

Note- this instruction manual is an excerpt from a clean version of the final modified version of Attachment C: CA-GREET3.0 Technical Support Documentation, posted on August 13, 2018 as part of the rulemaking process supporting the LCFS amendments in effect from Q1 2019.

Tier 1 Simplified CI Calculator Instruction Manual

Biodiesel and Renewable Diesel

A. Introduction

This document provides detailed instructions for the use of the Simplified CI Calculator for Tier 1 Biodiesel (BD) and Renewable Diesel (RD) pathway applications. This Calculator is to be used to determine the carbon intensity (CI) for either BD or RD produced from multiple feedstocks, including soy oil, canola oil, corn oil, used cooking oil (UCO), and tallow/animal fat. Each required specific input in the Calculator has been numerically labeled (i.e., 1.1, 1.2 etc.) so that users can follow the sequence and enter information as required.

Download the Simplified CI Calculator here:
<https://www.arb.ca.gov/fuels/lcfs/ca-greet/ca-greet.htm>

The Calculator has been automated to perform CI calculations using factors from the CA-GREET3.0 model. The Calculator replaces the existing Tier 1 Calculator and the operational data template in pathway application packages. Applicants are required to add facility information and verifiable monthly feedstock, operational energy use, fuel production and co-product data, and transport distances used in calculating the CI of BD and RD. **All inputs selected and input by the applicant must meet the requirements of the monitoring plan for entities required to validate or verify pursuant to sections 95491.1(c) and are subject to verification unless specifically exempted.**

This Calculator also includes additional reference material such as greenhouse gas emissions factors used in CA-GREET3.0 and reference fuel specifications. Also included with the Calculator is a detailed breakdown of the calculations used to determine the final CI of each fuel pathway.

The applicant may only enter values or make selections in input fields designated by CARB for user input/selection, and may not change any other values or fields in the Calculator.

B. Color Legend Used in the Calculator

The Calculator uses the following color legend to differentiate required inputs, calculated values, etc., described below:

Yellow Cells require user input
Light Blue Cells show CI results
Green Cells show the calculation button
Gray Cells are Calculated Values

C. Calculator Overview

The following table provides an overview of the tabs used in the Simplified CI Calculator.

Table C.1. Overview of Tabs used in the Simplified CI Calculator.

Tab Name	Description
BD RD Summary	Summary worksheet. Contains an overall summary of the information entered in the “Soy Oil”, “Canola”, “Corn Oil”, “UCO”, and “Tallow” tabs for feedstock production, and the “BD-Production” and “RD-Production” tabs for finished fuel production. This tab also includes calculated CIs and corresponding fuel volumes for the various streams. The tab includes a toggle for user to select either biodiesel or renewable diesel. If desired, a conservative margin of safety may be added to the calculated CIs in this tab in order to establish final CIs, pursuant to section 95488.4(a) of the regulation.
Soy Oil, Canola Oil, Tallow, Corn Oil, UCO	These sheets contain fields requiring user inputs for feedstocks (used in biofuel production), calculated values dependent on user inputs to yellow cells in the corresponding sections of the calculator, and other information from CA-GREET3.0. These tabs also include CI calculation details for each corresponding feedstock in the respective tab. Only a single tab each is provided for Soy Oil and Canola Oil used as feedstocks. For UCO and Tallow, three separate tabs for each feedstock are provided in the Calculator. These are labeled UCO1, UCO2, and UCO2 for the three UCO tabs and Tallow1, Tallow2, and Tallow3 for the three Tallow tabs.
BD-Production, RD-Production	These sheets include user inputs for BD or RD production processes, respectively. These include fields requiring user inputs and those calculated by the sheet. Calculations in grayed out cells are automatically calculated but dependent on input to yellow cells in the feedstock and fuel production tabs of the Calculator. Additional information in these tabs is from CA-GREET3.0 required in calculating pathway CIs for BD or RD. These tabs also include CI calculation details.

EF Table	Contains greenhouse gas emissions factors from the CA-GREET3.0 model used in calculation of carbon intensities.
References	This sheet details standard inputs in the Calculator for both soybean and canola farming for BD and RD. These inputs are not subject to change by the applicant. The sheet also contains loss factors related to the production of biodiesel and renewable diesel.
Fuel_Specs	Contains specifications of fuels, global warming potentials of greenhouse gases, carbon and sulfur ratios of pollutants, unit conversions, and other information used in calculation of CIs for BD or RD.

D. Calculator Details– Feedstock Tabs: Soy Oil, Canola, Tallow, UCO, and Corn Oil

The feedstock tabs contain the input worksheets for all the feedstocks listed above. This section provides details for the Soy Oil tab only. The other feedstock tabs are similar. The Soy Oil tab consists of the following major components (applies generally to **ALL** feedstock categories above with minor differences for the UCO and Tallow tabs):

- Section 1. Applicant Information for Soy Oil Production
- Section 2. Information for Soy Oil Production
- Section 3. Feedstock Inputs

Section 1: Applicant Information for Soy Oil Production

Begin by selecting the appropriate feedstock tab and entering the company and facility information, including the location of the feedstock processing facility. Details for entering data in all required fields are provided below.

Table D.1. List of input fields for Section 1 of the Simplified CI Calculator.

