

State of California  
**Air Resources Board**

*Staff Discussion Paper*

**Ethanol as a Transportation Fuel**

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## PURPOSE

This discussion paper provides an overview of how starch-derived ethanol used as a transportation fuel is 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 this fuel type. 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.<sup>1</sup> 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 employs an annually 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, reviews potential amendments, and provides considerations for the proposed verification program<sup>2</sup> as it relates to starch-derived ethanol supply chains. This paper currently focuses on simple (Tier 1) pathways for conventional ethanol derived from starch feedstocks—including corn grain and/or grain sorghum. Subsequent releases will focus on other ethanol pathways, including those made from sugarcane, and Tier 2 pathways for ethanol. Tier 2 pathways include ethanol produced from cellulosic and other residue-based feedstocks, as well as conventional ethanol produced using renewable process energy inputs or other innovative methods.

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<sup>1</sup> 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<sub>2</sub>e/MJ).

<sup>2</sup> 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](https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings_2016.htm).

**Current Parties Eligible to Generate Credits for Ethanol**

The initial regulated party for liquid alternative fuels is the producer or importer of the fuel as defined<sup>3</sup> 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.<sup>4</sup>

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 starch-derived ethanol 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 starch-derived ethanol (Q1-Q3 2016)**

Entity Category	Number of Entities
Producers in California <i>(Entities reporting 'Production in California' in the LRT-CBTS)</i>	4
Out-of-State Producers Reporting (Opt-in entities) <i>(Entities reporting 'Production for Import' and 'Import' in the LRT-CBTS)</i>	6
Entities Solely Importing <i>(Entities reporting only 'import' in the LRT-CBTS)</i>	13

During Q1-Q3 2016, there were 4 production facilities in California and 53 production facilities outside of California that provided starch-derived ethanol as a transportation fuel under the LCFS program.

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<sup>3</sup> Selected definitions from the 2015 LCFS Regulation are included in Appendix C in this document for reference.

<sup>4</sup> California Code of Regulations, title 17, section 95480 et seq. Available at: <https://www.arb.ca.gov/regact/2015/lcfs2015/lcfsfinalregorder.pdf>.

## 1. LCFS FUEL PATHWAY EVALUATION PROCESS FOR ETHANOL

### Current Pathway Application Process

When an initial regulated party listed above generates LCFS credits for corn or sorghum derived ethanol, 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.<sup>5</sup>

Tier 1 starch-based ethanol pathways vary primarily based on the following factors:

- Transportation modes and distances (for both feedstocks and finished fuel)
- Product and co-products yields (including ethanol, Distillers Grains and Solubles (DGS), syrup, and corn oil)
- Process energy types and consumption

Other contributors to the CI score, including agricultural phase parameters and land use change scores, are non-variable standard values applied to all pathways of a given feedstock type.

Most ethanol in the program is currently derived from corn, although many North American facilities can process both corn and sorghum. In 2015, starch-based ethanol made up 97% of the total volume of ethanol used in California.<sup>6</sup> Current approved Tier 1 pathway CI values for starch ethanol range from 53 to 86 gCO<sub>2</sub>e/MJ.<sup>7</sup> The lowest CI pathways for starch ethanol use renewable natural

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<sup>5</sup> 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>.

<sup>6</sup> See 2015 data from LCFS Reporting Tool Quarterly Summaries. Available at: <https://www.arb.ca.gov/fuels/lcfs/lrtqsummaries.htm>.

<sup>7</sup> 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 (ETH- 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—and in some cases, indicate the process energy source. For example, a FPC for ethanol derived from corn is now assigned an FPC beginning with “ETHC-,” where the “-C” indicates that the feedstock is corn. A corn ethanol

gas for process energy.<sup>8</sup> See Figure A-1 in Appendix A illustrating the life cycle stages involved in a typical pathway for starch-derived ethanol to California for use as a transportation fuel.

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<sup>9</sup> along with supporting documentation including invoices and receipts – see Table 2 for an example of the current operational data requirements for a Tier 1 corn or sorghum ethanol pathway.

**Table 2. Current operational data requirements for Tier 1 corn or sorghum ethanol pathway applications**

<p><b>A Tier 1 pathway application for corn or sorghum includes 24 months of the following monthly operational data:</b></p>	<p>Feedstock, product, and co-product purchase/production summaries:</p> <ul style="list-style-type: none"> <li>- Corn/sorghum (bushels, as received)</li> <li>- DGS (DDGS/MDGS/WDGS) (tons and % moisture content)</li> <li>- Syrup (tons)</li> <li>- Corn oil (pounds)</li> <li>- Ethanol (denatured gallons)</li> </ul>
	<p>All process energy used in ethanol production operations including:</p> <ul style="list-style-type: none"> <li>- Electricity (in kwh)</li> <li>- Fossil NG (in MMBtu)</li> <li>- Biogas (MMBtu) or Biomass (in MMBtu) used directly in the facility for process energy</li> <li>- Other</li> </ul>
	<p>Feedstock transport mode and distance (miles)—distance from storage (grain elevator) to ethanol production facility (a standard distance is used for the transport from field to storage).</p>
	<p>Ethanol fuel transport mode and distance (miles)—distance from ethanol production facility to California.</p>

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pathway using landfill gas as for process energy will end in “-L” (e.g., ETHC269L). A sugarcane ethanol pathway’s prefix is “ETHS-,” and a sorghum ethanol pathway’s prefix is “ETHG-.”

<sup>8</sup> In order to count toward a reduction of the fuel pathway CI, renewable process energy must be supplied directly to the facility; no indirect accounting mechanisms such as the purchase of Renewable Energy Credits or other renewable attributes are acceptable.

<sup>9</sup> For pathways with less than 24 months of operational data, a provisional CI may be considered.

