State of California
Air Resources Board

Staff Discussion Paper

Biomass-Based Diesel as a Transportation Fuel

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PURPOSE

This discussion paper provides an overview of how biomass-based diesels used as a transportation fuel are currently treated in the Low Carbon Fuel Standard (LCFS) program and opens a 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.

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 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] reviews potential amendments, and provides considerations for the proposed verification program[3] as it relates to biomass-based diesel supply chains. 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

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[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).

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

[3] The Staff White Paper: Framework for Development of a Low Carbon Fuel Standard Verification Program, October 21, 2016, presents overarching considerations for an LCFS verification program, taking into account stakeholder feedback received through prior workshops and providing the foundation for additional fuel-specific staff work and stakeholder discussions. Available at: https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings_2016.htm.

pathways. Although the current LCFS regulation's[4] 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.[5]

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).

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.

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

[5] 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

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.[6]

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

- Feedstock type
- Transportation modes and distances (feedstocks and finished fuel)
- Product yields
- Process energy types and consumption

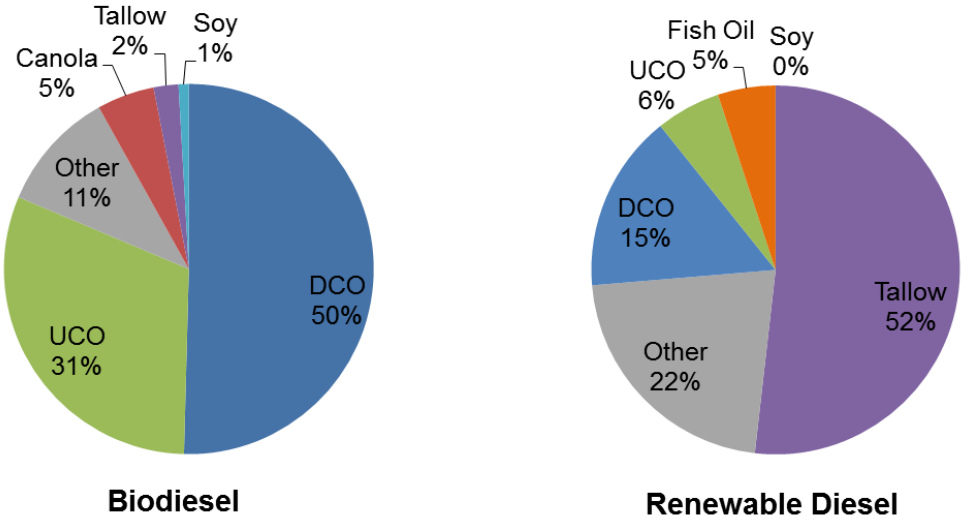
The choice of feedstock, whether crop- or residue-based, typically has the largest impact on CI. If the feedstock is derived from a crop, such as soy and canola, the life cycle includes the upstream emissions resulting from farming activities required to cultivate, harvest and transport the crop, and 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%

[6] 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.

of the total credits in the program over that time period.[7] Figure 1 shows the breakdown of these volumes by feedstock type. Current approved pathway CI values[8] 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 is 17 (UCO) to 37 gCO_2e/MJ (DCO), with a weighted average of 36 gCO_2e/MJ. Note that the volumes categorized as "Other" feedstock type, derived from palm or an unknown source, are deficit-generating fuels in the LCFS program; they are assigned a CI equal to the Lookup Table value for petroleum diesel, 102.01 gCO_2e/MJ.

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[9] along with supporting documentation

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

[8] 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-".

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

including invoices and receipts – see Table 2 for an example of the current operational data requirements for a Tier 1 biomass-based diesel pathway.

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) • Biomethane (MMBtu) or Biomass (dry tons) directly supplied to the facility • Other (e.g. Bottom Pitch) (lbs.)	
Chemical/Material Inputs	• Methanol (lbs.) • Sodium hydroxide (grams) • Sodium methoxide (grams) • Hydrochloric acid (grams) • Sulfuric Acid (grams) • Phosphoric acid (grams) • Citric acid (grams)	• Hydrogen (kg) • 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

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, these fillable forms 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 data summary form are discussed in Appendix B and a (non-functional) Excel version is posted for stakeholder review of the suggested input fields.[10] The form collects summarized monthly operational data, which is then 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 sheet could perform the needed CI calculations. This would allow 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. When finalized, it would offer 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 application data summary form. Please download and review the draft form. See specific requests for feedback in Appendix B.

Standard feedstock production parameters for Tier 1 Pathways

The draft data summary form uses standard (non-user-modifiable) parameters for oil yield and energy consumption when calculating the CI impact related to upstream feedstock production processes such as rendering of raw UCO and tallow, and extraction of soy, canola, and DCO. Staff is considering allowing applicants to apply for Tier 2 pathways if they wish to use facility-specific rendering/extraction energy. The improvement criteria for Tier 1 fuels produced using innovative methods would apply to the Tier 2 application, meaning that

[10] The draft data summary form is available for download at: https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/BD-RD_app.xlsm Note that the draft form has not yet been automated to perform CI calculations. A functional draft version of the form will be posted for stakeholder review once staff receives feedback from stakeholders in response to the operational data inputs discussed in this paper and adapt a new version of the CA-GREET model from the 2016 version of the Argonne GREET model.

applicants would need to demonstrate that the rendering/extraction facility achieves the minimum reduction in "source-to-tank" CI required in the LCFS regulation.[11] Tier 2 applicants would provide complete operational data for the rendering/extraction facility, establish chain of custody tracking to demonstrate the feedstock origin, and define a monitoring plan for third-party verification of the feedstock process.

Staff is seeking stakeholder feedback regarding default feedstock production parameters in determining the CI for Tier 1 pathways.

For applicants who wish to apply for a Tier 2 pathway with non-default (user-specific) feedstock production parameters, stakeholder suggestions are requested for application requirements and verification protocols.

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 feedstocks. 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 CI score for each pathway is determined using the overall facility average yield. A fuel producer must be able to unequivocally associate specific quantities of feedstock consumed with specific volumes of fuel. Currently, when the producer is not able to demonstrate accurate accounting of the gallons produced in accordance with a particular FPC, all gallons of fuel must be reported using the FPC with the highest CI.[12]

In order to reduce the risk of misreporting resulting in credit adjustments at the end of the verification period, staff is considering requiring the fuel producer to define their FPC allocation accounting methodology in their monitoring plan as a part of pathway validation prior to certification. For verification purposes, staff is considering requiring producers to provide records that unequivocally associate the volumes reported in a quarter with specific quantities of feedstock consumed within that quarter. Producers would also be required to demonstrate to verifiers that their accounting methodologies are supported by the fuel yield demonstrated in the pathway application for every CI compliance period (calendar year).

[11] 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.
[12] LCFS Regulation section 95488(c)(6)(A).

Multiple pathways for feedstocks from different 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 of diverse origins. 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 CI application data summary form to determine separate CI scores for the same feedstock.

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.

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. The CA-GREET model uses an energy allocation methodology to allocate a fixed percentage of upstream emissions to the co-product, regardless of the actual yield ratio of co-products and finished fuel. Additionally, 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 considering allowing applicants to submit their actual co-product yields and developing an allocation methodology for the additional co-products.

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.

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

The current Tier 1 calculator 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 (non-user-modifiable) values to reduce the need for recordkeeping and verification of these inputs. In this case the values would not appear in the CI application data summary form, but would be factored into the CI determination as background data. Staff suggests that values which do not appear in the data summary form as user-modifiable inputs should be exempt from verification requirements. Staff could determine the values by analyzing real world data that applicants have submitted in support of their pathway applications and choosing conservative 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.

If stakeholders prefer facility-specific inputs, we request suggestions for verification protocols to ensure the inputs can be confirmed both during initial CI validation and on an ongoing basis.

Other Potential Changes to Pathway Application Requirements

Staff is considering removing the requirement to submit supporting documentation substantiating the information found in the application data summary form. 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 requiring ongoing verification of fuel shipments to California and eliminating the existing current one-time fuel transportation mode demonstration.