Field Name	Description
1.1. Company Name	Registered name of the company. Example “ABC Company, LLC” or “ABC Company, Inc.”
1.2. Company ID	Enter U.S. EPA Company ID. If not available, contact CARB for LCFS Company ID.
1.3. Facility ID	Enter the Company’s Facility ID. If not available, contact CARB for LCFS Facility ID.
1.4. Soy Oil Production Location	Enter City, State, and Country from where Soy Oil is sourced.

Section 2: Information for Soy Oil Production

Table D.2 lists the details of fields in Section 2 of the Soy Oil tab.

Table D.2. List of input fields for Section 2 of the Simplified CI Calculator.

Field Name	Description
2.1. Select Source of Feedstock	Field 2.1 (for soybean production) includes two choices in a pulldown menu: U.S. or User-Defined. If U.S. sourced soybean is selected, standard inputs are applied and no additional inputs are required for soybean farming. If User-Defined is selected, click on "Calculate" and Fields 2.2 and 2.3 will appear.
2.2. Specify source of Soybean	If user-defined is selected in field 2.1, input source of Soybeans in field 2.2 (i.e., country).
2.3. User Defined GHG Emission Factor of Electricity Mix for Farming, gCO₂e/kWh:	If user-defined is selected in field 2.1, input the GHG emission factor of user-defined electricity mix where farming practice occurs. This value is used to develop the EF of Farming (or oil extraction/rendering) in the next section 2.4
2. 4. User Defined GHG Emission Factor of Soybean Farming, gCO₂e/ton	If user-defined is selected in field 2.1, consult CARB staff to develop emission factors for soybean farming in gCO ₂ e/ton for the specific region and input in Field 2.4. Click on "Calculate" to update the sheet. Data sources for the User-Defined emission factors must be documented in the Supplemental Documentation attached with the Simplified CI Calculator. Note: Since farming is not applicable for UCO and Tallow, this option is not available on the tabs for these feedstocks.
2.5.Select Oil Extraction	Field 2.5 provides option to select either Standard or User-Defined oil extraction for Soy Oil. If standard is selected (applies for U. S. Facilities only), no additional input is required for oil extraction. Click on "Calculate" after either selection. For facilities electing to use User-Defined, consult with CARB staff to develop emission factor for oil extraction and input the emission factor in field 2.6. Note: UCO and Tallow tabs have an option for Standard or User-Defined rendering energy in lieu of oil extraction energy. Standard applies only to rendering facilities in the U. S. All facilities outside the U. S. must choose the User-Defined option. Facilities in the U. S. which can demonstrate site-specific rendering energy may elect to use the User-Defined option.
2 6. Enter Oil Extraction GHG Emission Factor, gCO₂e/lb. oil	This field is available for input only if User-Defined is selected in field 2.5. If User-Defined is selected in field 2.5, consult CARB staff to develop emission factors for oil extraction in gCO ₂ e/lb. oil for the specific region and input in field 2.6. Data sources for the User-Defined emission factors must be documented in the Supplemental Documentation attached with the

	Simplified CI Calculator.
2.7. Enter Oil Extraction Oil Extraction Energy, Btu/lb. oil	This field is available for input only if User-Defined is selected in field 2.4. If User-Defined is selected in field 2.4, consult CARB staff to develop an oil extraction energy factor in Btu/lb. oil for the specific region and input in field 2.7. Data sources for the User-Defined oil extraction energy must be documented in the Supplemental Documentation attached with the Simplified CI Calculator.
2.8. Select Ocean Tanker Size for Feedstock (Oil) Transport in Deadweight Ton (DWT)	This field is for applicants to select Standard Values for Ocean Tanker size at 22,500 DWT or User-Defined to define own size, and then click the Calculate button. If User-Defined is selected, enter the Ocean Tanker size in DWT.
2.9. Ocean Tanker Size GHG EF, gCO₂e/ton-mile	This field is available for input only if User-Defined is selected in field 2.8. If User-Defined is selected in field 2.8, consult CARB staff to develop an Ocean Tanker oil transport emission factor in gCO ₂ e/ton-mile and input in field 2.9. Data sources for the User-Defined emission factor must be documented in the Supplemental Documentation attached with the Simplified CI Calculator.

Section 3: Feedstock Inputs

Table D.3 lists the fields used in Section 3 of the Soy Oil tab in the Calculator.

Table D.3. List of input fields for Section 3 in the Soy Oil Tab of the Simplified CI Calculator