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**

#### *Simplification of the Tier 1 Calculator for Starch Derived Ethanol Pathways*

To further streamline pathway CI application, evaluation, and verification for Tier 1 ethanol 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 for corn and sorghum ethanol pathways are discussed in Appendix B and a (non-functional) Excel version is posted for stakeholder review of the suggested input fields.<sup>10</sup> The form collects summarized operational data, which is 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 on in Appendix B.*

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<sup>10</sup> The draft data summary form is available for download at: [https://www.arb.ca.gov/fuels/lcfs/lcfs\\_meetings/etoh\\_app.xlsx](https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/etoh_app.xlsx) 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.

*Accounting Methodologies for Allocating Fuel Volumes by FPC*

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 corn or sorghum across a wide range of blend proportions reduces the likelihood of production disruptions caused by price volatility or shortages of individual feedstocks. Similarly, many facilities have the ability to vary the co-products they produce—such as dry, modified or wet DGS—in response to market demand. At facilities processing multiple feedstocks or producing co-products in varying proportions, quarterly fuel production can yield ethanol associated with two or more FPCs.

Currently, when the producer is not able to demonstrate accurate accounting of the gallons produced in accordance with a particular FPC, all gallons of ethanol must be reported using the FPC with the highest CI.<sup>11</sup>

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, producers would be required to provide records that unequivocally associate specific quantities of feedstock consumed with specific volumes of fuel produced over the reported quarter. Producers would also be required to demonstrate that their accounting methodologies are supported by the fuel yield demonstrated in the pathway application for every CI compliance period (calendar year).

*Staff is seeking stakeholder feedback on a potential requirement to include the accounting methodology for allocating FPCs in their monitoring plan.*

*Would third-party verifier assessment of feedstock consumption on a quarterly basis help to minimize risk of credit adjustments at the conclusion of an entire verification period?*

*Consideration of Multiple Pathways for Dry, Modified and Wet DGS*

Currently, most corn ethanol pathways (and sorghum, if applicable) use a composite CI score that reflects the share of co-products produced over the 24 months of operational data submitted as part of the initial pathway application. Co-products include: dry DGS (DDGS, moisture below 15%), modified DGS (MDGS, moisture between 15 to 55%), wet DGS (WDGS, moisture greater than 55%), syrup, and corn oil.

<sup>11</sup> LCFS Regulation section 95488(c)(6)(A).



Staff is considering an option in the data summary form that would allow applicants the flexibility of having up to three separate pathway CIs corresponding to applicable DGS drying levels. Because ethanol produced with WDGS can achieve a significantly lower CI score than DDGS, it is likely that some applicants would prefer the flexibility of reporting fuel volumes (with corresponding CIs) based on different DGS drying levels. However, applicants with multiple pathways must ensure that their method for accounting and reporting of the volumes associated with each drying level is accurate and verifiable. Potential requirements might include metering of drying energy and DGS throughput and maintaining detailed records to allow for verification of volumes associated with each pathway.

*Staff is seeking stakeholder feedback from producers who would opt to apply for multiple pathways associated with varying DGS drying levels. We request suggestions for requirements to ensure operational data and reported volumes associated with each DGS drying level are verifiable.*

#### *Consideration of User-Specific Inputs for Feedstock Transportation*

Staff is considering offering standard default values for corn feedstock transport distance from field to storage to the ethanol facility to reduce burden during verification.

For Midwestern facilities (IL, IN, IA, MN, NE, OH, MI, SD, WI) staff suggests a standard default corn transport of 50 miles by heavy duty trucks. For ethanol facilities in California receiving corn from these Midwestern states, staff suggests a standard corn shipment input of 1,400 miles of rail transport and 20 miles of heavy duty truck transport. A similar option could be made available based on feedback received from stakeholders for sorghum transport inputs.

If an applicant opts to use these standard defaults, staff suggests that they should be exempt from verification requirements for corn transport. In contrast, the use of plant specific feedstock transport distance should entail a full verification of feedstock transport distances indicated in the data summary form.

*Staff is seeking stakeholder feedback on the appropriate default transport distances for corn and sorghum, and the modes offered.*

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

#### *Other Potential Changes to Pathway Application Requirements*

Staff is considering proposing to remove 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, eliminating the need for the current one-time fuel transport 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 would review the simplified form and application for completeness. If the application is complete, applicants would 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., ethanol, biodiesel, and renewable diesel), 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.<sup>12</sup> The quarterly report shall include the amount of fuel transacted in the quarter (in gallons), corresponding Fuel Pathway Code (FPC), and the vehicle application<sup>13</sup> (e.g., light

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<sup>12</sup> 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.

<sup>13</sup> The vehicle application determines the Energy Economy Ratio (EER) used in the credit calculation,

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.<sup>14</sup>

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.<sup>15</sup> Any negative TOA for a FPC will result in an error message at the time of quarterly report submission.

### **Potential Implementation Improvements for Enhanced Reporting**

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

#### *Reporting Standardized Volumes for Liquid Alternative Fuels*

The volume of ethanol and 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 ethanol and other alternative liquid fuels 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.

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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. Ethanol is considered a light duty gasoline 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.

<sup>14</sup> LCFS Regulatory Guidance 16-01 available at:

[https://www.arb.ca.gov/fuels/lcfs/guidance/regguidance\\_16-01.pdf](https://www.arb.ca.gov/fuels/lcfs/guidance/regguidance_16-01.pdf)

<sup>15</sup> 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 *sold 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 (no change), are '+', '-', and 'o', respectively.

Staff would clarify that any ethanol volume reported in the LRT-CBTS should be adjusted to standard temperature conditions of 60°F.<sup>16</sup> Staff is issuing a draft guidance which includes the methodology for adjusting fuel volumes to account for temperature corrections, please refer to Draft LCFS Regulatory Guidance 17-01.<sup>17</sup>

*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.

