Instruction Manual

Tier 1 CI Calculator for Biodiesel

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State of Oregon
DEQ Department of Environmental Quality

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Introduction

This document provides detailed instructions for the Tier 1 CI Calculator for Biodiesel (T1 BD Calculator) to calculate the carbon intensity (CI) of BD produced from up to 20 unique feedstocks for use as a transportation fuel in Oregon.

Click here to download the T1 BD Calculator

The T1 BD Calculator requires the applicant to enter monthly operational data for feedstock types and quantities, fuel production quantities, and transport distances.

T1 BD Calculator overview

Table 1 provides a summary of the worksheets present in the Tier 1 HEFA BD Calculator.

Table 1: T1 BD Calculator Worksheet Overview

Worksheet Name	Description
Introduction	Introduction to the T1 HEFA Calculator.
Feedstock Inputs	Worksheet for feedstock data entry.
Biodiesel Production Inputs	Worksheet for fuel production data entry.
Pathway Summary	Worksheet that displays fuel production quantities, calculates CIs, and site-specific operating conditions.
OR-GREET4.0	Worksheet for predefined input values, emission factors, fuel specifications, and unit conversion values from the OR-GREET4.0 model.

The cells in the T1 BD calculator have various fill colors per the legend below:

User Input
Calculated Value
OR-GREET4.0 Value

To calculate the fuel pathway CI, the user must enter site-specific data into “User Input” fields if that field is relevant to the fuel pathway. If the input field is not relevant to the fuel pathway, it may be left blank or hidden by deselecting the input checkboxes located in Sections 1 and 4.

All User Inputs are subject to verification as part of initial pathway certification and annual fuel pathway reporting. If a fuel pathway has additional emissions inside the system boundary that

are not captured in the User Input fields, a Tier 2 application is required to document and account for those emissions.

“Calculated Value” cells contain formula that provide a calculated value based on user input data or OR-GREET4.0. In some instances, a “Calculated Value” cell may display a blank value if that input is not relevant or insufficient user input data has been entered.

“OR-GREET4.0” cells contain input values from the OR-GREET4.0 model. Calculated Value formula and OR-GREET4.0 values cannot be modified without prior approval from DEQ and may elevate the pathway to a Tier 2 application.

Feedstock inputs

The Feedstock Inputs worksheet contains fields for entering information or up to 20 feedstocks, yielding CIs for up to 80 fuel pathways per application. At the top of the Feedstock Inputs worksheet are two drop-down menus that allows the user to specify the number of feedstocks in the pathway and navigate to a given feedstock.

For each individual feedstock, the worksheet consists of the following sections:

- Section 1. Static Feedstock Inputs
- Section 2. Monthly Feedstock Inputs

Table 2: Instructions for Section 1 - Static Feedstock Inputs

Field Name	Instructions
1.1.x Feedstock Type	Using the drop-down menu, select the feedstock type. If “Other (Specify Below)” is selected, specify the feedstock in the cell below the drop-down menu.
1.2.x Feedstock Origin	Using the drop-down menu, select the origin of the feedstock. If “Other (Specify Below)” is selected, specify the feedstock origin in the cell below the drop-down menu.
1.3.x Production EF (gCO_2e/dry lb oil)	Using the drop-down menu, select a default or site-specific production emission factor (EF). This EF is a composite of farming, transport and oil extraction or rendering emissions per unit of feedstock. If a predefined production EF is not available, consult with DEQ to develop an EF. Site-specific extraction or rendering EFs require validation and verification of the extraction or rendering facility’s operational data.
1.4.x Transport Modes	Select the transport mode(s) from processing facility to production facility.
1.5.x Ocean Tanker EF (gCO_2e/lb-mile oil)	If ocean tanker transport is selected in field 1.4.x, use the drop-down menu to select the ocean tanker. If user-defined has been selected, consult with DEQ to develop an EF.

Section 2 inputs (Table 3) must be entered for each month of the operational data period.