No other changes are being suggested for the staff evaluation process; however, once the Tier 1 application data is submitted as part of a complete pathway application, staff will review the simplified form 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 would 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, organization federal employer identification number (FEIN), and account administrator(s) 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.[13] The quarterly report includes the amount of fuel transacted in the quarter (gallons), corresponding Fuel Pathway Code (FPC), and the vehicle application[14] (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.[15]

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[13] 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.

[14] 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.

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

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.[16] 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 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.[17] ARB is issuing guidance which includes a methodology for adjusting fuel volumes to account for temperature corrections; please refer to Draft LCFS Regulatory Guidance 17-01.[18]

Quarterly Reconciliation with Counterparties in the LRT-CBTS

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

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[16] 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.

[17] Note that this aligns with the standardization of volume requirements for Renewable Identification Number generation in CFR §80.1426.

[18] Draft LCFS Regulatory Guidance 17-01 available at: https://www.arb.ca.gov/fuels/lcfs/guidance/regguidance_17-01.pdf

All the fuel transactions reconciled with counterparties and submitted in the quarterly reports before the stipulated deadlines are eligible to generate credits. However, if there remain any unreconciled fuel transactions at the time of quarterly report submission, then credits pertaining to the fuel amount under contention should not be issued. Currently, the LRT-CBTS flags all such transactions but does not place hold on the credits. Staff is now considering placing automated holds on any such credits in the LRT-CBTS.

Staff suggests that the LRT-CBTS's reconciliation ability eliminates the need for third-party verification of fuel transactions reported downstream from the initial regulated party in the LRT-CBTS. This will eliminate the requirement for third-party verification of all the fuel transactions reported downstream of production or import of the fuel, except for exports out of California.

Staff is seeking stakeholder feedback on whether LRT-CBTS reconciliation eliminates the need for third-party verification of fuel transactions reported downstream from an initial regulated party.

Staff is seeking suggestions for options to resolve credit disputes resulting from unreconciled fuel transactions. Should the resolution be based on the upstream party's report?

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

As discussed 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 reported to the LCFS program may generate credits only if they are used as transportation fuel in California; if these fuels are exported out of California they are no longer eligible to claim credits in the LCFS program. To balance the number of credits generated for the amount of fuel which gets exported, an equivalent number of credits must be deducted or retired from the LRT-CBTS account of the entity reporting the export.

Liquid alternative fuels are blended into Gasoline blendstock (CARBOB)[19] or Ultra Low Sulfur Diesel (ULSD) which is sometimes exported out of California as a blend. For example, biomass-based diesel can be blended into ULSD to produce different diesel blends. If any biomass-based diesel reported to the LCFS program subsequently gets exported out of California, either as neat biomass-based diesel or as a diesel fuel blend, then it must be reported in the LRT-CBTS with accurate amounts and FPCs. The amount and FPC of exported biomass-based diesel will be

[19] For associated fuel pathway code, please refer to *Table 6. Tier 2 Lookup Table for Gasoline and Diesel and Fuels that Substitute for Gasoline and Diesel* of LCFS regulation

used to calculate the adjustment to the credit balance in the exporting entities' LRT-CBTS account. If biomass-based diesel is exported as a fuel blend, then its percentage in the final product should be used to calculate the exported amount. If the accurate blend percentage is not known then default blend percentages provided by ARB should be used to report the amount of biomass-based diesel in the exported fuel blends.

Staff is suggesting using a default of 5 percent biodiesel by volume and 5 percent renewable diesel by volume to report export of diesel fuel without any labeling identifying the blend level or type of biomass-based diesel. If accurate blend levels are not available for reporting export of diesel fuel labeled as "B-20 Biodiesel Blend" or "20% Biomass-Based Diesel Blend", staff suggests using a default of 20 percent biodiesel or 20 percent renewable diesel by volume, respectively. Table 3 below summarizes the default blend percentages and FPCs to be used for reporting exports of different diesel blends when an accurate blend percentage is not available. Suggested default values are based on FTC labeling requirements.[20]

Table 3. Default blend percentages for reporting of diesel exports

Diesel Fuel Blend	Default blend percentage by volume	Default FPC (CI in gCO_2e/MJ)
Diesel fuel with no FTC labeling identifying the blend level and unknown blend levels of biomass-based diesel	5% Biodiesel + 5% Renewable Diesel	BIOD0116 (15) and RNWD0116 (30)
Diesel fuel labeled as "B-20 Biodiesel Blend"	20% Biodiesel	BIOD0116 (15)
Diesel fuel labeled as "20% Biomass-Based Diesel Blend"	20% Renewable Diesel	RNWD0116 (30)

Typically renewable diesel is blended into ULSD at the refineries and biodiesel is blended into diesel at the terminals. Thus, the diesel transported through pipeline from refineries may contain up to 5 percent of renewable diesel by volume without

[20] 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

required labeling identifying the blend level. And, diesel fuel not delivered by pipeline may contain up to 5 percent of biodiesel by volume blended at terminal without required labeling identifying the blend level. Therefore, up to 5 percent by volume of either, or both, biodiesel and renewable diesel may exist in the diesel fuel without labels identifying the blend level.

As mentioned earlier, substitute FPCs are already available to be used in cases when the FPCs 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.[21] Staff is planning to enhance the existing guidance and provide additional substitute FPCs for fuel blends containing biodiesel or renewable diesel and other liquid alternative fuels.

Staff is seeking stakeholder feedback on the feasibility of tracking blend percentages of biomass-based diesel in the fuel blends for the purpose of reporting exports. If both biodiesel and renewable diesel are present in the fuel blend, can they be tracked separately?

Staff is seeking stakeholder feedback on the concept of using conservative default blend percentages when the actual biomass-based diesel content in the exported diesel blend is not available for 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 required to maintain a non-negative value for Total Obligated Amount (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.

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

This means the reporting party would need to ensure that the fuel amounts for each FPC reported under transaction types which decreases inventory *(*such as *sold with* or *without obligation,* or *loss in inventory,* etc.*)* do not exceed the amounts reported under transaction types which increases the 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 amount of fuels are 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 of 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. “Obligation” for liquid alternative fuel refers to the credits associated with the fuel, or the ability of the fuel to generate credits, and the requirement to report these volumes in the LRT-CBTS.

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 reporting quarter, it could be transferred to a recipient with obligation no later than the end of the following reporting 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.

Staff is seeking feedback on the concept of fuel obligation transfer period.

If such a period were implemented, would there be any challenges with selecting two quarters as the duration?

3. VERIFICATION

A successful GHG reduction program requires a system to monitor, report, and verify GHG emissions to aid implementation and tracking of the effectiveness of emission reduction strategies. Historically the LCFS has relied upon a robust reporting program built around ARB staff evaluation of fuel CI through the fuel pathway application process and spot-checks on the reporting of quarterly fuel volumes.[22,23]

ARB is now considering supplementing the work of ARB staff with a verification system conducted by independent third-parties engaged by entities participating in the LCFS. Conceptually, these verifiers would perform GHG accounting checks in a role similar to the independent, objective evaluations of organizations' financial reports by financial auditors. ARB has extensive experience with an analogous system under the regulation for the Mandatory Reporting of Greenhouse Gas Emissions (MRR) pursuant to the California Global Warming Solutions Act of 2006 (AB 32) and through the verification of GHG compliance offset projects under ARB's Cap-and-Trade Program.[24,25] ARB's experience implementing MRR and the Cap-and Trade Compliance Offset Program has demonstrated that mandatory third-party verification is valuable in creating a credible and durable GHG trading system.

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[22] LCFS Fuel Pathways. Available at: https://www.arb.ca.gov/fuels/lcfs/fuelpathways/fuelpathways.htm.

[23] LCFS Data Management System. Available at: https://www.arb.ca.gov/fuels/lcfs/reporting%20tool/datamanagementsystem.htm%23lrt-cbts.

[24] AB 32 explicitly supported verification calling for ARB to "adopt regulations to require the reporting and verification of statewide greenhouse gas emissions and to monitor and enforce compliance…" Health and Safety Code (H&SC) section 38530(a). Program information on MRR verification is available at: https://www.arb.ca.gov/cc/reporting/ghg-ver/ghg-ver.htm.