To further ensure the accuracy of fuel data in the program, staff would 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 would be implemented in addition to the existing TOA check as discussed above.

This means the reporting party would need to ensure that the fuel amounts for each FPC reported under transaction types which 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 re-adoption 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 that

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<sup>16</sup> Note that this aligns with the standardization of volume requirements for Renewable Identification Number generation in CFR §80.1426.

<sup>17</sup> Draft LCFS Regulatory Guidance 17-01 available at:  
[https://www.arb.ca.gov/fuels/lcfs/guidance/regguidance\\_17-01.pdf](https://www.arb.ca.gov/fuels/lcfs/guidance/regguidance_17-01.pdf)

unequivocally associate reported fuel amounts with the respective FPCs to those fuel amounts in their physical inventories.

*Reporting Exports of Ethanol and Fuel Blend Containing Ethanol*

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 then 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) or Diesel (ULSD) which is sometimes exported out of California as a blend. For example, denatured ethanol is blended with CARBOB to produce California Reformulated Gasoline (CaRFG) which may contain up to 10 % of ethanol by volume. If any ethanol reported to the LCFS program gets exported out of California, either as denatured fuel ethanol or as a fuel blend containing ethanol, then it must be reported in the LRT-CBTS with accurate amounts and FPCs. The amount and FPC of exported ethanol will be used to calculate the adjustment to the credit balance in the exporting entities' LRT-CBTS account.

If ethanol is exported as a fuel blend, then the percentage of ethanol in the final product should be used to calculate the exported amount of ethanol. If the blend percentage of the ethanol is not known then default blend percentages provided by ARB should be used to estimate the amount of ethanol in the exported fuel blend. Staff suggests using default blend percentage for denatured ethanol of 10% by volume in exported reformulated gasoline (CaRFG) product and 85% by volume in exported products labeled as E85. Staff will be issuing a guidance including more details on the methodology and the default blend percentages to be used for estimating ethanol in exported fuel blends.

As mentioned earlier, substitute FPCs are already available to be used in cases when the FPCs of exported ethanol 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.<sup>18</sup> Staff is planning to enhance the existing guidance and provide additional substitute FPCs for fuel blends containing ethanol and other liquid alternative fuels.

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<sup>18</sup> LCFS Regulatory Guidance 16-01 available at:  
[https://www.arb.ca.gov/fuels/lcfs/guidance/regguidance\\_16-01.pdf](https://www.arb.ca.gov/fuels/lcfs/guidance/regguidance_16-01.pdf)

*Staff is seeking stakeholder feedback on the feasibility of tracking blend percentages of ethanol in the fuel blends for the purpose of reporting exports.*

*Staff is seeking stakeholder feedback on the concept of using default blend percentages when the actual ethanol content in the exported blend is not available for reporting.*

### *Quarterly Reconciliation with Counterparties in the LRT-CBTS*

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

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 of 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 the concept of LRT-CBTS's reconciliation eliminating the need for third-party verification of fuel transactions reported downstream of 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?*

### **Potential Regulatory Amendments to Reporting Requirements**

Staff is considering the following amendments to the reporting of ethanol 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 amount 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, 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 means if the ownership of the fuel with obligation is received in one reporting quarter then it can 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 can 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 the periodical boundaries for the transfer of fuel obligation will ensure 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 is 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.<sup>19,20</sup>

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<sup>19</sup> LCFS Fuel Pathways. Available at:  
<https://www.arb.ca.gov/fuels/lcfs/fuelpathways/fuelpathways.htm>.

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

ARB is now considering supplementing the work of ARB staff with a verification system conducted by independent third-parties engaged by entities reporting to ARB under 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.<sup>21,22</sup> CARB'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.

### **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 GHG trading programs and international standards.<sup>23</sup>

#### *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,<sup>24</sup> 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."

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<sup>21</sup> 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>.

<sup>22</sup> Offset Verification Program. Available at: <https://www.arb.ca.gov/cc/capandtrade/offsets/verification/verification.htm>.

<sup>23</sup> 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 has validation and verification bodies for use in accreditation or other forms of recognition.

<sup>24</sup> 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>.



## Potential Amendments to Verification

Staff's verification white paper<sup>25</sup> provides a 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 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
- 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 this 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.

The degree of ARB oversight, verifier competency and training, and conflict of interest requirements are expected to be consistent with ARB's Regulation for the Mandatory Reporting of Greenhouse Gas Emissions (MRR) and Cap-and-Trade Compliance Offset verification programs, while seeking to harmonize, where possible, with existing fuels verification and certification programs, most notably U.S. EPA's RFS Quality Assurance Program (QAP).

Staff is continuing to coordinate with U.S. EPA to harmonize with the RFS and QAP requirements. Under the RFS, starch ethanol derived from corn and grain sorghum meets the requirements to generate D6 RINs for renewable fuels,<sup>26</sup> and the majority

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<sup>25</sup> Staff White Paper: Framework for Development of a Low Carbon Fuel Standard Verification Program, October 21, 2016. Available at: [https://www.arb.ca.gov/fuels/lcfs/lcfs\\_meetings/lcfs\\_meetings\\_2016.htm](https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/lcfs_meetings_2016.htm).

<sup>26</sup> U.S. EPA Renewable Fuel Standard Program – Program Overview for Renewable Fuel Standard Program. Available at: <https://www.epa.gov/renewable-fuel-standard-program/program-overview-renewable-fuel-standard-program>.

of D6 fuel is ethanol from corn starch.<sup>27</sup> Approximately 9% of D6 fuels are QAP program-approved biofuels as of September 2015.<sup>28</sup>

Verification sampling requirements will be based on risk of error, risk of fraud, and the CI sensitivity of user-defined inputs.