Field Name	Description
3.1. Monthly Data	Input the months and year(s) corresponding to the operational data provided.
3.2. Beginning Feedstock Inventory	Input monthly beginning feedstock inventory data (in lbs.) in field 3.2. Additional feedstock production details are provided below Table D.3.
3.3. Oil Received	Input monthly total feedstock purchased (in lbs.) in this field for all 24 months of operation.
3.4. Oil Used (Calculated)	Monthly feedstock used (in lbs.) is automatically calculated in field 3.4. No inputs are required for this Field.
3.5. Ending Feedstock Inventory	Input monthly total feedstock ending inventory (in lbs.) in this field for all 24 months of operation.
3.6. Moisture Content	Input monthly weighted average moisture content (in percentage) for feedstock in this field for all 24 months of operation. Utilize an industry standard moisture measurement protocol to report weighted average moisture.
3.7. Weighted average of oil transported by HDD Truck Note: For UCO tab, Field 3.7 reads as: 3.7. Weighted average of raw UCO or rendered oil transported by HDD Truck	Input monthly total feedstock transported by HDD truck (in lbs.) and monthly weighted average transport distance (in miles) by this mode in field 3.7. In the case of UCO, if rendered oil is sourced from a renderer, upstream transport distance to the renderer is not required to be input. If raw UCO is sourced directly from restaurants, only monthly weighted average transport distance from the restaurants to the rendering facility must be input. Additional feedstock transport details are provided below Table D.3.
3.8. Weighted average of oil transported by Ocean Tanker	Input monthly total feedstock transported by Ocean Tanker (in lbs.) and monthly weighted average transport distance (in miles) by this mode in field 3.8.
3.9. Weighted average of oil transported by Rail	Input monthly total feedstock transported by rail (in lbs.) and monthly weighted average transport distance (in miles) by this mode in field 3.9.
3.10. Weighted average of oil transported by Barge	Input monthly total feedstock transported by barge (in lbs.) and monthly weighted average transport distance (in miles) by this mode in field 3.10.

Additional details for Feedstock-Specific tab, Section 3

Feedstock Inputs (Fields 3.2-3.6)

For feedstock inputs, enter data for site-specific inputs for feedstock inventory to enable calculation of quantity of feedstock used in biofuel production. Cells which are grayed out are calculated values and do not require applicant input. The first input field is the monthly beginning inventory of feedstock (in lbs.). Input monthly totals for feedstock received (as purchased) in lbs. and total monthly ending feedstock inventory in lbs. The monthly total quantities must be inclusive of moisture and not reported on a dry basis. The inventory data are used to determine the total feedstock used for biofuel production.

Feedstock Transport (Fields 3.7-3.10)

Given the likelihood that a batch of feedstock transport may entail more than one mode of transport, staff suggests a calculation methodology detailed below. The example detailed is for Soy Oil transported to a biomass-based diesel production facility. The same suggested approach could be used for all feedstocks used in by a production facility.

The example lists five different batches of Soy Oil delivered to a biomass-based diesel facility. The Table provides details of individual transport modes for each batch received at the facility. The suggested calculation methodology includes direct transport by a single mode of transport, and also transport which includes more than one mode of transport to ship feedstock from the source to the biomass-based diesel production facility.

Actual soyoil (lbs.) transported by corresponding mode of transport and miles transported						
Modes of Transport						
	Truck	Miles	Rail	Miles	Barge	Miles
1	100,000	50	100,000	1,200		
2	200,000	150				
3			200,000	800		
4			100,000	200	100,000	250
5			50,000	1,000		
6						
7						
8						
Weighted average distance and corresponding quantities to be used for monthly reporting of feedstock						
	300,000	117	450,000	778	100,000	250
Example in sheet above:						
Entry 1	For the month, the facility received 100,000 lbs. by a mode which included 50 miles by truck followed by 1200 miles by rail					
Entry 2	For the month, the facility also received 200,000 lbs. by truck only with a transport distance of 150 miles					
Entry 3	For the month, the facility also received 200,000 lbs. by rail only with a transport distance of 800 miles					
Entry 4	For the month, the facility also received 100,000 lbs. which included 200 miles by rail followed by 250 miles by barge					
Entry 5	For the month, the facility also received 50,000 lbs. using only rail transport for a distance of 1000 miles					

For these scenarios, the facility shall report 300,000 lbs. of soy oil with a weighted average distance of 117 miles by HDD truck, 450,000 lbs. of soy oil with a weighted average distance of 778 miles by rail and 100,000 lbs. of soy oil with a weighted average distance of 250 miles by barge.

For transport of feedstock, applicants must calculate the appropriate mileage for each mode of transport as described below. For rail transport, mileage must be based on the rail network maps from either BNSF Railway¹ or Union Pacific.² For facilities which are not directly located on the BNSF or Union Pacific rail network, applicants may use a publicly available web-based driving distance estimator for the distance between the facility and the applicable rail depot. Truck transport distance between two points may be determined using a publicly available web-based driving distance estimator. Barge transport distance must be calculated using a reputable online mapping system, reported in miles.³ Nautical miles calculated by the online mapping system must be converted to miles using the conversion factor of 1 nautical mile/1.152 miles.⁴

¹ BNSF railway system: <http://www.bnsf.com/customers/where-can-i-ship/>

² Union Pacific system: <https://www.up.com/aboutup/usguide/index.htm>

³ Example of an online nautical distance mapping system: <https://www.marinetraffic.com/en/voyage-planner>

⁴ Nautical miles to miles conversion factor source: <http://www.metric-conversions.org/length/uk-nautical-miles-to-miles.htm>

E. Calculator Details – BD-Production Tab

The “BD-Production” tab contains the CI calculation worksheet for biodiesel production consisting of the following major components:

- Section 1. Application Information, Pathway Summary, and Estimated CI
- Section 2. Information for Biodiesel Production (FAME)
- CI Calculation Details

All CI values are calculated based on relevant site-specific inputs entered into the respective input fields. After all site-specific inputs for a given facility have been entered, the calculated CIs will represent the pathway CIs for the various streams as detailed in this tab and the “BD RD Summary” tab. Details for entering data in all required fields are included below.