[25] Offset Verification Program. Available at: https://www.arb.ca.gov/cc/capandtrade/offsets/verification/verification.htm.

This section first provides an overview of existing LCFS verification provisions and potential amendments, and then describes considerations for third-party verification of biomass-based diesel at the production facility and downstream in the fuel supply chain. In addition, the risk of incorrect classification of feedstocks is addressed in the discussion on potential upstream verification scope.

Existing Verification Provisions

Existing verification provisions were added in the 2015 readoption of the LCFS regulation. These provisions are currently being used to support ARB compliance audits and enforcement activities and did not require third-party verification consistent with international standards.[26]

Section 95491(d) Verification of Pathway, CI, Report

"All data and calculations submitted by a Regulated Party for demonstrating compliance or claiming credit are subject to verification by the Executive Officer or a third party approved by the Executive Officer."

Section 95491(e) Access to Records

"Pursuant to H&S section 41510[27] the Executive Officer has the right of entry to any premises used, leased, or controlled by a Regulated Party, a Reporting Party, a verifier, or an applicant, in order to inspect and copy records relevant to the determination of compliance. Scheduling of access shall be arranged in advance where feasible and must not unreasonably disturb normal operations, provided, however, that access shall not be unreasonably delayed."

Potential Amendments to Verification

Staff's verification white paper[28] provides the framework for the development of an LCFS verification program and overarching considerations that will inform potential amendments to the LCFS regulation. ARB staff is considering proposing mandatory verification of various program aspects including, but not limited to:

- fuel pathway carbon intensities,
- reported fuel quantities (for both high and low carbon fuels), and

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[26] ISO 14064-3: Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions; ISO 14065: Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition.
[27] Health and Safety Code, section 41510. Available at: http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=41001-42000&file=41500-41514.10.
[28] Staff White Paper: Framework for Development of a Low Carbon Fuel Standard Verification Program: https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/verification_whitepaper_102116.pdf

- chain of custody information (for some feedstocks and finished products).

The objective of such a verification program is to ensure integrity in the LCFS credit market through assurance of GHG reduction claims in the LCFS. In pursuit of this objective, the guiding principles when designing the LCFS verification program must include:

(1) ARB retention of sole authority over the LCFS program, including verification requirements, as bestowed through the State's legislative and regulatory process;

(2) Continual improvement in the detection, prevention, and correction of errors or fraud;

(3) Identification and implementation of cost reducing strategies, while maintaining verification rigor;

(4) Policy consistency with other ARB verification programs; and

(5) Consideration of the unique attributes of fuel carbon intensities and fuels marketing structure.

In general, LCFS verification sampling requirements will be based on type of feedstock, risk of error or fraud, and the CI sensitivity of user-defined inputs to the CA-GREET model. ARB staff is considering proposing additional verification for DCO, UCO and tallow feedstocks, compared to crop-based feedstocks (i.e., soybean or canola oil), due to the importance of feedstock classification on CI value.

The degree of ARB oversight, verifier competency and training, and conflict of interest requirements are expected to be consistent with ARB's MRR and Cap-and-Trade Compliance Offset verification programs, while seeking to harmonize, where possible, with existing verification and certification programs.

Staff is continuing to coordinate with U.S. EPA to consider ways the LCFS program can harmonize with the mandatory RFS and its voluntary Quality Assurance Program (QAP). However, while the goals are similar, the programs are very different. Under the RFS, biodiesel (produced through trans-esterification) and renewable diesel (produced through hydrotreating) derived from the following feedstocks both meet a 50% greenhouse gas reduction threshold and are therefore eligible to generate Biomass-based Diesel (D4) RINs: soybean oil, oil from annual cover crops, oil from algae grown photosynthetically, biogenic waste oils/fats/greases, non-food grade corn oil, and *Camelina sativa* oil.[29] These categories include the existing LCFS Tier 1 biomass-based diesel feedstocks under the same category in the RFS, meaning that there is no incentive in the RFS to use, or to mischaracterize virgin primary oils as residue-derived or secondary oils. In contrast, the facility-specific CI score determined

[29] Renewable Fuels Standard Program. Approved Pathways for Renewable Fuel. Available at: https://www.epa.gov/renewable-fuel-standard-program/approved-pathways-renewable-fuel

under the LCFS is primarily dependent on, and highly sensitive to, feedstock type.[30] The significant difference in CIs achieved by fuels made from secondary (DCO) or residue-based oils (UCO or tallow) relative to primary crop-based oils creates a risk that entities may mischaracterize the source or type of feedstock in order to capture the value associated with a lower CI score.

To assure conformance with the certified CI in the LCFS program and to detect a material misstatement[31] of credits generated based on feedstock volume accounting, special effort is needed to assure each feedstock is properly classified and accurate volumes reported. Staff is using the phrase "upstream feedstock verification" to mean additional verification for DCO, UCO, and tallow beyond checking feedstock supply contracts, invoices, and payment records at the fuel production facility. For the purposes of this paper, we separate these "upstream" feedstock verification issues (occurring above the fuel production facility) from the verification issues occurring at the fuel production facility and downstream of the fuel producer (which are not feedstock dependent).

Considerations for the Third-Party Verification of Biomass-Based Diesel

Staff is seeking stakeholder feedback on the following approach, which would align future verification responsibility for reported fuel volumes by FPC with initial regulated party status (producers and importers) and exporter status in the current rule. In this paper, the type of responsibilities that fall on each party are generally broken into two categories: (1) verification that the correct CI scores were claimed, and (2) verification that the correct volume of fuel was delivered for each fuel pathway code (see Figures 2 and 3 and Tables 4 and 5).[32]

Potential Verification Responsibilities at, and Downstream of, the Production Facility

To assure credit validity in cases where the responsible party does not have all information necessary for verification (e.g., due to a more complex supply chain), the party responsible for verification may need to work with its suppliers or customers along the supply chain to ensure that the necessary information is available for verification by an ARB-accredited verification body.

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[30] Refer to Table A-1 in Appendix A of this document to compare the range of CI scores achieved under the LCFS for various feedstock types.

[31] "Material misstatement" is discussed in the Staff White Paper: Framework for Development of a Low Carbon Fuel Standard Verification Program: https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/verification_whitepaper_102116.pdf

[32] Note that information that would need to be verified at the biomass-based diesel fuel production facility and downstream of the facility is similar to the potential requirements for starch-based ethanol, as described in the Staff Discussion Paper: Ethanol as a Transportation Fuel: https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/01312017discussionpaper_etoh.pdf.

- All producers who maintain FPCs, whether or not they opt in to report fuel volume and claim credits in the LRT-CBTS, would be responsible for initial validation, and ongoing verification, of their CIs. Ongoing verification would also include full facility material balance and yield analysis to assure fuel volumes produced, shipped, and sold per FPC.
- The party that initiates the chain of custody for a given fuel volume in the LRT-CBTS (the most upstream party claiming volume in that system) would be responsible for verification that the volumes it claims for each FPC are accurate. Quarterly reconciliation in LRT-CBTS could substitute for third-party verification of fuel transactions reported by entities downstream of an initial regulated party, with the exception of exports of LCFS fuels.[33]
- Exporters of LCFS fuels would be required to have their claims of exported volume verified for each FPC. An exemption threshold is being considered for exporters who do not also produce or import fuel to California.

Three general cases of potential verification responsibility are described and illustrated below, followed by a table that summarizes information required for the CI application, transactions reporting, and potential verification points along the supply chain for stakeholder consideration.

1. A producer is the initial regulated party (Entity A in Figure 2 and Table 4)

    a. Producer with a production facility located in California
    b. Producer with an out-of-state production facility <u>who is regulated as an importer</u>
    c. Producer with an out-of-state production facility who is <u>not</u> an importer and <u>opts in as the initial regulated party.</u>[34]

2. An importer, who is not a producer, is the initial regulated party (Entity B in Figure 3 and Table 5).

3. The exporter is shown as Entity E in both figures and tables.

All producers would be responsible for validation of its CI applications and ongoing CI verifications ($CI_{actual} \leq CI_{certified}$ for the annual compliance period), and to assure no double counting of low-CI fuels, staff is considering a full material balance and yield analysis be verified for each facility annually. When the simplified CI application data summary form shown in Appendix B is finalized, staff will request feedback on considerations for monitoring plans to be developed and maintained by biomass-based diesel producers to ensure any additional verification points are considered.