### **Considerations for the Third-Party Verification of Ethanol**

Figure A-1 in Appendix A presents an example of the life cycle stages in a typical corn ethanol pathway. Tables 3 and 4 below present examples of a full starch ethanol supply chain to help provide clarity on potential verification requirements for ethanol pathways. 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 ethanol producers to ensure any additional verification points are considered.

Staff is considering third-party verification requirements for a starch ethanol fuel pathway that would consist of four main components:

- (1) Validate the initial 24 months of operational data required for fuel pathway application approval.<sup>29</sup>
- (2) Verify, on an ongoing basis, that the average CI over the compliance period (calendar year) does not exceed the certified value (by reviewing monthly operational data and transactions at the production facility).
- (3) Verify, on an ongoing basis (using mass balance and yield assessment) the total ethanol production volumes, and the volumes of ethanol sold from the production facility to each counterparty.
- (4) Verify ethanol volumes claimed as imported to California, or produced for use in California, to ensure proper accounting for reported fuel volumes by FPC.
- (5) Verify exported volumes of LCFS ethanol are accounted for correctly.

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<sup>27</sup> U.S. Energy Information Administration "Today in Energy," Feb. 23, 2015. Available at: <http://www.eia.gov/todayinenergy/detail.php?id=20072>

<sup>28</sup> RIN Fraud & Compliance Presentation, Byron Bunker, Director, Compliance Division, Office of Transportation and Air Quality, U.S. EPA, Sept. 22, 2015. Available at: [https://www.epa.gov/sites/production/files/2015-11/documents/bunkerenergyconferenceslidedeck\\_09212015\\_final.pdf](https://www.epa.gov/sites/production/files/2015-11/documents/bunkerenergyconferenceslidedeck_09212015_final.pdf).

<sup>29</sup> See the draft CI application data summary form shown in Appendix B as it relates to potential CI verification points.

*Example Supply Chain Verification Responsibilities and Requirements*

Staff is seeking stakeholder feedback on the following approach which would potentially align future verification responsibility with initial regulated party status and exporter status, as well as ethanol producers who maintain FPCs but do not opt in as regulated parties. Under this potential approach, quarterly reconciliation in LRT-CBTS could substitute for third-party verification of fuel transactions reported by entities downstream of an initial regulated party and upstream of an exporter.<sup>30</sup>

Staff also is seeking stakeholder feedback on the information that would be verified to assure LCFS credit market integrity, referred to as *verification points*. To assure credit validity in cases where the initial regulated party does not have all information necessary for verification, e.g., due to a more complex supply chain, the party responsible for verification would need to work with its suppliers or customers to ensure that the necessary information is verified by an ARB-accredited verification body.

Staff believes that this potential approach and the listed potential verification points would provide reasonable assurance that initial credit generation and export credit adjustments in the LRT-CBTS are correct.

The two types of initial regulated party status with potential verification responsibility are each 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 1 and Table 3)
  - a. Producer with an ethanol production facility located in California
  - b. Producer with an out-of-state ethanol production facility who is regulated as an importer
  - c. Producer with an out-of-state ethanol production facility who is not an importer and opts in as the initial regulated party<sup>31</sup>
2. An importer, who is not an ethanol producer, is the initial regulated party (Entity B in Figure 2 and Table 4).
3. The exporter is shown as Entity E in both figures and tables.

In Figure 1, the producer who is the initial regulated party would be responsible for validation of its CI applications and ongoing verification of the credits it generates (CI<sub>actual</sub> ≤ CI<sub>certified</sub> for the annual compliance period and quarterly transactions). The

<sup>30</sup> Note that fuel transactions that are subsequent to the first fuel purchase without associated credits are not required to be reported in the LRT. The exception is fuel exports. All exports of fuels, regardless of whether they are purchased from a party that retains the credits, must be reported.

<sup>31</sup> LCFS regulation section 95483.1(a)(2).

producer would also be responsible for verification of physical delivery of the fuel it 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. To assure no double counting of low-CI fuels, staff is considering a full mass balance and yield analysis be verified for each facility annually.

Figure 2 illustrates a simplified supply chain where ethanol producers (Entities A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>... A<sub>i</sub>) 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 (see Entity B in Figure 2 and Table 4). 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 ongoing CI verifications. To assure ongoing credit validity, the importer would need to work with the producers to ensure that the necessary information continues to be verified by an ARB-accredited verification body ( $CI_{\text{actual}} \leq CI_{\text{certified}}$ ) for the annual compliance period and full facility mass balance and yield analysis to assure no double counting). The importer would also be responsible for verification that the imported fuels are tracked from the production facilities to California during the prior calendar year.

*Staff is seeking feedback on holding the following entities responsible for verification: producers, importers (for out-of-state producers who do not opt-in to be regulated parties), and exporters.*

*Staff is seeking feedback on the potential verification points identified in Tables 3 and 4.*