Section 1: Application Information, Pathway Summary, and Estimated CI

Table E.1 includes fields requiring inputs related to applicant, facility location. This section also provides a summary of pathway CIs corresponding to inputs in the feedstock tabs and the BD-Production tab. All CI values are calculated based on relevant site-specific inputs which have to be entered in the respective input fields. Only after all site-specific inputs for a given facility have been entered will the calculated CIs represent the pathway CIs for the various streams as detailed in this tab.

Table E.1. List of input fields for Section 1 of the BD-Production tab.

Field Name	Description
1.1. Applicant	Registered name of the company. Example “ABC Company, LLC” or “ABC Company, Inc.”
1.2. Facility Location	Enter City, State, and Country of BD production facility.
1.3. Pathway Summary	Field to include a summary of the BD pathways such as “soy oil and tallow to BD”.
1.4. Provisional Application?	If available data is less than 24 months, select “Yes”, else “No”, and click “Calculate”. If “Provisional”, input available months of operational data starting in Month 1 of the Calculator (minimum three months of operational data required to meet provisional requirements).
1.5. Application Number	Enter the application number provided by the AFP.
1.6. Facility Number	Enter the Facility ID.
1.7. Application Date	Enter Application Date in the format MM/DD/YYYY

This section of the calculator contains the calculated CI results for BD pathways. The final results are displayed here after the data are entered and the user clicks the “Calculate” button.

Section 2: Information for Biodiesel Production (FAME)⁵

The following table lists the fields used in Section 2 of the BD-Production tab.

Table E.2. List of input fields for Section 2 of the BD-Production tab

Field Name	Description
<p>2.1. Regional Electricity Mix for Fuel</p>	<p>Choose the electricity mix corresponding to the zip code for the region where the BD production facility is located. The Calculator includes 26 eGRID zone mixes, U.S average Mix, Brazilian average mix, Canadian average mix and User Defined Mix included in the pull down menu. For facilities in the U. S., select one of 26 eGRID zones available for the U. S. These are selected based on zip code of the fuel production facility. After a selection, click the “Calculate” button. Additional electricity mix details are provided below Table E.2.</p>
<p>2.2 Enter GHG EF of Electricity Mix, gCO₂e/kWh</p>	<p>This field is highlighted only if “User-Defined Mix” is selected in field 2.1. This field requires input of emission factor for electricity mix corresponding to the location of the BD production facility. Consult with CARB staff to develop a user-defined emission factor for electricity mix. Data sources for User-Defined electricity mixes must be documented in the Supplemental Documentation attached with the Simplified CI Calculator.</p>
<p>2.3. Regional Crude Mix</p>	<p>Choose the source of crude mix from the pulldown menu based on location of BD production facility. After a selection, click the “Calculate” button. If selection is “U. S. Average Crude”, no additional input is required. If selection is “User Defined Crude”, consult with CARB staff to develop emission factor for crude and input in Field 2.4.</p>
<p>2.4. Enter GHG EF of Crude Sources, gCO₂e/MMBtu of Crude</p>	<p>This field is highlighted only if “User-Defined Crude” is selected in field 2.3. This field requires input of emission factor for crude corresponding to the location of the BD production facility. Consult with CARB staff to develop a user-defined emission factor for crude. Data sources for user-defined crude mixes must be documented in the Supplemental Documentation attached with the Simplified CI Calculator.</p>

⁵ FAME: Fatty Acid Methyl Esters (FAME) through a transesterification process by mixing fats and oils with an alcohol and a catalyst to create a reaction that produces biodiesel and other co-products.

2.5. Regional Natural Gas (NG) Source	<p>Choose the source of NG from the pulldown menu based on location of BD production facility. If selection is “U. S. Average NG”, no additional input is required. If selection is “User-Defined NG”, consult with CARB staff to develop emission factor for NG and input in Field 2.6. After a selection, click the “Calculate” button.</p>
2.6. Enter GHG EF of NG Sources, gCO₂e/MMBtu of NG	<p>This field is highlighted only if “User-Defined NG” is selected in field 2.5. This field requires input of emission factor corresponding to the location of the BD production facility. Consult with CARB staff to develop a site-specific emission factor for natural gas. Data sources for User-Defined NG mixes must be documented in the Supplemental Documentation attached with the Simplified CI Calculator.</p>
2.7. Monthly Data	<p>Input the months and year(s) corresponding to the operational data provided.</p>
2.8. Beginning Biodiesel Inventory (Gallons @ 60°F)	<p>Input monthly beginning inventory data for BD (gallons at 60°F) for all 24 months of operation.</p>
2.9. Biodiesel Produced (Calculated) (Gallons @ 60°F)	<p>Monthly fuel produced data (gallons at 60°F) in this field will be automatically calculated. No inputs are required for this field since these are calculated from inputs in fields 2.8 through 2.11.</p>
2.10. Ending Biodiesel Inventory (Gallons @ 60°F)	<p>Input monthly total ending inventory for BD (gallons at 60°F) in this field for all 24 months of operation.</p>
2.11. Biodiesel Sales (Gallons @ 60°F)	<p>Input monthly total sales data of BD (gallons at 60°F) in this field for all 24 months of operation.</p>
2.12. NG Use from Utility Invoices, (MMBtu in HHV)	<p>Input monthly total NG consumption data (MMBtu, HHV) in this field for all 24 months of operation.</p>
2.13. Electricity Use from Utility Invoices (kWh)	<p>Input monthly total electricity use (in kWh) in this field for all 24 months of operation.</p>