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[33] Note that fuel transactions without associated credits that are subsequent to the first fuel purchase are not required to be reported in the LRT. The exception is fuel exports. All exports of LCFS fuels, regardless of whether they are purchased from a party that retains the credits, must be reported.
[34] LCFS regulation section 95483.1(a)(2).

Because producers in the three cases listed above (1a, 1b, 1c) are the initial regulated parties (see Entity A in Figure 2 and Table 4), the scope of verification would include annual review of quarterly reported transactions. Producers would also be responsible for verification of physical delivery of the fuel they produced for use in California (delivered for use within California from either an in-state or out-of-state facility) during the prior calendar year.

Figure 3 illustrates a simplified supply chain where producers (Entities A_1, A_2, A_3... A_i) do not opt in to be regulated parties, but have obtained certified FPCs. The importer, who is not a producer, is the initial regulated party who reports fuel volumes per FPC in the LRT-CBTS (see Entity B in Figure 3 and Table 5). Producers who apply to receive FPCs but do not opt in to be regulated parties would be responsible for the initial validation of the CI applications and also annual CI verification if their fuel is used in California during the calendar year. Staff is considering an expiration of fuel pathway codes that are not claimed in the LRT for three consecutive years. The importer must be responsible for verification that the imported fuels reported in LRT-CBTS are tracked from the production facilities to California during the prior calendar year and verification of quarterly fuel volumes sold with and without obligation. Tracking imported fuels from out-of-state producers to California may require importers to establish chains of custody. Note that in this scenario, the importer may need to work with the producers to ensure that all necessary information is verified by an ARB-accredited verification body. Staff envisions that imported volumes reported by FPC would be provided to the producer's verifier to confirm that sufficient volumes were produced and sold directly to the importer or via a trader along the chain of custody.

Staff is seeking feedback on holding the following entities responsible for verification: all producers, importers (when out-of-state producers do not opt in to be regulated parties), and exporters. Note that intermediate entities may also opt in (see definition in Appendix C); however, this is not common.

Are there concerns about assuring alignment of fuel volumes produced and sold (by a producer who does not opt in to report in the LRT-CBTS) with imported fuel volumes reported by the importer? If so, how can these be addressed?

Staff is seeking feedback on the potential verification points identified in Tables 4 and 5.

Staff is considering annual verification and site visits, based on the calendar year. Should shorter or longer verification cycles be considered? Why?

Exemption for Small Export Volumes

Staff is considering proposing that biomass-based diesel exporters be subject to third-party verification to accurately account for the credits associated with exported fuel volumes. See Table 4 for verification points under consideration for exporters. Staff is considering a potential exemption threshold of 10,000 gallons of total biomass-based diesel per calendar year for each exporter to reduce the administrative burden of the third-party verification for smaller fuel volume exports without compromising the integrity of the program. This means that if the total amount of biomass-based diesel exported, either as neat biomass-based diesel or as part of diesel fuel blend, is less than 10,000 gallons per year then the exporting party would be exempt from the third-party verification requirements.

Such an exemption threshold would recognize the relatively low risk to LCFS credit market integrity for exporters of low fuel volumes. Based on average annual CI, credits associated with 10,000 gallons of biodiesel and renewable diesel represent only 0.009% and 0.005% of total credits generated during Q1-Q3 2016, respectively. Note that the 50,000 gallons exemption threshold proposed in the ethanol discussion paper [32] is equivalent to 10,000 gallons for biomass-based diesel; the difference in volumes is a result of the lower CI associated with biomass-based diesel as compared to ethanol. Further analysis of 2016 LCFS reported data suggests majority of the biomass-based diesel exports reported per entity were of the magnitude of 100,000 gallons or higher.

With that in mind, all exported fuel volumes reported in the LRT-CBTS will be compared against Board of Equalization (BOE) records by ARB staff when the data are available. Note that staff considers exports of LCFS fuels reported by initial regulated parties to be within the scope of material balance verification.

Figure 2. Verification Responsibility: Producer is Initial Regulated Party

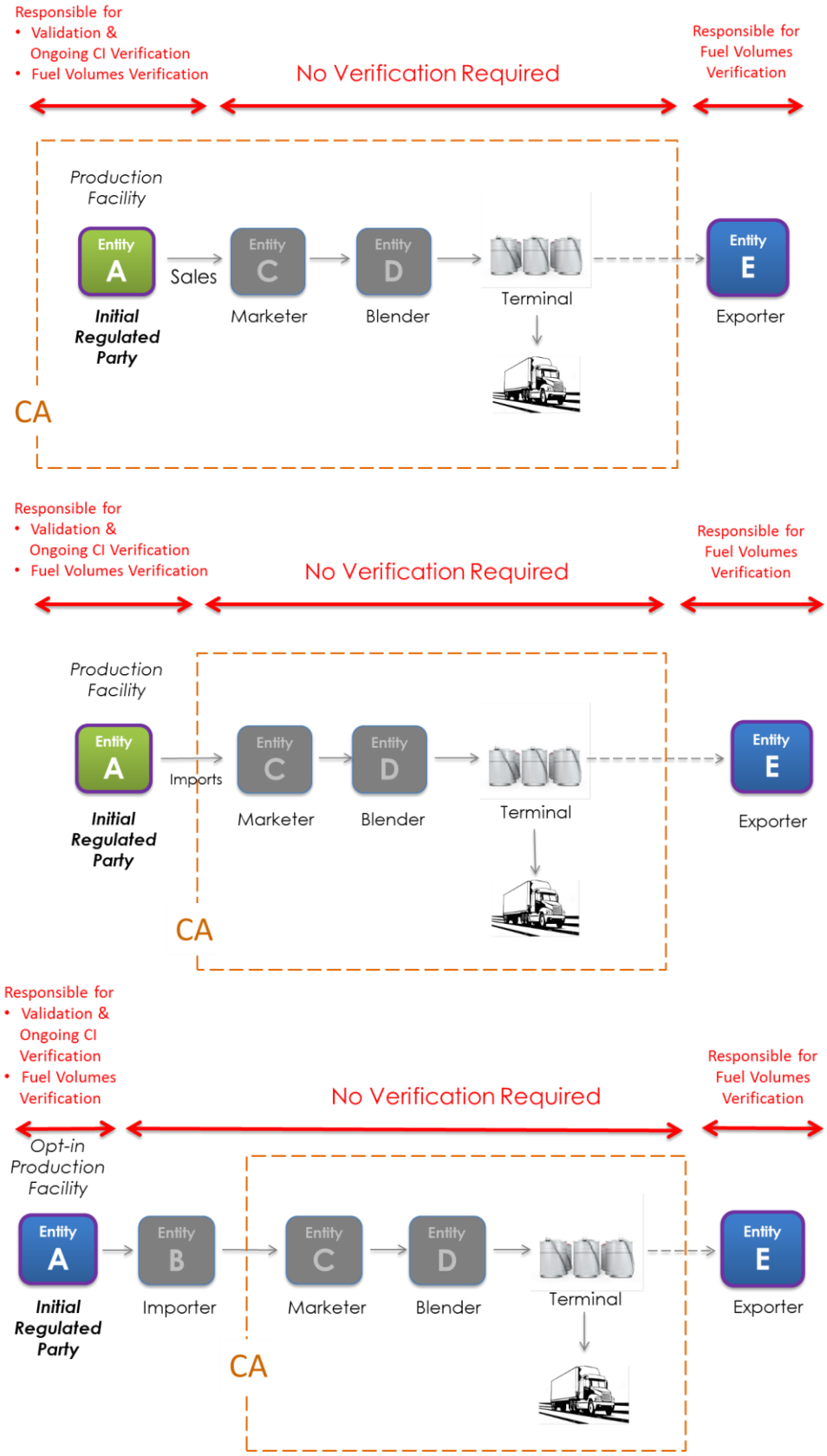

Table 4. Summary of Potential Requirements for CI Determination, LRT-CBTS Reporting, and Verification Points for each entity in supply chain—Example: Biodiesel Producer is Initial Regulated Party