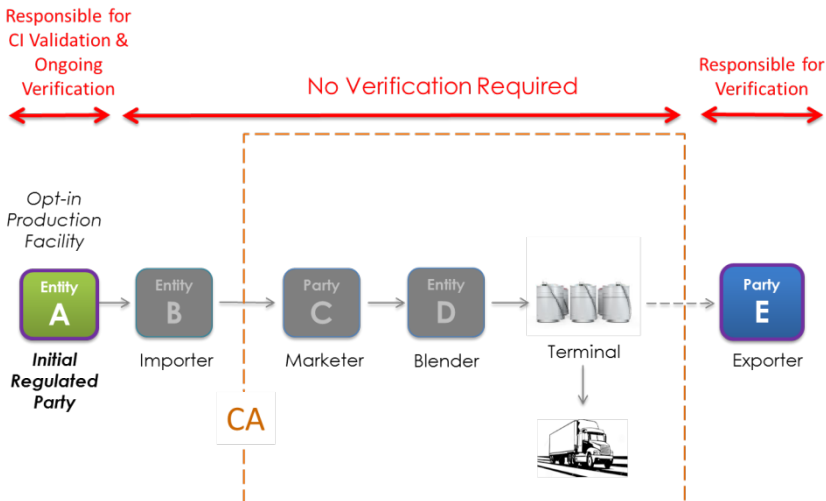
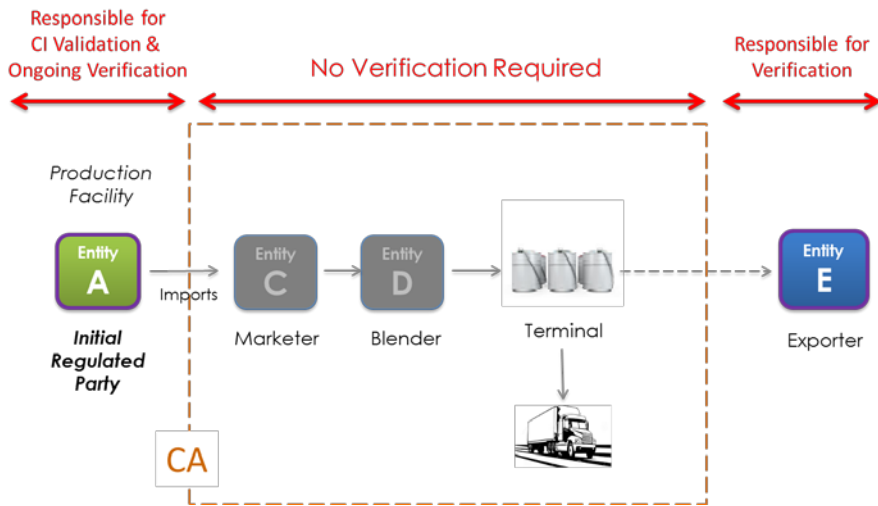
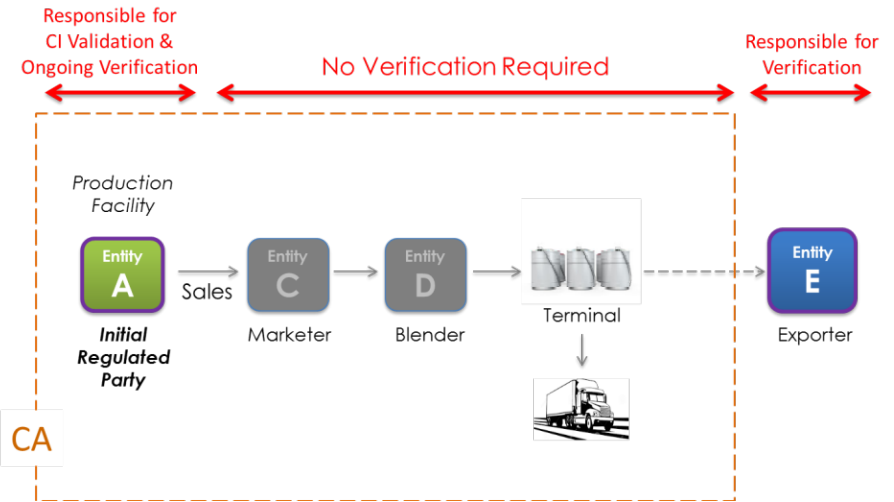
*To inform site visit frequency and verification period (quarterly, annual, triennial) for starch-derived ethanol verification, staff is seeking stakeholder feedback regarding the frequency with which points most likely to impact compliance can potentially change. Are there critical verification points that may change frequently, versus verification points that are unlikely to change during the course of normal ethanol production and delivery?*

*Is remote monitoring by a third-party verification body sufficient to detect potential fraud in the supply chain and thereby substitute for more frequent site visits at the production facility?*

*Exemption for Small Export Volumes*

Staff is considering proposing that ethanol exporters be subject to third-party verification to accurately account for credits associated with exported fuel volumes. Recognizing the relatively low risk to LCFS credit market integrity for exporters of low fuel volumes, staff is considering an exemption threshold. Analysis of current exported fuel volumes and the associated credits as reported in the LRT-CBTS suggests a reasonable potential exemption threshold for export of ethanol or ethanol-containing fuel blends of less than 50,000 gallons of total ethanol per calendar year for each exporter. With that in mind, all exported fuel volumes reported in LRT-CBTS will be verified by ARB staff against Board of Equalization (BOE) records when the data are available. Note that staff considers exports reported by initial regulated parties to be within the scope of the mass balance verification. Please see Table 3 for additional information on verification points for exporters.

**Figure 1. Verification Responsibility: Producer is Initial Regulated Party**



**Table 3. Summary of Potential Requirements for CI Determination, LRT-CBTS Reporting, and Verification Points for each entity in the starch ethanol supply chain—Example: Producer is Initial Regulated Party**

