices. If biomass supplied is not reported in dry tons, applicant shall provide supporting information to corroborate reported quantities of biomass in dry tons. Other thermal energy use should also be reported in HHV in MMBTU from invoices, and electricity from other sources should be reported in kWh from either invoices or meters designating consumed quantity. For Other Thermal Energy, in addition to filling in the monthly data, applicants should click the button labeled 'Enter Other Fuel Parameters' (cell K9) and enter relevant inputs in the pop up window. For Other Electricity, click on 'Other Electricity Parameters' (cell M9) which will enable a pop up window. All relevant inputs should be entered in the pop up window. GHG emission inputs in the Other Fuel Use and Other Electricity pop-up boxes must be developed in conjunction with ARB staff. For biomass, which must be supplied directly to the facility, weighted monthly average transport distances by heavy duty truck and/or rail should be reported (and supported by invoices). For biogas, actual distance from the generation facility should be reported (supported by invoices).

Next, the applicant shall enter rolling inventories for methanol (gallons) used in biodiesel production and co-products produced (pounds). If invoices for methanol are listed in pounds, these must be converted to gallons using the CA-GREET value of 3006 g/gal. The suggested co-products currently included in the draft form are distillate bottoms, free fatty acids, glycerin and an "other" option for novel co-products. If an applicant selects the 'other' option, supporting information shall provide details of the 'other' co-product including its HHV (with supporting literature or research report citation) and final disposition of this co-product in order to be considered for co-product credit; this must be approved by the Executive Officer. If supporting information for any of the co-products is deemed insufficient, the Executive Officer may choose not to credit one or more of the co-products from biodiesel production.

The final step is to enter the transport modes and corresponding distances for finished fuel supplied to California. As is specified in the *Finished Fuel Transport* section in Chapter 1 of this document, the proposed methodology for calculating finished fuel distance by mode type is the total distance to transport the fuel to the California blending terminal. These distances should be entered in cells W11 to W20. Applicants should refer to the requirements suggested in the *Feedstock Transport Distance Calculations* section of Chapter 1 of this document for instructions on how to generate finished fuel transport distances by mode.

Renewable Diesel Production

Applicants for renewable diesel pathways should open the sheet marked RD-Production. Moving from left to right, the sheet is organized to allow for 24 months of renewable diesel and co-product production along with hydrogen, transportation and energy inputs necessary to determine the CI. When all inputs are complete, the sheet will include CIs for RD produced from individual feedstocks listed in the Feedstock Production sheet with corresponding RD volumes. Each pathway will use the overall facility-average yield, and apply the actual energy use data, as if the facility had been operating on a single feedstock.

The applicant shall first select a regional electricity mix for the biodiesel production region from a drop down menu in Cell H5. The same options as detailed in the feedstock production sheet are available for regional electricity mix. Applicants whose electricity mix is not available in the drop down menu shall follow the same procedure listed for feedstock energy sources (the same would apply to the regional crude and natural gas). As described in the *Consideration of Adding New Regions/Countries for Feedstock and Finished Fuels and Regional Energy Mixes to the Draft Simplified CI Calculator* section of Chapter 1, staff proposes to include regulatory language permitting staff to add regions specified by applicants. After selecting the electricity mix, the applicant shall click the 'Select' button located at Cell J5 which will auto-populate Crude and Natural Gas Sources.

Next, moving from left to right across the sheet, the applicant should enter rolling inventories and production of renewable diesel at 60°F (+/- 5% accuracy). The production and inventory volumes should be recorded in gallons.

Next, the applicant shall enter appropriate energy inputs to the facility. Only the energy inputs relevant to the facility should be entered. The energy types include fossil natural gas, biomass, biogas, other thermal sources (to be specified by the user if necessary), grid electricity, and other electricity (i.e., wind, solar, etc., to be specified by the user if necessary). Natural gas, biogas and other thermal energy should be reported in higher heating value (HHV) in MMBtu from invoices. Biomass should be reported in dry tons (supported by invoices), and electrical energy in kWh from invoices. If biomass supplied is not reported in dry tons, applicant shall provide supporting information to corroborate reported quantities of biomass in dry tons. Other thermal energy use should also be reported in HHV in MMBTU from invoices, and electricity from other sources should be reported in kWh from either invoices or meters designating consumed quantity. For Other Thermal Energy, in addition to filling in the monthly data, applicants should click the button labeled 'Enter Other Fuel Parameters' (cell K9) and enter relevant inputs in the pop up window. For Other Electricity, click on 'Other Electricity Parameters' (cell M9) which will enable a pop up window. All relevant inputs should be entered in the pop up window. GHG emission inputs in the Other Fuel Use and Other Electricity pop-up boxes must be developed in conjunction with

ARB staff. For biomass, which must be supplied directly to the facility, weighted monthly average transport distances by heavy duty truck and/or rail should be reported (and supported by invoices). For biogas, actual distance from the generation facility should be reported (supported by invoices).