Entity	Potential Future Requirements
Entity A: Biodiesel Producer Initial Regulated Party	**Initial CI Determination** *Submit 24 Months of pathway-specific monthly operational data, including:* • Feedstock, product, and co-product purchase/production summaries • Process energy types and amounts • Any inputs or conditions that the applicant chooses to change from the standard values, e.g. feedstock transport mode(s) and distance • Fuel transportation mode(s) and distance from production facility to California, if out-of-state
	Fuel Volume Reporting and Credit Creation *Report Quarterly to LRT:* • Fuel Pathway Code (FPC) • Fuel Volume (gallons) • Fuel Production Facility • Transaction Date • Transaction Type (Production or Production for Import; Sold with/without Obligation) • Business Partner *(if applicable)* • Aggregator indicator *(if transaction is an aggregated amount)* Required to produce and retain Product Transfer Documents (PTD), Bills of Lading (BOL), invoices, and other supporting documents *(not uploaded in LRT)*
	Third-Party Verification Points *For Initial Validation of CI:* • Validate operational data submitted for the initial CI determination • Confirm facility geographic location and physical configuration appropriate for Biodiesel/Renewable Diesel production • Confirm that process flow diagram as described in pathway application accurately reflects combustion equipment and facility configuration, including meter locations, recycling or return lines, storage tank volumes • Review recordkeeping and data management practices *For Ongoing Verification of CI:* • Verify operational data and supporting records: – feedstock inputs (meter records and feedstock purchase invoices) – process energy inputs (utility invoices, meter records) – biodiesel production and sales volumes, adjusted to 60°F (meter records, contracts, and sales invoices) – amount of co-product produced and sold – quantity methanol used – full material balance and yield analysis • Verify chain of custody for volumes and classification of residue-based and secondary product feedstocks, and upstream as specified • Verify accuracy of allocation methodology of reported fuel volumes to FPC(s) as documented in producer's monitoring plan

Table 4 continued

Entity	Potential Future Requirements
Continued **Entity A: Biodiesel Producer** Initial Regulated Party	*For Ongoing Verification of LRT-CBTS reports:* • Review Product Transfer Documents (PTD) to ensure accurate accounting of fuel volumes per FPC(s) sold for use as a transportation fuel in California and document physical delivery • Review sales contract terms and PTDs to confirm all California fuel sales are properly labeled by FPC and as sold with or without obligation, using ARB-approved wording • Review sales invoices and payment records to confirm volumes were sold for transportation use in California and to support fuel transportation distances and modes used in CI determination
Entity B: Biodiesel Importer Downstream reporting party	**CI Determination** No CI Impact
	Fuel Volume Reporting and Credit Creation *Report Quarterly to LRT:* Same as Entity A except transaction type (Import)
	Third-Party Verification Points LRT-CBTS's quarterly reconciliation could substitute for third-party verification of fuel transactions reported downstream of the initial regulated party.
Entity C: Biodiesel Marketer Downstream reporting party	**CI Determination** No CI Impact
	Fuel Volume Reporting and Credit Creation *Report Quarterly to LRT:* Same as Entity A, except: transaction type (Purchased with/without Obligation; Sold with/without Obligation)
	Third-Party Verification Points Same as Entity B.
Entity D: Biodiesel Blender Downstream reporting party	**CI Determination** No CI impact
	Fuel Volume Reporting and Credit Creation *Report Quarterly to LRT:* Same as Entity A, except: transaction type (Purchased with/without obligation; Sold with/without Obligation)
	Third-Party Verification Points Same as Entity B.
Entity E: Biodiesel Exporter If reported fuel is subsequently exported from California	**CI Determination** No CI impact
	Fuel Volume Reporting and Credit Creation *Report to LRT:* Same as Entity A, except: transaction type (Export)
	Third-Party Verification Points *For Ongoing Verification of LRT-CBTS reports:* • Review methodology for allocation of exported fuel volumes to FPC(s) • Review PTDs to ensure accurate accounting of fuel volumes per FPC(s) reported upstream for transportation use in California • Review purchase and sales invoices and payment records to confirm volumes sold for use outside California and for transportation use in California • Review exporter's copies of tax records submitted to Board of Equalization

Figure 3. Verification Responsibility: Importer is Initial Regulated Party and Producer Does Not Opt-In

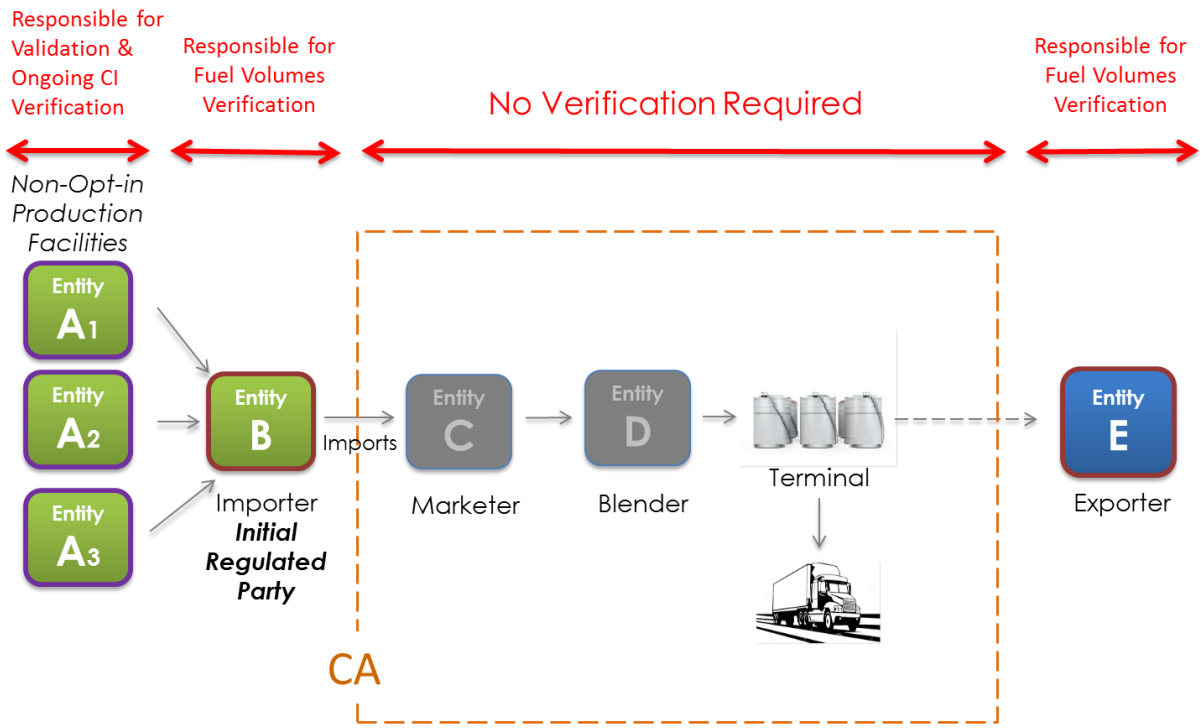

Table 5. Summary of Potential Requirements for CI Determination, LRT-CBTS Reporting, and Verification Points for each entity in the supply chain — Example: Biodiesel Importer is Initial Regulated Party

Entity	Potential Future Requirements
Entity A_i: Biodiesel Producer Out-of-state producer not reporting in the LRT	**CI Determination** *Submit 24 Months of pathway-specific monthly operational data:* Same as Entity A in Table 4
	Fuel Volume Reporting and Credit Creation *Report quarterly to LRT:* Not applicable, as this entity does not report in the LRT
	Third-Party Verification Points *For Initial Validation of CI:* Same as Entity A in Table 4 *For Ongoing Verification of CI:* Same as Entity A in Table 4 *For Ongoing Verification of LRT-CBTS reports:* Not applicable