<p>2.14. Alternate Fuel Use</p>	<p>If another fuel source is used for fuel production, input monthly total use (lbs.) in field 2.14 for all 24 months of operation. This field may be used to adjust a quantity of energy input (such as natural gas) that is entered corresponding to invoices, if part of that input energy is exported from the fuel production facility (e.g., as steam exported to a collocated facility); the quantity of fuel exported may be entered with a negative value in field 2.14 to reduce the total energy consumption.</p>
<p>2.14.a. Alternate Fuel GHG Emission Factor</p>	<p>Consult with CARB staff to develop an appropriate emission factor (gCO₂e/lb.) for the alternate fuel and input in Field 2.14.a. Alternate fuel sources and data sources used in calculating emission factors must be described in detail in the Supplemental Documentation submitted with the Simplified CI Calculator. This description must at a minimum identify the alternative fuel and the source.</p>
<p>2.14.b. Conversion Factor from HHV to LHV</p>	<p>Consult with CARB staff to develop an appropriate conversion factor from HHV to LHV for the alternate fuel and input in Field 2.14.b. Alternate fuel sources and data sources used in this conversion factor must be described in detail in the Supplemental Documentation submitted with the Simplified CI Calculator.</p>
<p>2.15. Beginning Methanol Inventory</p>	<p>Input monthly inventory data for methanol (in lbs).</p>
<p>2.16. Methanol Used (Calculated)</p>	<p>Monthly methanol used data in this field will be automatically calculated. No inputs are required for this field.</p>
<p>2.17. Methanol Purchased</p>	<p>Input monthly total methanol purchased data (in lbs.) in this field for all 24 months of operation.</p>
<p>2.18. Ending Methanol Inventory</p>	<p>Input monthly total methanol ending inventory (in lbs.) in this field for all 24 months of operation.</p>
<p>2.19. Distillate Bottoms Production (moisture corrected)</p>	<p>Input monthly total distillate bottoms production (in lbs.) in this field for all 24 months of operation. To ensure co-product credit, appropriate evidence of end-use of the co-product must be demonstrated in the Supplemental Documentation submitted with the Simplified CI Calculator. If part of the distillate bottoms are used as process fuel, co-product credit will not be offered for the fraction used as process fuel. The exported co-product will be credited provided that there is evidence of its end use disposition for useful purpose.</p>

<p>2.19.a. Energy Density Factors for Coproducts (Btu/lb., LHV)</p>	<p>Consult with CARB staff to develop the appropriate energy density factor for distillate bottoms, free fatty acids and other co-products, as applicable, for co-product credit (Btu/lb. for LHV). Enter it in Field 2.19.a. below the monthly inputs. To ensure co-product credit, appropriate evidence of end-use of all co-products must be demonstrated in the Supplemental Documentation submitted with the Simplified CI Calculator. Co-product credit will not be offered for any co-products used as a process fuel, and the energy density value for each co-product used as a process fuel must be input as zero.</p>
<p>2.20. Free Fatty Acids Production (moisture corrected)</p>	<p>Input monthly total free fatty acids production (in lbs.) in this field for all 24 months of operation. To ensure co-product credit, appropriate evidence of end-use of the co-product must be demonstrated in the Supplemental Documentation submitted with the Simplified CI Calculator. If part of the free fatty acids are used as process fuel, co-product credit will not be offered for the fraction used as process fuel. The exported product will be credited provided that there is evidence of its end use disposition for useful purpose.</p>
<p>2.21. Glycerin Production (moisture corrected)</p>	<p>Monthly total glycerin produced (in lbs.) must be input in this field for all 24 months of operation. To ensure co-product credit, appropriate evidence of end-use of all co-products need to be demonstrated in the Supplemental Documentation submitted with the Simplified CI Calculator. If part of the glycerin is used as process fuel, co-product credit will not be offered for the fraction used as process fuel. The exported co-product will be credited provided that there is evidence of its end use disposition for useful purpose.</p>
<p>2.22. Other Co-products (Specify here)</p>	<p>Monthly total “other” co-product production (in lbs.) must be input in this field for all 24 months of operation. Enter the name of the “other” co-product above the monthly inputs in cell P21. To ensure co-product credit, appropriate evidence of end-use of all co-products need to be demonstrated in the Supplemental Documentation submitted with the Simplified CI Calculator. If part of the “Other” co-product is used as process fuel, co-product credit will not be offered for the fraction used as process fuel. The exported co-product will be credited provided that there is evidence of its end use disposition for useful purpose.</p>
<p>2.23. Biodiesel Transportation</p>	<p>No inputs are required for field 2.23. Additional biodiesel transportation details are provided below Table E.2.</p>
<p>2.23.a. By HDD Truck to port/ rail yard</p>	<p>Input miles transported by HDD truck from BD production facility to either a port or rail yard for further transport.</p>
<p>2.23.b. By HDD Truck to blending terminal</p>	<p>Input miles transported by HDD truck to final blending terminal.</p>