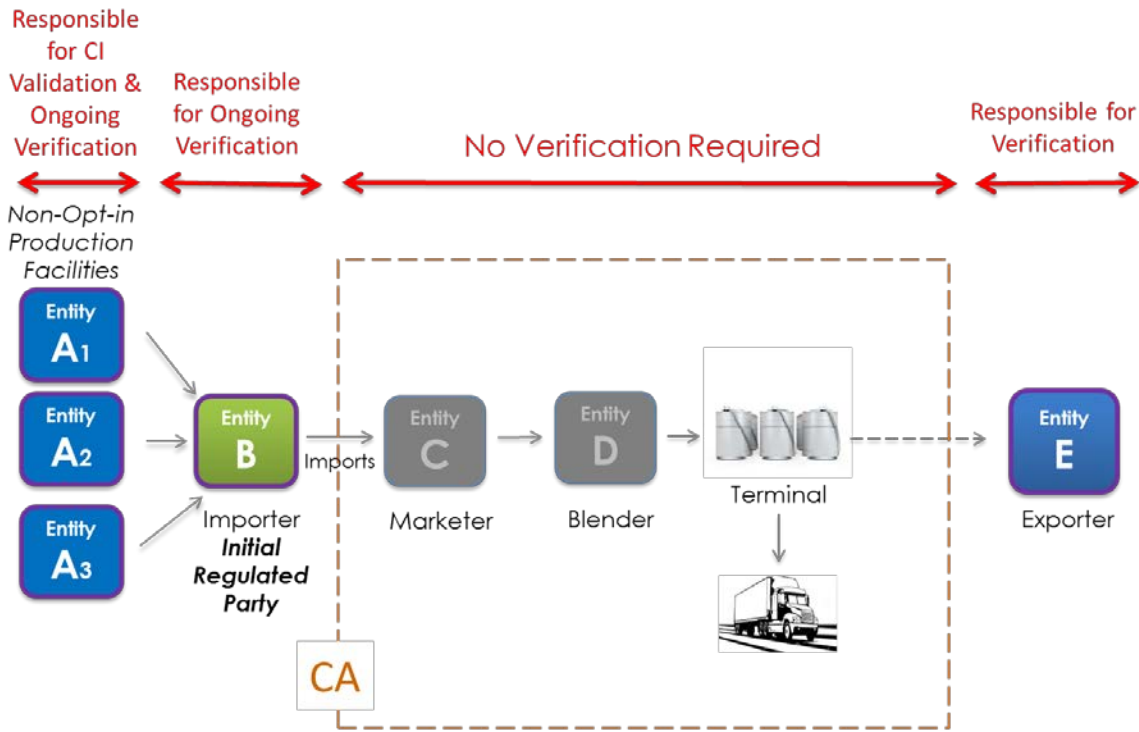
Entity	Potential Future Requirements
<p><b>Entity A: Ethanol Producer</b></p> <p>Initial Regulated Party</p>	<p style="text-align: center;"><b>Initial CI Determination</b></p> <p><i>Submit 24 Months of pathway-specific monthly operational data, including:</i></p> <ul style="list-style-type: none"> <li>• Feedstock, product, and co-product purchase/production summaries</li> <li>• Any inputs or conditions that the applicant chooses to change from the standard values, e.g., feedstock transport mode(s) and distance</li> <li>• Fuel transportation mode(s) and distance from production facility to California, if out-of-state</li> </ul>
	<p style="text-align: center;"><b>Reporting</b></p> <p><i>Report Quarterly to LRT:</i></p> <ul style="list-style-type: none"> <li>• Fuel Pathway Code (FPC)</li> <li>• Fuel Volume (gallons)</li> <li>• Fuel Production Facility</li> <li>• Transaction Date</li> <li>• Transaction Type (Production or Production for Import; Sold with/without Obligation)</li> <li>• Business Partner <i>(if applicable)</i></li> <li>• Aggregator indicator <i>(if transaction is an aggregated amount)</i></li> </ul> <p>Required to produce and retain Product Transfer Documents (PTD), Bills of Lading (BOL), invoices, and other supporting documents <i>(not uploaded in LRT)</i></p>
	<p style="text-align: center;"><b>Third-Party Verification Points</b></p> <p><i>For Initial Validation of CI:</i></p> <ul style="list-style-type: none"> <li>• Validate operational data submitted for the initial CI determination</li> <li>• Confirm facility geographic location and physical configuration appropriate for starch ethanol production</li> <li>• 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</li> <li>• Review recordkeeping and data management practices</li> </ul> <p><i>For Ongoing Verification of CI:</i></p> <ul style="list-style-type: none"> <li>• Verify operational data and supporting records:                             <ul style="list-style-type: none"> <li>– feedstock inputs (metering and feedstock purchase invoices)</li> <li>– process energy inputs (utility invoices, meter records)</li> <li>– ethanol production and sales volumes, adjusted to 60°F (meter reading, contracts, and sales invoices)</li> <li>– co-product quantities and moisture content(metering, sales invoices)</li> <li>– full mass balance and yield analysis</li> </ul> </li> <li>• Verify accuracy of allocation methodology of reported fuel volumes to FPC(s) as documented in producer's monitoring plan</li> </ul> <p><i>For Ongoing Verification of LRT-CBTS reports:</i></p> <ul style="list-style-type: none"> <li>• 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 confirm physical delivery</li> <li>• 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</li> <li>• 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</li> </ul>