Table 5 continued

Entity	Potential Future Requirements
Entity B: Biodiesel Importer Initial regulated party	**CI Determination** No CI impact
	Fuel Volume Reporting and Credit Creation *Report Quarterly to LRT:* Same as Entity A in Table 4, except: transaction type (Import; Sold with/without Obligation)
	Third-Party Verification Points *For Ongoing Verification of LRT-CBTS reports:* Same as Entity A in Table 4
Entity C: Biodiesel Marketer Downstream reporting party	**CI Determination** No CI Impact
	Fuel Volume Reporting and Credit Creation *Report Quarterly to LRT:* Same as Entity A in Table 4, except: transaction type (Purchased with/without Obligation; Sold with/without Obligation)
	Third-Party Verification Points Same as Entity C in Table 4
Entity D: Biodiesel Blender Downstream reporting party	**CI Determination** No CI impact
	Fuel Volume Reporting and Credit Creation *Report Quarterly to LRT:* Same as Entity A in Table 4, except: transaction type (Purchased with/without Obligation; Sold with/without Obligation)
	Third-Party Verification Points Same as Entity C in Table 4
Entity E: Biodiesel Exporter If reported fuel is subsequently exported from California	**CI Determination** No CI impact
	Fuel Volume Reporting and Credit Creation *Report to LRT:* Same as Entity A in Table 4, except: transaction type (Export)
	Third-Party Verification Points *For Ongoing Verification of LRT-CBTS reports:* Same as Entity E in Table 4

Potential Upstream Supply Chain Verification Requirements for Feedstocks of Secondary Products (DCO) and Residues (Tallow, Fish Oil, and UCO)

Staff is considering holding biomass-based diesel producers responsible for establishing feedstock chain of custody from the production facility upstream to the ethanol production facility (DCO), rendering facility (fish oil, tallow, and/or UCO), or UCO collection facility to demonstrate delivery of volumes, proper feedstock classification, unique transportation distances,[35] and transportation modes (see Figure4). Verified feedstock chains-of-custody would reduce risk of higher CI oils, such as palm oil, being substituted for lower CI oils.

Chain of custody can be confirmed from reviewing either type of evidence:

(1) Delivery records that show shipments of material type and quantity directly from the processing facility to the fuel producer or

(2) Material balance systems that contain information about the direct suppliers and direct customers of the feedstock supplier.[36]

Staff would like feedback on the extent to which chain of custody systems are already in place. For example, our review of invoices from commodity traders supplying feedstock to fuel producers show unique supplier identification numbers that prevent the supplier from being transparent to the fuel producer, but can be verified from the trader's accounting system. Some fuel producers purchase feedstock directly from an ethanol production facility (DCO), or UCO/tallow rendering facility, a UCO transporter, or restaurants and food processing facilities, which simplifies the chain of custody review. Feedstocks would be verified at the fuel production facility through review of contracts, invoices and payment records, bills-of-lading, weigh scale readings, Certificates of Analysis (CoA), and inventory monitoring.

DCO pathways will be based on default values for corn oil extraction, yield, and DGS credit removal; however, staff is considering requesting limited additional upstream verification for supply chains that include ethanol facilities not participating in LCFS to confirm the ethanol plant is operating, has oil extraction equipment in place, and produces corn oil. For purchases through commodity traders, the biomass-based diesel producer may need to require, potentially via contract, that DCO is traceable back to the ethanol facility and that the trader provide information, as requested, to the producer's verifier.

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[35] Due to the variety of feedstocks and associated supply chains, staff is considering accommodating unique transportation distances to biomass-derived diesel production facilities using secondary products or residues as feedstock. Note that staff is considering default transportation modes and default weighted average distances for crop based feedstocks.

[36] *RTFO Guidance Part 2 Year 9*. Available at: https://www.gov.uk/government/publications/renewable-transport-fuel-obligation-rtfo-guidance-year-9.

Staff is considering proposing a more robust upstream verification for fish oil, tallow, and UCO renderers or collection facilities due to the incentive to over-report these low CI feedstocks.[37] On-site verification of materials balance and yield analysis at these facilities—referred to as "the first collection point" shown in Figure 4—would mitigate risk of falsifying records, errors, and commingling other oils.

In addition, staff is considering whether attestations collected by the fuel production facility (via contract with suppliers) from all entities in residue-based feedstock supply chains (including restaurants and food processing facilities) would help assure suppliers are aware of the fuel producer's expectations that feedstocks meet LCFS requirements for proper feedstock characterization and volume accuracy. However, attestations alone are not considered sufficient evidence of conformance. This is why staff requests feedback on whether materials balance *at all or a sample of* renderers (tallow, fish oil, and UCO) and UCO collection facilities in a supply chain should be reviewed and compared to volumes shipped to and purchased by fuel production facilities.

Checking a portion of restaurants and food processing facilities directly would give additional assurance of UCO volumes downstream. To address the likelihood that restaurants and food processing centers have less financial incentive to misrepresent their residues to transporters, renderers, or UCO collection centers, auditing based on a sample is allowed under the EU RED[38] and is being considered by staff. The rationale is that less risk of error (at the point of origin of residues) should require less administrative burden. ISCC, a voluntary feedstock and fuel certification scheme recognized by the European Commission, requires points of origin to issue self-declarations (i.e., attestations) to the collection center.[39] Self-declarations include a statement that the residue meets the regulatory definition and has not been commingled with other oils. The self-declaration also allows on-site audits, as needed. The UCO volume threshold for on-site auditing is higher than most restaurants ARB staff has reviewed (10 metric tons/month, approximately 3000 gallons/month), such that unless a discrepancy is found while auditing the renderer/collection facility, a sample of restaurants would not be audited.

Staff would like feedback on the following questions and considerations.

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[37] In developing these requirements, staff seeks to harmonize, where possible, with existing tracking systems and avoid duplication, for example, the California Department of Food and Agriculture (CDFA) Inedible Kitchen Grease (IKG) Program. Information available at: https://www.cdfa.ca.gov/ahfss/mpes/IKG_Program.html.
Staff also continues to review chain of custody material balance certifications by voluntary schemes that are in good standing with the European Commission for reporting renewable fuels in the European Union (EU) pursuant to the EU Renewable Energy Directive (RED).

[38] European Commission Communication 10/10/2014: Verification of the chain of custody of biofuels made from waste and processing residues. Available at: http://ec.europa.eu/energy/sites/ener/files/documents/2014_letter_wastes_residues.pdf.

[39] ISCC 201-1 Wastes and Residues, Version 3.0, pages 9-10. Available at: http://www.iscc-system.org/en/certification-process/isccsystemdocuments/iscc-eu/.

What controls do fuel producers, brokers, traders, renderers, collection facilities, and transporters have in place to minimize mischaracterization of DCO, tallow, fish oil, and UCO feedstocks? Please include descriptions of contractual specifications and on-site analyses.

Are there concerns for error or fraud in mischaracterizing DCO? Note Tier 1 would be based on default values. Is DCO commingled with other non-food grade corn oil in the supply chain?

To verify DCO characterization and volumes from ethanol production facilities that do not have an LCFS FPC, would document review and a site visit be necessary? Alternatively, should ARB specify additional LCFS requirements that could be reviewed by third-party engineers and CPAs retained by ethanol plants under the U.S. EPA RFS program and require consideration by the fuel producer's verifier?

Is a material balance verification of each renderer, collector, and trader in UCO tallow, and fish oil feedstock supply chains necessary to mitigate risk of mischaracterization and inaccurate volumes?

Staff also continues to review chain of custody material balance certifications by voluntary schemes that are in good standing with the European Commission for reporting renewable fuels in the European Union (EU) pursuant to the EU Renewable Energy Directive (RED) and would like continued stakeholder input on how to adopt best practices from these systems.