<p>2.23.c. By Rail</p>	<p>Input miles transported by rail to blending terminal. The point of origin for rail transport is either from a loading dock at the BD production facility or a point where BD is transported from the production facility by HDD truck to a railyard (as described in field 2.23.a).</p>
<p>2.23.d. By Ocean Tanker</p>	<p>Select ocean tanker size options of either a standard value (22,500 DWT) or a user-defined tanker size, and then click the Calculate button. Then input miles transported by Ocean Tanker to a blending terminal in California. If User-Defined is selected, consult CARB staff to develop an Ocean Tanker BD transport emission factor in gCO₂e/gallon BD-mile and input in field 2.23.d. Data sources for the User-Defined emission factor must be documented in the Supplemental Documentation attached with the Simplified CI Calculator. The point of origin for ocean transport is either from a loading dock at the BD production facility or a point where BD is transported from the production facility by HDD truck to a port (as described in field 2.23.a).</p>
<p>2.23.e. By Barge</p>	<p>Input miles transported by barge to blending terminal. The point of origin for barge transport is either from a loading dock at the BD production facility or a point where BD is transported from the production facility by HDD truck to a port (as described in field 2.23.a).</p>

Additional details for BD Production Tab, Section 2

Electricity Mix (field 2.1)

The applicant must select a regional electricity mix for biodiesel production from "Electricity Mix Region for Fuel". The dropdown menu consists of 30 subregions (26 from the U.S based on eGRID2014v2 ⁶ one from Brazil, one from Canada, one representing the U.S average, and one for User-Defined region⁷).

Biodiesel Transportation (field 2.23)

For transport of finished fuel to California, applicants must input the appropriate transport distance by HDD truck, by Rail, by Ocean Tanker and by Barge, as applicable. Emissions from transport modes are additive to reflect all legs of transport of finished fuel to California.

Note: For applicants who expect to use various combinations of transport modes to ship fuel to California, staff suggests calculating the CIs for each combination and inputting the combination with the highest CI in the Simplified CI Calculator to prevent unintentional exceedance of the pathway CI. The supplemental documentation provided with the application must include the CIs for each of the anticipated combinations and highlight the combination used in the Calculator.

CI Calculation Details

This section contains an example pathway CI calculation with a detailed breakdown of all calculations used for CI determination based on information entered by the user and applicable reference data. These calculations are included below section 2 in the BD production tab.

⁶ United States Environmental Protection Agency, 11th edition of the Emissions & Generation Resource Integrated Database with year 2014 data (eGRID2014v2, released February 27, 2017): https://www.epa.gov/sites/production/files/2017-02/documents/egrid2014_summarytables_v2.pdf

⁷ Applicants must consult CARB staff to develop emission factors for User-Defined electricity.

F. Calculator Details – RD-Production Tab

The “RD-Production” tab contains the CI calculation worksheet consisting of the following major components:

- Section 1. Application Information, Pathway Summary, and Estimated CI
- Section 2. Renewable Diesel Production Data (via Hydrotreating)
- Section 3: CI Calculation Details

All CI values are calculated based on relevant site-specific inputs entered in the respective input fields. After all site-specific inputs for a given facility have been entered, the calculated CIs will represent the pathway CIs for the various streams as detailed in this tab and in the “BD RD Summary” tab. Details for entering data in all required fields is detailed below.

Section 1: Applicant Information, Pathway Summary, and Estimated CI

Table F.1 includes fields requiring inputs related to applicant, facility location. This section also provides a summary of pathway CIs corresponding to inputs in the feedstock tabs and the RD-Production tab. All CI values are calculated based on relevant site-specific inputs which have to be entered in the respective input fields. Only after all site-specific inputs for a given facility have been entered, the calculated CIs will represent the pathway CIs for the various streams as detailed in this tab.

Table F.1. List of input fields for Section 1 of the RD-Production Tab.

Field Name	Description
1.1. Applicant	Registered name of the company. Example "ABC Company, LLC" or "ABC Company, Inc."
1.2. Facility Location	Enter City, State, and Country of RD production facility.
1.3. Pathway Summary	Field to include a summary of the RD pathways such as "soy oil and tallow to RD".
1.4. Provisional Application?	If available data is less than 24 months, select "Yes", else "No", and click "Calculate". If "Provisional", input available months of operational data starting in Month 1 of the Calculator (minimum three months of operational data required to meet provisional requirements).
1.5. Application Number	Enter the application number provided by the AFP.
1.6. Facility Number	Enter the Facility ID.
1.7 Application Date	Enter application date in the format MM/DD/YYYY

Section 2: Renewable Diesel Production Data (via Hydrotreating)

The following table lists the fields used in Section 2 of the RD-Production tab.