**Table 3 continued**

<b>Entity</b>	<b>Potential Future Requirements</b>
<b>Entity B: Ethanol Importer</b>  Downstream reporting party	<b>CI Determination</b> No CI Impact
	<b>Reporting</b> <i>Report Quarterly to LRT:</i> Same as Entity A except transaction type (Import)
	<b>Third-Party Verification Points</b> LRT-CBTS's quarterly reconciliation could substitute for third-party verification of fuel transactions reported downstream of the initial regulated party.
<b>Entity C: Ethanol Marketer</b>  Downstream reporting party	<b>CI Determination</b> No CI Impact
	<b>Reporting</b> <i>Report Quarterly to LRT:</i> Same as Entity A, except: transaction type (Purchased with/without Obligation; Sold with/without Obligation)
	<b>Third-Party Verification Points</b> Same as Entity B.
<b>Entity D: Ethanol Blender</b>  Downstream reporting party	<b>CI Determination</b> No CI impact
	<b>Reporting</b> <i>Report Quarterly to LRT:</i> Same as Entity A, except: transaction type (Purchased with/without obligation; Sold with/without Obligation)
	<b>Third-Party Verification Points</b> Same as Entity B.
<b>Entity E: Ethanol Exporter</b>  If reported fuel is subsequently exported from California	<b>CI Determination</b> No CI impact
	<b>Reporting</b> <i>Report to LRT:</i> Same as Entity A, except: transaction type (Export)
	<b>Third-Party Verification Points</b> <i>For Ongoing Verification of LRT-CBTS reports:</i> <ul style="list-style-type: none"> <li>• Review methodology for allocation of exported fuel volumes to FPC(s)</li> <li>• Review PTDs to ensure accurate accounting of fuel volumes per FPC(s) reported upstream for transportation use in California</li> <li>• Review purchase and sales invoices and payment records to confirm volumes sold for use outside California and for transportation use in California</li> <li>• Review tax records submitted to the Board of Equalization by exporter</li> </ul>



**Figure 2. Verification Responsibility: Importer is Initial Regulated Party and Producer Does Not Opt-In**



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

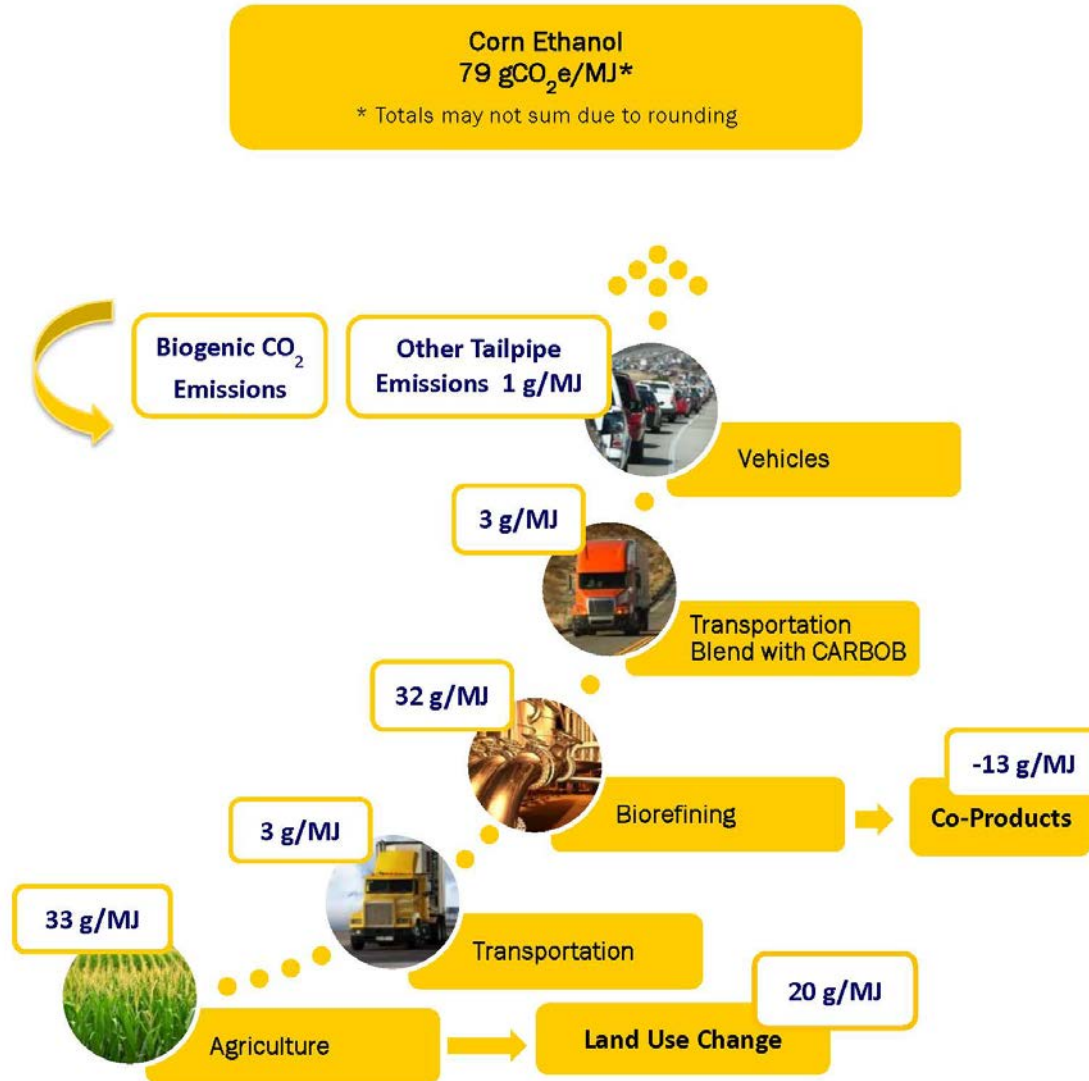
Entity	Potential Future Requirements
<b>Entity A<sub>i</sub>: Ethanol Producer</b>  Out-of-state producer not reporting in the LRT	<b>CI Determination</b> Submit 24 Months of pathway-specific monthly operational data: Same as Entity A in Table 3
	<b>Reporting</b> Report quarterly to LRT: Not applicable, as this entity does not report in the LRT
	<b>Third-Party Verification Points</b> For Initial Validation of CI: Same as Entity A in Table 3 For Ongoing Verification of CI: Same as Entity A in Table 3 For Ongoing Verification of LRT-CBTS reports: Not applicable