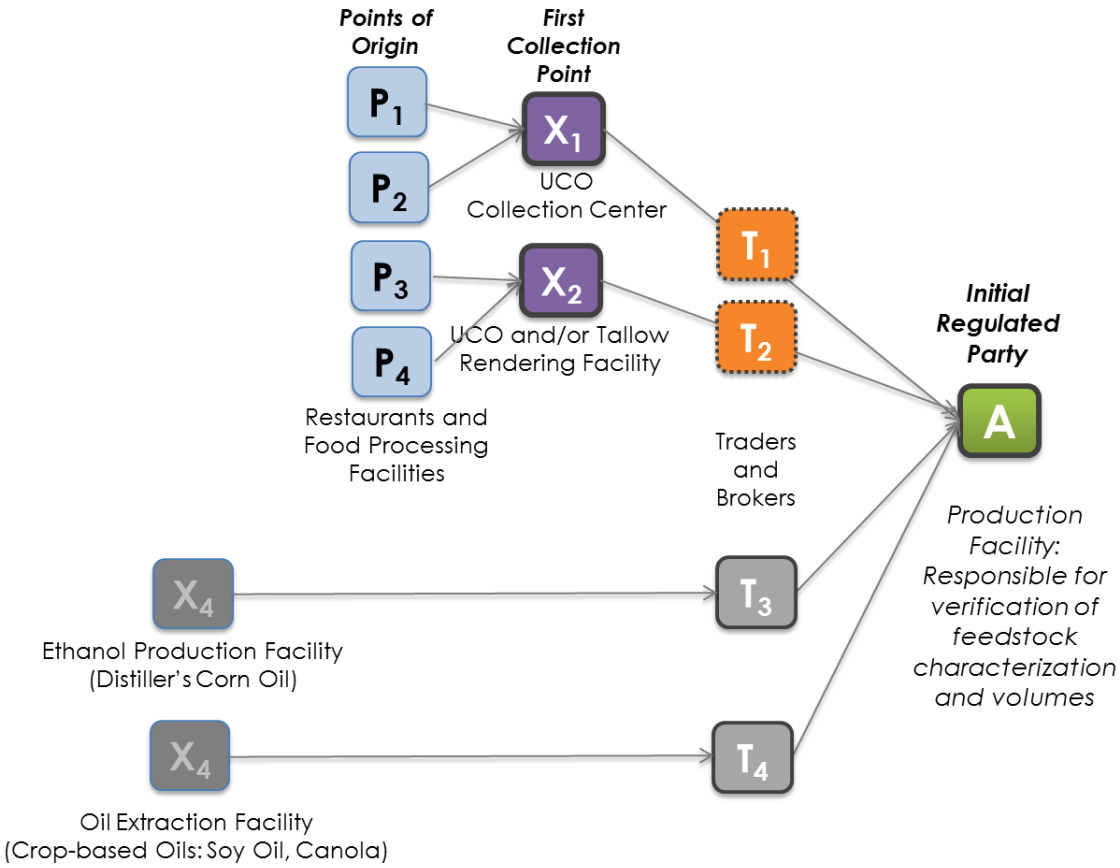
Staff is seeking suggestions for criteria to evaluate existing third-party product certifications, such as those recognized in the EU.

To what extent could feedstock supplier certification reduce the potential for multiple verifications of UCO and tallow suppliers?

Would verification of a selected portion of UCO, tallow, and fish oil suppliers by the fuel producer's verifier be sufficient? Please comment on risk assessment criteria such as relative volumes supplied to the fuel production facility, the relative financial incentives inherent in the claimed FPC, relative commodity value other than LCFS incentives, and other industry considerations.

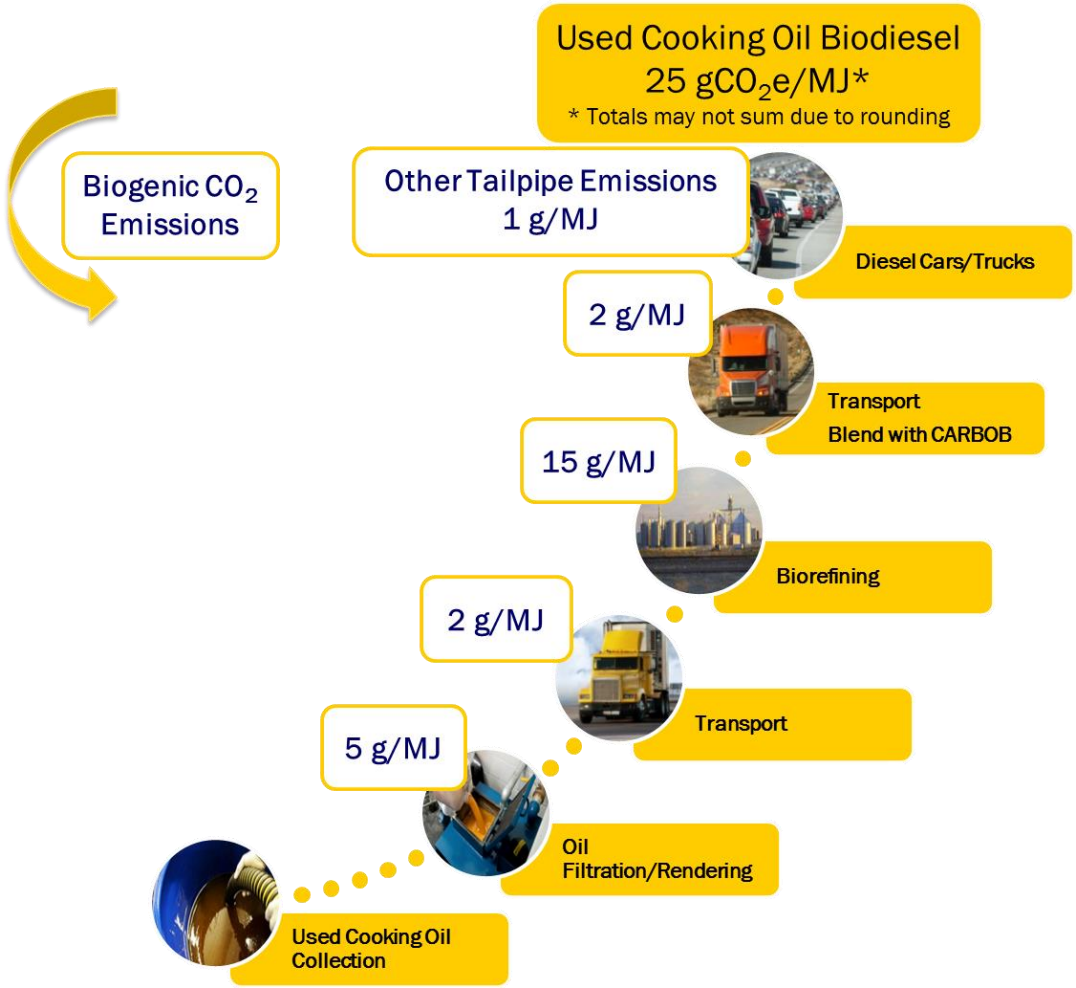
What considerations should guide audit selection at the UCO point of origin (restaurants and food processing centers)? Please consider factors that can inform error risks such as effective tracking procedures with transporter, UCO volumes, length of time contracts have been in place, change in management, and other factors that may be relevant.