Table 3: Instructions for Section 2 - Monthly Feedstock Inputs

Field Name	Instructions
2.1.x Reporting Month (MM/YYYY)	This section will be automatically populated with each month of operational data entered in Field 6.1.
2.2.x Feedstock Inventory - Stored at Fuel Production Facility - Beginning Inventory (lbs)	Enter the quantity of feedstock stored at the fuel production facility the first day of each month.
2.3.x Feedstock Inventory - Stored at Fuel Production Facility - Ending Inventory (lbs)	Enter the quantity of feedstock stored at the fuel production facility the last day of each month.
2.4.x Feedstock Inventory - Delivered to Fuel Production Facility - Weight (lbs)	Enter the quantity of feedstock delivered to the fuel production facility.
2.5.x Feedstock Inventory - Delivered to Fuel Production Facility - Moisture (%)	Enter the weighted average moisture content for feedstock delivered to the fuel production facility.
2.6.x Feedstock Transport - Truck - Weight (lbs)	Enter the quantity of feedstock transported by truck.
2.7.x Feedstock Transport - Truck - Distance (miles)	Enter the distance for feedstock transport from the point of origin to the fuel production facility by truck using a publicly available distance estimator tool that reflects the actual transport route. If feedstock is transported from multiple origins, a weighted average distance may be calculated, or the mileage of the farthest route may be applied.
2.8.x Feedstock Transport - Rail - Weight (lbs)	Enter the quantity of feedstock transported by rail.
2.9.x Feedstock Transport - Rail -Distance (miles)	Repeat instructions in 2.7.x for feedstock transported by rail.
2.10.x Feedstock Transport - Barge - Weight (lbs)	Enter the quantity of feedstock transported by barge.
2.11.x Feedstock Transport - Barge - Distance (miles)	Repeat instructions in 2.7.x for feedstock transported by barge.
2.12.x Feedstock Transport – Ocean Tanker - Weight (lbs)	Enter the quantity of feedstock transported by ocean tanker.
2.13.x Feedstock Transport – Ocean Tanker - Distance (miles)	Repeat instructions in 2.7.x for feedstock transported by ocean tanker.

Biodiesel production inputs

The Biodiesel Production Inputs worksheet consists of the following major components:

- Section 3. Application Information
- Section 4. Pathway Inputs
- Section 5: Static Operational Data
- Section 6: Monthly Operational Data

Table 4: Instructions for Section 3 - Application Information

Field Name	Instructions
3.1 Application Number	Enter the application number provided by the Alternative Fuels Portal (AFP).
3.2 Company Name	Enter the company name as entered in the AFP.
3.3 Company ID	Enter the company ID as generated by the AFP. If not available, contact DEQ staff for Company ID.
3.4 Facility ID	Enter U.S EPA Facility ID. If not available, contact DEQ.

Section 4 inputs (Table 5) provide the option to select only input fields that apply to a given pathway. Unselected inputs in Section 4 do not require corresponding user entries in Sections 5 and 6 of the worksheet.

Table 5: Instructions for Section 4 - Pathway Inputs

Field Name	Instructions
4.1 Process Energy	Select the types of process energy used by the fuel production facility.
4.2 Exported Coproducts	Select co-products exported from the fuel production facility.
4.3 Biodiesel Transport Modes	Select the transport modes of the BD to Oregon fueling stations.

Table 6: Instructions for Section 5 - Static Operational Data

Field Name	Instructions
5.1 Electricity Grid Region	If the BD production facility uses grid electricity, select the electricity mix corresponding to the eGRID region where the facility is located. A map of eGRID zones is provided in the

Field Name	Instructions
	"OR-GREET4.0" worksheet. The eGRID region may also be determined using the eGRID Power Profiler tool.[1]
5.2 Electricity Grid EF (gCO_2e/kWh)	The grid electricity EF will be displayed based on the selection for Field 5.1. If User-Defined is selected in Field 5.1, consult with DEQ to develop an emission factor for a user-defined grid electricity mix.
5.3 Low-CI Electricity EF (gCO_2e/kWh)	Consult with DEQ to develop an emission factor for the low-CI electricity used by the biodiesel production facility. Low-CI electricity must be physically supplied directly to the production facility. The low-CI electricity source and all data sources used in calculating emission factors must be described in detail in the Supplemental Documentation submitted with the fuel pathway application.
5.4 Alternative Fuel Type	Specify fuel type if another fuel source is used for fuel production. Alternate fuel source must be described in detail in the Supplemental Documentation submitted with the fuel pathway application.
5.5 Alternative Fuel EF ($gCO_2e/MMBtu$, HHV)	Consult with DEQ to develop an emission factor for the alternate fuel. Alternate fuel emission factors must be described in detail in the Supplemental Documentation submitted with the application.
5.6 Free Fatty Acid Heating Value (Btu/lb, LHV)	Consult with DEQ to develop site-specific heating value(s). Heating value sampling and analysis must be described in detail in the Supplemental Documentation submitted with the application.
5.7 Distillate Bottoms Heating Value (Btu/lb, LHV)	
5.8 User-Defined Coproduct Heating Value (Btu/lb, LHV)	
5.9 Biodiesel Transport - Truck (miles)	Enter the distance for BD transport by truck using a publicly available distance estimator tool that reflects the actual transport route. If BD is transported to multiple destinations, a weighted average distance may be calculated, or the mileage of the farthest route may be applied.
5.10 Biodiesel Transport - Rail (miles)	Repeat instructions in Field 5.9 for BD transported by rail.
5.11 Biodiesel Transport - Barge (miles)	Repeat instructions in Field 5.9 for BD transported by barge.
5.12 Biodiesel Transport - Ocean Tanker (miles)	Repeat instructions in Field 5.9 for BD transported by ocean tanker.