Table F.2. List of input fields for Section 2 of the RD-Production tab

Field Name	Description
<p>2.1. Regional Electricity Mix for Fuel</p>	<p>Choose the electricity mix corresponding to the zip code for the region where the RD production facility is located. The Calculator includes 26 eGRID zone mixes, Brazilian average mix, Canadian average mix and User Defined Mix included in the pull down menu. For facilities in the U. S., select one of 26 eGRID zones available for the U. S. These are selected based on zip code of the fuel production facility. After a selection, click the “Calculate” button. Additional electricity mix details are provided below Table F.2.</p>
<p>2.2. Enter GHG EF of Electricity Mix, gCO₂e/kWh</p>	<p>This field is highlighted only if “User-Defined Mix” is selected in field 2.1. This field requires input of emission factor for electricity mix corresponding to the location of the RD production facility. Consult with CARB staff to develop a user-defined emission factor for electricity mix. Data sources for User-Defined electricity mixes must be documented in the Supplemental Documentation attached with the Simplified CI Calculator.</p>
<p>2.3. Regional Crude Mix</p>	<p>Choose the source of crude mix from the pulldown menu based on location of RD production facility. After a selection, click the “Calculate” button. If selection is “U. S. Average Crude”, no additional input is required. If selection is “User Defined Crude”, consult with CARB staff to develop emission factor for crude and input in Field 2.4.</p>
<p>2.4. Enter GHG EF of Crude Sources, gCO₂e/MMBtu of Crude</p>	<p>This field is highlighted only if “User-Defined Crude” is selected in field 2.3. This field requires input of emission factor for crude corresponding to the location of the RD production facility. Consult with CARB staff to develop a user-defined emission factor for crude. Data sources for user-defined crude mixes must be documented in the Supplemental Documentation attached with the Simplified CI Calculator.</p>
<p>2.5. Regional Natural Gas (NG) Source</p>	<p>Choose the source of NG from the pulldown menu based on location of RD production facility. If selection is “U. S. Average NG”, no additional input is required. If selection is “User-Defined NG”, consult with CARB staff to develop emission factor for NG and input in Field 2.6. After a selection, click the “Calculate” button.</p>

<p>2.6. Enter GHG EF of NG Sources, gCO₂e/MMBtu of NG</p>	<p>This field is highlighted only if “User-Defined NG” is selected in field 2.5. This field requires input of emission factor corresponding to the location of the RD production facility. Consult with CARB staff to develop a site-specific emission factor for NG. Data sources for User-Defined NG sources must be documented in the Supplemental Documentation attached with the Simplified CI Calculator.</p>
<p>2.7. Monthly Data</p>	<p>Input the months and year(s) corresponding to the operational data provided.</p>
<p>2.8. Beginning Renewable Diesel Inventory (Gallons @ 60°F)</p>	<p>Input monthly beginning inventory data for RD (gallons at 60°F) for all 24 months of operation.</p>
<p>2.9. Renewable Diesel Produced (Gallons @ 60°F) (Calculated)</p>	<p>Monthly fuel produced data (gallons at 60°F) in this field will be automatically calculated. No inputs are required for this field since these are calculated from inputs in fields 2.8 through 2.11.</p>
<p>2.10. Ending Renewable Diesel Inventory (Gallons @ 60°F)</p>	<p>Input monthly total ending inventory data for RD (gallons at 60°F) in this field for all 24 months of operation.</p>
<p>2.11. Renewable Diesel Sales (Gallons @ 60°F)</p>	<p>Input monthly total sales data of RD (gallons at 60°F) in this field for all 24 months of operation.</p>
<p>2.12. NG Use from Utility Invoices</p>	<p>Input monthly total NG consumption data (in MMBtu, HHV) in this field for all 24 months of operation.</p>
<p>2.13. Electricity Use from Utility Invoices</p>	<p>Input monthly total electricity use (in kWh) in this field for all 24 months of operation.</p>
<p>2.14. Alternate Fuel Use</p>	<p>If another fuel source is used for fuel production, input monthly total use (lbs.) in field 2.14 for all 24 months of operation. This field may be used to adjust a quantity of energy input (such as natural gas) that is entered corresponding to utility invoices, if part of that input energy is exported as a co-product from the fuel production facility (e.g., as steam exported to a collocated facility); the quantity of fuel exported may be entered with a negative value in field 2.14 to reduce the total energy consumption.</p>

<p>2.14.a. Alternate Fuel GHG Emission Factor</p>	<p>Consult with CARB staff to develop an appropriate emission factor (gCO₂e/lb.) for the alternate fuel and input in Field 2.14.a. Alternate fuel sources and data sources used in calculating emission factors must be described in detail in the Supplemental Documentation submitted with the Simplified CI Calculator. This description must at a minimum identify the alternative fuel and the source.</p>
<p>2.14.b. Conversion Factor from HHV to LHV</p>	<p>Consult with CARB staff to develop an appropriate conversion factor from HHV to LHV for the alternate fuel detailed in 2.14 and input this value in Field 2.14.b. Alternate fuel sources and data sources used in this conversion factor must be described in detail in the Supplemental Documentation submitted with the Simplified CI Calculator.</p>
<p>2.15. Hydrogen Use</p>	<p>Input monthly Hydrogen use (in cubic feet) from grid data in this field for all 24 months of operation.</p>
<p>2.16. Light Hydrocarbon Production</p>	<p>Input monthly production for light hydrocarbon production (in MMBtu, HHV.) in this field for all 24 months of operation. To ensure co-product credit, appropriate evidence of end-use of the co-product must be demonstrated in the Supplemental Documentation submitted with the Simplified CI Calculator. If part of light hydrocarbons are used as process fuel, co-product credit will not be offered for the fraction used as process fuel. The exported co-product will be credited provided that there is evidence of its end use disposition for useful purpose.</p>
<p>2.16.a Conversion Factor from HHV to LHV for cell J51</p>	<p>Consult with CARB staff to develop an appropriate conversion factor from HHV to LHV for the light hydrocarbon stream detailed in 2.16 and input this value in Field 2.16.a. Alternate fuel sources and data sources used in this conversion factor must be described in detail in the Supplemental Documentation submitted with the Simplified CI Calculator.</p>
<p>2.17. Renewable Naphtha Production</p>	<p>Input monthly production for renewable naphtha production (in gallons) in this field for all 24 months of operation. To ensure co-product credit, appropriate evidence of end-use of the co-product must be demonstrated in the Supplemental Documentation submitted with the Simplified CI Calculator. If part of the renewable naphtha is used as a process fuel, co-product credit will not be offered for the fraction used as process fuel. The exported co-product will be credited provided that there is evidence of its end use disposition for useful purpose.</p>