Figure 4. Illustrative Example of Biomass-Based Diesel Feedstock Supply Chains



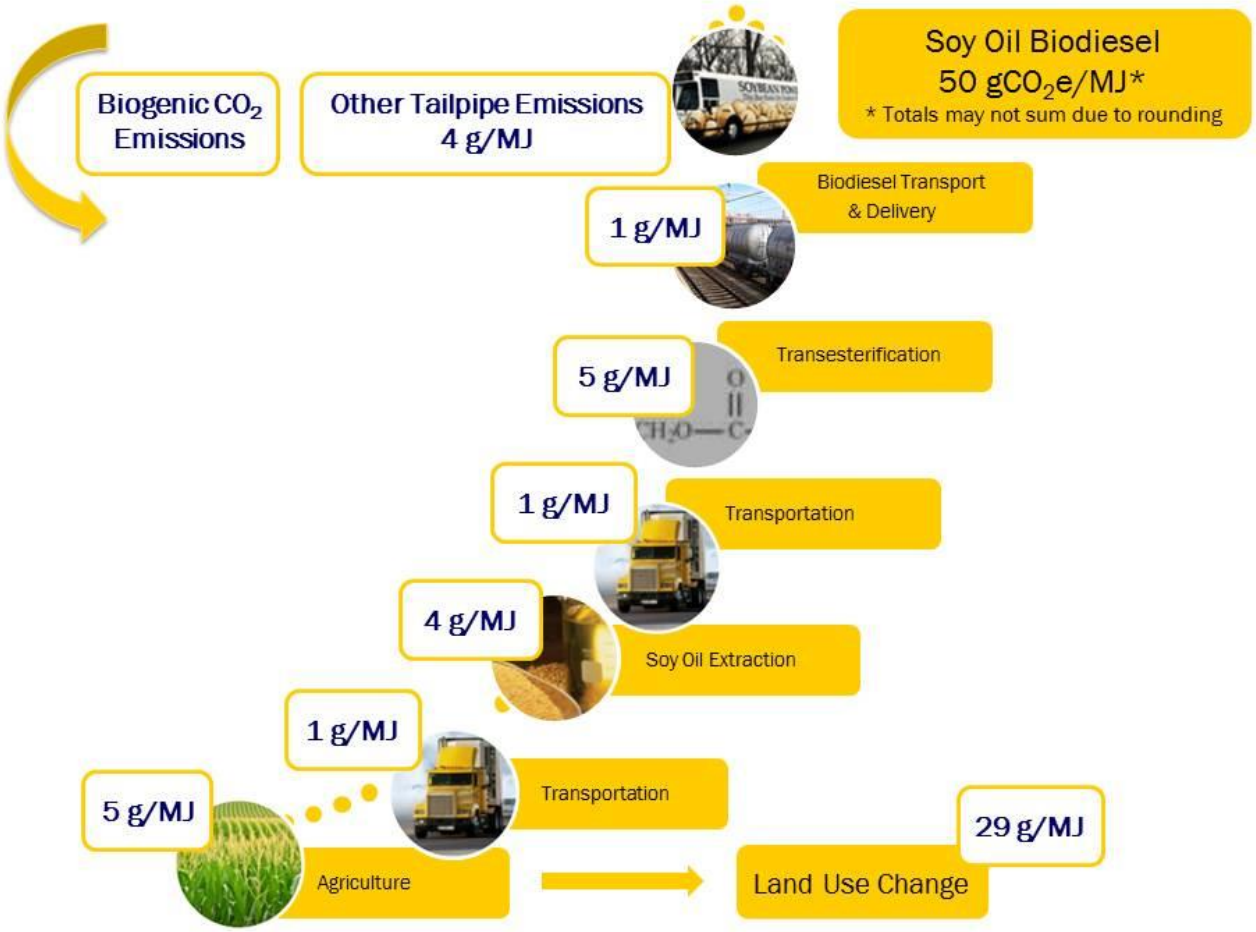
APPENDIX A

Figure A-1. Example Life Cycle Stages for Used Cooking Oil Biodiesel [40]



[40] 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 [41]



[41] 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 (gCO_2e/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	16-28	28-41
Considering Upstream Site Visit	NO	NO	YES	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 APPLICATION DATA SUMMARY FORM

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

Download the draft data summary form:
https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/BD-RD_app.xlsm

Note that the data summary form has not yet been automated to perform CI calculations. A functional draft version of the form will be developed and posted for stakeholder review after staff receives feedback from stakeholders in response to the operational data inputs discussed in this paper and adapts a new version of the CA-GREET model from the 2016 version of the Argonne GREET model.

The form would potentially replace the existing Tier 1 calculator in pathway application packages. All data entered in this form would be subject to verification unless specifically exempted. The form would require the applicant to add facility information and verifiable feedstock, operational energy use and fuel production data used in calculating the CI of biodiesel and renewable diesel pathways.

The data summary form consists of three sheets: 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 Feedstock Production and entering the company name and the physical address of the fuel production facility in the top row.

Feedstock Production

Data should be entered for each feedstock used in the 24 month operational data period (up to nine feedstocks can be accommodated in the form), regardless of whether the fuel produced from that feedstock will be used in California.

Beginning at Step 1 for Feedstock1, 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, Used Cooking Oil, Tallow, and Other. If “Other” is selected, the applicant will be prompted (through a popup) to provide the name of the other feedstock type in Row 5 of the same column. After selecting a feedstock in Row 3, the applicant may include additional description for this feedstock in Row 4 of the same column (if

applicable). 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 nine currently available). Once descriptions for all feedstocks have been entered, the applicant should click the Feedstock Selection button located at Cell L3 to update the feedstock selections throughout the form.

Proceeding to Step 2, the applicant should select the geographical region and corresponding electricity mix associated with each feedstock from the dropdown menus in rows 6 and 7. User Defined should be selected if the correct region is not among the choices available in the drop down menu. If User Defined is selected then the applicant will be prompted (not currently enabled) to specify details for both Crude and Natural Gas mixes in a pop up window. After selecting the geographical region, the applicant should select the electricity mix from the drop down menu in the next row. For Feedstock 1, this will be in Cell C7. This drop down menu will include the following options: all 26 U.S. E-grid regions, U.S. Ave Mix, Canadian Ave Mix, Brazilian Ave Mix and User Defined. If User Defined is selected here then the applicant will be prompted to specify details for the electricity mix in a pop-up window. Once electricity mixes have been chosen for all feedstock selections from Step 1, the applicant should click on the Regional Selection button located at Cell L6 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 provide 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. 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 moisture content. Finally, the applicant should enter the transport distances and modes for each feedstock: truck, rail, ocean tanker, and barge.

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.

Prior to entering any data in this sheet, the applicant should first press the F9 key (located at the top row of most keyboards) which will auto populate feedstock information from the Feedstock Production sheet to the BD-Production sheet. The applicant should then select a regional electricity mix for the biodiesel production region from a drop down menu in Cell H5. This drop down menu will include the following options: all 26 U.S. E-grid regions, U.S. Average Mix, Canadian Average Mix, Brazilian Average Mix and User Defined. After selecting the electricity mix, the applicant should click the GO 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 biodiesel. The production and inventory volumes should be recorded at 60 °F.

Next, the applicant should enter appropriate energy inputs to the facility. The energy types include fossil natural gas, biomass, biomethane, 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, biomethane and other thermal energy should be reported in higher heating value (HHV), biomass in tons (dry) and electrical energy in kwh. For biomass and biomethane (which must be supplied directly to the facility), applicable transport distances should be reported.

Next, the applicant should enter rolling inventories for methanol used in biodiesel production and co-products produced. The suggested co-products currently included in the draft form are distillate bottoms, free fatty acids, and glycerin. The final step is to enter the transport modes and corresponding distances for finished fuel supplied to California. Distribution parameters, from a California port/railyard to blending terminal and finally to fueling facilities, are standard values applied to all biomass-based diesel pathways.

Renewable Diesel Production

Renewable diesel applicants 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.

Prior to entering any data in this sheet, the applicant should first press the F9 key (located at the top row of most keyboards) which will auto populate feedstock information from the Feedstock Production sheet to the RD-Production sheet.

The applicant should then select a regional electricity mix for the renewable diesel production region from a drop down menu in Cell H5. This drop down menu will include the following options: all 26 U.S. E-grid regions, U.S. Ave Mix, Canadian Ave Mix, Brazilian Ave Mix and User Defined. After selecting the electricity mix, the applicant should click on the GO 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. The production and inventory volumes should be recorded at 60 °F.

Next, the applicant should enter appropriate energy inputs to the facility. The energy types include fossil natural gas, biomass, biomethane, 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, biomethane and other thermal energy should be reported in higher heating value (HHV), biomass in tons (dry) and electrical energy in kwh. For biomass and biomethane, applicable transport distances should be reported.

Next, the applicant should enter monthly data for hydrogen used in renewable diesel production, and co-products produced. The suggested co-products currently included in the draft form are naptha, purge gas, and other (to be specified by the user if necessary). The final step is to enter the transport modes and corresponding distances for finished fuel supplied to California. Distribution parameters, from a California port/railyard to blending terminal and finally to fueling facilities, are standard values applied to all biomass-based diesel pathways.

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