Next, the applicant should enter monthly data for hydrogen (MMBtu) used in renewable diesel production, and co-products produced. Hydrogen use should be supported by invoices for sourced hydrogen. If hydrogen is produced on-site, applicant may provide appropriate measurement data (with an accuracy of +/- 5 percent) to support such production. The suggested co-products currently included in the draft calculator are naphtha, purge gas, and other (to be specified by the user if necessary), all reported in MMBtu. Gaseous co-products may be quantified with an accuracy of +/- 5 percent using calibrated gas chromatography. Any conversion factors used to report quantity in MMBtu shall be clearly detailed by supporting information, and must be approved by the Executive Officer. If quantification and supporting information for any of the co-products is deemed insufficient, the Executive Officer may choose not to credit one or more of the co-products from renewable diesel production.

The final step is to enter the transport modes and corresponding distances for finished fuel supplied to California. As is specified in the *Finished Fuel Transport* section in Chapter 1 of this document, the proposed methodology for calculating finished fuel distance by mode type is the total distance to transport the fuel to the California blending terminal. These distances should be entered in cells S11 to S20. Applicants should refer to the requirements suggested in the *Feedstock Transport Distance Calculations* section of Chapter 1 of this document for instructions on how to generate finished fuel transport distances by mode.

APPENDIX C

Selected Definitions from the 2015 LCFS Regulation

The following definitions can be found in § 95481(a) of the 2015 LCFS Regulation.

Biomass-based diesel means a biodiesel (mono-alkyl ester) or a renewable diesel that complies with ASTM D975-14a, (2014), Specification for Diesel Fuel Oils, which is incorporated herein by reference. This includes a renewable fuel derived from co-processing biomass with a petroleum feedstock.

Business Partner refers to the counterparty in a specific transaction involving the regulated party. This can either be the buyer or seller of fuel.

Credit generator means a fuel provider for an alternative fuel listed in section 95482(b) who may generate LCFS credits for that fuel by electing to opt into the LCFS pursuant to section 95483.1 and who meets the requirements of this regulation.

Intermediate entity is defined in section 95843.1(3) as a person who is in the distribution/marketing chain of imported fuel and is positioned on that chain between the producer under section 95843.1(2) and the importer ("intermediate entity").

Import means to bring a product from outside California into California.

Importer means the person who owns the transportation fuel or blendstock, in the transportation equipment that held or carried the product, at the point the fuel entered California. For purposes of this definition, "transportation equipment" includes, but is not limited to, rail cars, cargo tanker trucks, and pipelines.

Producer means, with respect to any fuel, the entity that made or prepared the fuel. This definition includes "out-of-state" producers where the production facility is out of the State of California and the entity has opted into the LCFS pursuant to section 95483.1.

Product transfer document (PTD) means a document that authenticates the transfer of ownership of fuel from a regulated party to the recipient of the fuel. A PTD is created by a regulated party to contain information collectively supplied by other fuel transaction documents, including bills of lading, invoices, contracts, meter tickets, rail inventory sheets, Renewable Fuels Standard (RFS2) product transfer documents, etc.

Production facility means, with respect to any fuel (other than CNG, LNG and L-CNG), a facility at which the fuel is produced. "Production facility" means, with respect to natural gas (CNG, LNG, L-CNG, or biomethane), a facility at which fuel is converted, compressed, liquefied, refined, treated, or otherwise processed into CNG, LNG, L-CNG, biomethane, or biomethane-natural gas blend that is ready for

transportation use in a vehicle without further physical or chemical processing.

Regulated party means a person who, pursuant to section 95483 or 95483.1, must meet the average carbon intensity requirements in section 95484.

Reporting party means any person who, pursuant to section 95483 or 95483.1 is the initial regulated party holding the compliance obligation, and any person to whom the compliance obligation has been transferred directly or indirectly from the initial upstream regulated party.

Opt-in Party eligibility criteria are specified pursuant to section 95843.1

Transaction type means the nature of a fuel-based transaction as defined below:

A. “Production in California” means the transportation fuel was produced at a facility in California for use in California;

B. “Production for Import” means the transportation fuel was produced outside of California and imported into California for use in transportation. This transaction type is to be reported by out-ofstate producers who claim the initial LCFS obligation for fuel imported into California.