**Table 4 continued**

Entity	Potential Future Requirements
<b>Entity B: Ethanol Importer</b>  Initial regulated party	<b>CI Determination</b> No CI impact
	<b>Reporting</b> <i>Report Quarterly to LRT:</i> Same as Entity A in Table 3, except: transaction type (Import; Sold with/without Obligation)
	<b>Third-Party Verification Points</b> <i>For Initial Validation of CI:</i> Not applicable <i>For Ongoing Verification of CI:</i> Not applicable <i>For Ongoing Verification of LRT-CBTS reports:</i> Same as Entity A in Table 3
<b>Entity C: Ethanol Marketer</b>  Downstream reporting party	<b>CI Determination</b> No CI Impact
	<b>Reporting</b> <i>Report Quarterly to LRT:</i> Same as Entity A in Table 3, except: transaction type (Purchased with/without Obligation; Sold with/without Obligation)
	<b>Third-Party Verification Points</b> Same as Entity B in Table 3
<b>Entity D: Ethanol Blender</b>  Downstream reporting party	<b>CI Determination</b> No CI impact
	<b>Reporting</b> <i>Report Quarterly to LRT:</i> Same as Entity A in Table 3, except: transaction type (Purchased with/without Obligation; Sold with/without Obligation)
	<b>Third-Party Verification Points</b> Same as Entity B in Table 3
<b>Entity E: Ethanol Exporter</b>  If reported fuel is subsequently exported from California	<b>CI Determination</b> No CI impact
	<b>Reporting</b> <i>Report to LRT:</i> Same as Entity A in table 3, except: transaction type (Export)
	<b>Third-Party Verification Points</b> <i>For Ongoing Verification of LRT-CBTS reports:</i> Same as Entity E in Table 3

### APPENDIX A

Figure A-1: Life Cycle Stages for Corn Ethanol



## APPENDIX B

### DRAFT SIMPLIFIED CI APPLICATION DATA SUMMARY FORM

This Appendix includes an overview of the input fields shown in the data summary form and requests for stakeholder feedback. The draft simplified CI application data summary form for Tier 1 corn and sorghum ethanol 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/etoh\\_app.xlsm](https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/etoh_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 corn and sorghum derived ethanol.

The top of the form contains inputs related to facility identification, including: the applicant's company name, the region or location where feedstock is sourced, and the physical address of the ethanol production facility. The form will calculate and display the CI score and ethanol volume corresponding to each pathway.

The section labeled "Inputs for Corn and Sorghum and Co-Products" shows the necessary inputs for feedstock transport, inventory tracking, and co-product production data to be completed by the applicant. In this section of the input form, the applicant first selects the regional electricity mix for feedstock production region from a pull-down menu, then fills in total monthly rolling inventories (beginning, received, and ending) of corn and sorghum feedstocks used to produce ethanol. The inventory data will be used to determine the net feedstock consumed in ethanol production, and thereby ethanol yield.

Feedstock transport modes and distances are the next set of required inputs, followed by input fields for total monthly co-product quantities. These include the unadjusted mass (inclusive of moisture content) and moisture content of each co-product stream: Dry DGS, Modified DGS, Wet DGS, syrup, and corn oil. The dry mass produced in each month is calculated using the current month's sales and inventory level minus the previous month's inventory. The total DGS yield, adjusted to dry pounds per gallon of ethanol as currently input to the CA-GREET model, is calculated in the last column of this section.

*See the discussion of potential changes to feedstock transport inputs and multiple co-product specific pathways in Chapter 11 LCFS FUEL PATHWAY EVALUATION PROCESS FOR ETHANOL.*

*Staff is seeking stakeholder feedback describing feedstock and co-product inventory tracking methods that facilities currently employ, whether the input fields provided in the form align with those methods, and if the methodology provided is suitable for verification.*

The section labeled “Inputs for Ethanol Production” shows the necessary inputs for ethanol production, facility energy use and fuel transport to be completed by the applicant.

For this section of the data summary form, the applicant has to first select a regional electricity mix for ethanol production location from a pull down menu. Next, moving from left to right across the spreadsheet, the applicant would enter rolling inventory volumes of denatured ethanol, adjusted to a standard 60°F. Staff is not suggesting any change to the current practice of determining ethanol CI using a standard amount (2.5% by volume) of denaturant. The inventory data would be used to determine the actual production volumes over the operational data period.

Next, the applicant must enter all energy inputs to the facility. The energy types include fossil natural gas, biomass, biogas, other thermal sources, grid electricity, and other electricity (e.g., onsite wind or solar). Natural gas, biogas and other thermal energy shall be reported in higher heating value (HHV) as shown on utility invoices; the finalized form will automate the conversion to the lower heating value used in CA-GREET calculations. Biomass combusted at the facility should be entered in short, bone dry tons, and electrical energy in kWh. For biomass and biogas, applicable transport distances must be reported and supplemental information on the bioenergy source may be required for approval.

The final set of entries includes transport mode and distance for finished fuel supplied to California.

*Staff is seeking stakeholder feedback describing product inventory metering and tracking methods that facilities currently employ, whether the input fields provided in the form align with those methods, and if the methodology provided is suitable for verification.*

*At what conditions are product quantities recorded? What adjustments (unit conversions or adjustment to normalize climate variations) are made to metered or measured quantities? Are there variations in the types of meters used, meter location within the production stream, calibration requirements, or other potential sources of inconsistency across producers that staff should be aware of?*

*Staff is interested in feedback from participants on the units of energy and whether the appropriate documentation sources for validation should be indicated in the input sheet (such as "Natural gas use from Invoices").*

*Should additional modes of transport for ethanol to California be offered in the form?*

*Will the fields offered in this form accommodate the majority of starch ethanol production processes?*

## APPENDIX C

### SELECTED DEFINITIONS FROM THE 2015 LCFS REGULATION

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

**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.

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

**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.