<p>2.17.a. Energy Density For Other Co-Products (Btu/gal) in LHV</p>	<p>Consult with CARB staff to develop the appropriate energy density factor for renewable naphtha, renewable propane, jet fuel or other fuel co-products, as applicable, for co-product credit (Btu/lb. for LHV). Enter it in Field 2.17.a. below the monthly inputs. To ensure co-product credit, appropriate evidence of end-use of all co-products must be demonstrated in the Supplemental Documentation submitted with the Simplified CI Calculator. Co-product credit will not be offered for any co-products used as a process fuel, and the energy density value for each co-product used as a process fuel must be input as</p>
<p>2.18. Renewable Propane Production</p>	<p>Input monthly production for renewable propane production (in gallons) in this field for all 24 months of operation. To ensure co-product credit, appropriate evidence of end-use of the co-product must be demonstrated in the Supplemental Documentation submitted with the Simplified CI Calculator. If part of the renewable propane is used as a process fuel, co-product credit will not be offered for the fraction used as process fuel. The exported co-product will be credited provided that there is evidence of its end use disposition for useful purpose.</p>
<p>2.19. Jet Fuel or Other</p>	<p>Input monthly production for jet or other fuel production (in gallons) in this field for all 24 months of operation. Enter the name of the “other” co-product above the monthly inputs in cell M25. To ensure co-product credit, appropriate evidence of end-use of the co-product must be demonstrated in the Supplemental Documentation submitted with the Simplified CI Calculator. If part of the jet (or other fuel) is used as a process fuel, co-product credit will not be offered for the fraction used as process fuel. The exported co-product will be credited provided that there is evidence of its end use disposition for useful purpose. Users shall input applicable unit for the “Other” co-products</p>
<p>2.20. RD Transportation</p>	<p>No inputs are required for field 2.20.</p>
<p>2.20.a. By HDD Truck to port/yard</p>	<p>Input miles transported by HDD truck from RD production facility to either a port or rail yard for further transport. Additional RD transportation details are provided below Table F.2.</p>
<p>2.20.b. By HDD Truck to blending terminal</p>	<p>Input miles transported by HDD truck to final blending terminal.</p>
<p>2.20.c. By Rail</p>	<p>Input miles transported by rail to blending terminal. The point of origin for rail transport is either from a loading dock at the RD production facility or a point where RD is transported from the production facility by HDD truck to a railyard (as described in field 2.20.a).</p>

<p>2.20.d. By Ocean Tanker</p>	<p>Select ocean tanker size options of either a standard value (22,500 DWT) or a user-defined tanker size, and then click the Calculate button. Then input miles transported by Ocean Tanker to a blending terminal in California. If User-Defined is selected, consult CARB staff to develop an Ocean Tanker RD transport emission factor in gCO₂e/gallon RD-mile and input in field 2.23.d. Data sources for the User-Defined emission factor must be documented in the Supplemental Documentation attached with the Simplified CI Calculator. The point of origin for ocean transport is either from a loading dock at the RD production facility or a point where RD is transported from the production facility by HDD truck to a port (as described in field 2.20.a).</p>
<p>2.20.e. By Barge</p>	<p>Input miles transported by barge to blending terminal. The point of origin for barge transport is either from a loading dock at the RD production facility or a point where RD is transported from the production facility by HDD truck to a port (as described in field 2.20.a).</p>

Additional details for RD Production Tab, Section 2

Electricity Mix (field 2.1)

The applicant must select a regional electricity mix for renewable diesel production from Electricity Mix Region for Fuel”. The dropdown menu consists of 30 subregions (26 from the U.S based on eGRID2014v2⁸, one from Brazil, one from Canada, one representing the U. S. average, and one for User-Defined region⁹).

Renewable Diesel Transportation (field 2.20)

For transport of finished fuel to California, applicants must input the appropriate transport distance by HDD truck, by Rail, by Ocean Tanker and by Barge, as applicable. Emissions from transport modes are additive to reflect all legs of transport of finished fuel to California.

Note: For applicants who expect to use various combinations of transport modes to ship fuel to California, staff suggests calculating the CIs for each combination and inputting the combination with the highest CI in the Simplified CI Calculator. The supplemental documentation provided with the application must include the CIs for each of the anticipated combinations and highlight the combination used in the Calculator.

⁸ United States Environmental Protection Agency, 11th edition of the Emissions & Generation Resource Integrated Database with year 2014 data (eGRID2014v2, released February 27, 2017): https://www.epa.gov/sites/production/files/2017-02/documents/egrid2014_summarytables_v2.pdf

⁹ Applicants must consult CARB staff to develop emission factors for User-Defined electricity.

CI Calculation Details

This section contains an example pathway CI calculation with a detailed breakdown of all calculations used for CI determination based on information entered by the user and applicable reference data. These calculations are below Section 2 in the RD production tab.