C. “Import” means the transportation fuel was produced outside of California and later brought by any party other than its producer into California for use in transportation. This transaction type is to be reported by non-producers who claim the initial LCFS obligation for out-of-state fuel imported into California.

D. “Purchased with Obligation” means the transportation fuel was purchased with the compliance obligation from a reporting party;

E. “Purchased without Obligation” means the transportation fuel was purchased without the compliance obligation from a reporting party;

F. “Sold with Obligation” means the transportation fuel was sold with the compliance obligation by a reporting party;

G. “Sold without Obligation” means the transportation fuel was sold without the compliance obligation by a reporting party;

H. “Export” means a transportation fuel was reported with compliance obligation under the LCFS but was later exported outside of California;

I. “Loss of Inventory” means the fuel entered the California fuel pool but was not used due to volume loss;

J. “Gain of Inventory” means the fuel entered the California fuel pool due to a volume gain;

K. “Not Used for Transportation” means a transportation fuel was reported with compliance obligation under the LCFS but was later not used for transportation purposes in California or otherwise determined to be exempt under section 95482(d);

L. “EV Charging” means providing electricity to recharge EVs;

M. “Fixed Guideway Charging” means fueling light rail or heavy rail, exclusive right-of-way bus operations, or trolley coaches with electricity;

N. “Forklift Fueling” means providing fuel (electricity, hydrogen, etc.) to forklifts;

O. “NGV Fueling” means the dispensing of natural gas at a fueling station designed for fueling natural gas vehicles

APPENDIX D

Suggested FPC Allocation Accounting Methodology

The following examples illustrate the suggested FPC allocation accounting methodology when multiple feedstocks are processed at a facility. Any other FPC allocation accounting methodology must be defined in the monitoring plan as a part of pathway validation and approved by the Executive Officer prior to being used.

Example 1:

Assuming the fuel production facility is processing four different feedstocks and each has a certified CI associated with it. The average yield for the facility is calculated using the data reported during the fuel pathway certification.

Feedstock Types	FPC (CI)	Average yield determined during fuel pathway certification	Q1 Feedstock consumption (lbs)	Estimated production amount based on average yield for Q1 (gal)	Max. Q1 fuel production amount that can be allocated for LCFS reporting
Type 1	FPC1 (40)	0.8	*300,000*	240,000	240,000
Type 2	FPC2 (42)		*200,000*	160,000	160,000
Type 3	**FPC3 (55)**		***150,000***	**120,000**	**136,000**
Type 4	FPC4 (16)		*80,000*	64,000	64,000
Total			***730,000***	**584,000**	**600,000**

Based on staff's preliminary proposal, in this example, the maximum production amount reported in LCFS for Q1 for all FPCs with the exception of the highest CI FPC (FPC3) cannot exceed the estimated production amounts as determined above.

If the actual total fuel produced at the facility is 600,000 gallons which is greater than the estimated production amount (584,000 gallons) then the excess amount (16,000 gallons) would be allocated to Type 3 feedstock as it is the highest CI fuel pathway for the facility. The maximum amount that can be reported under this FPC3 in this case would be (120,000+16,000 gallons) or 136,000 gallons.

Example 2:

Considering all conditions are same as in previous example, except in this example the facility has a new feedstock (Type 4) which does not have a certified CI value.

Feedstock Types	FPC (CI)	Average yield determined during fuel pathway certification	Q1 Feedstock consumption (lbs)	Estimated production amount based on average yield for Q1 (gal)	Max. Q1 fuel production amount that can be allocated for LCFS reporting
Type 1	FPC1 (40)	0.8	*300,000*	240,000	240,000
Type 2	FPC2 (42)		*200,000*	160,000	160,000
Type 3	FPC3 (55)		*150,000*	120,000	120,000
Type 4	**Temporary FPC (95)**		***80,000***	**64,000**	**80,000**
Total			***730,000***	**584,000**	**600,000**

In this example, the actual total fuel produced at the facility is 600,000 gallons which is greater than the estimated production amount (584,000 gallons) resulting in excess amount (16,000 gallons) of fuel that needs to be allocated to a FPC. As the Type 4 feedstock does not have certified CI value the producer would have to request a temporary FPC. Once the temporary FPC is available for reporting the excess gallon should be allocated to the highest CI fuel pathway for the facility which is the temporary FPC in this example. Thus, the maximum amount that can be allocated to Type 4 feedstock, or the temporary FPC, in this case would be (64,000+16,000 gallons) or 80,000 gallons.