[1] United States Environmental Protection Agency, *eGRID Power Profiler tool*. (Updated on June 5, 2023). https://www.epa.gov/egrid/power-profiler#/

Field Name	Instructions
5.13 Ocean Tanker EF (gCO_2e/gallon-mile oil)	If ocean tanker has been selected in Section 4, select from the drop-down the default ship size of 22,500 DWT or user defined. If user-defined has been selected, consult with DEQ to develop an EF.

Section 6 inputs (Table 7) must be entered for each month of the operational data period. Any gaps in data reporting must comply with the Missing Data Provisions in OAR 340-253-0450(13).

Quantities entered should be inclusive of the entire fuel production facility; quantities used by the facility that are outside the fuel pathway system boundary may only be excluded with written permission from DEQ.

Table 7. Instructions for Section 6: Monthly Operational Data

Field Name	Instructions
6.1 Reporting Month (MM/YYYY)	Enter the 24 consecutive months of the most recent operational data available for the biodiesel production facility. Applications must not have an interval of greater than 3 months between the end of the operational data month and the date of submission. For fuel production facilities that have been in operation less than 24 months, or that have undergone a major modification, the operational data submitted is permitted to range from 3 to 24 months.
6.2 North American Natural Gas (MMBtu, HHV)	Enter the quantity of natural gas (NG) sourced from a common carrier NG pipeline in North America. For alternate NG sources, use Field 6.5.
6.3 Grid Electricity (kWh)	Enter the quantity of electricity sourced from the grid.
6.4 Directly-Supplied Low-CI Electricity (kWh)	Enter the quantity of low-CI electricity supplied directly.
6.5 Alternate Fuel (MMBtu, HHV)	Enter the quantity of alternate fuel used by the BD production facility.
6.6 Beginning Methanol Inventory (gallons @ 60°F)	Enter the quantity of methanol stored at the BD production facility the first day of each month.
6.7 Methanol Purchased (gallons @ 60°F)	Enter the quantity of methanol purchased.
6.8 Ending Methanol Inventory (gallons @ 60°F)	Enter the quantity of methanol stored at the BD production facility the last day of each month.
6.9 Free Fatty Acids (dry lbs)	Enter the quantity of free fatty acids exported outside the fuel pathway. The mass and energy content associated with the reported quantity of this coproduct cannot be used in any way by the fuel pathway.
6.10 Glycerin (dry lbs)	Repeat instructions in Field 6.9 for glycerin.

Field Name	Instructions
6.11 Distillate Bottoms (dry lbs)	Repeat instructions in Field 6.9 for distillate bottoms.
6.12 Alternate Coproduct (dry lbs)	Repeat instructions in Field 6.9 for any alternate coproduct.
6.13 BD Beginning Inventory (gallons @ 60°F)	Enter the quantity of BD stored at the fuel production facility on the first day of the month.
6.14 BD Ending Inventory (gallons @ 60°F)	Enter the quantity of BD stored at the fuel production facility on the last day of the month.
6.15 BD Sales (gallons @ 60°F)	Enter the quantity of BD sold by the fuel production facility.

Pathway summary worksheet

The Pathway Summary worksheet calculates the CI of each fuel pathway from operational data and user selections in the Feedstock Inputs and Biodiesel Production Inputs worksheets.

The top section of this worksheet (Applicant Information and Biodiesel Production Quantities) provides application identification information and a summary of the total feedstock used and fuel produced by the facility.

The Carbon Intensity Calculations section provides a summary of each fuel production stage inputs along with its calculated emissions and stage-specific CI contributions. The CIs are then summed to provide a CI associated with each BD pathway. The applicant may opt to apply a conservative margin of safety to the fuel pathway CI to ensure that the pathway remains compliant with certified CIs.

The final section of this worksheet provides a space for DEQ staff to publish Operating Conditions associated with the pathway. A completed version of this worksheet is shared with the applicant for review and approval prior to pathway certification.

OR-GREET4.0 worksheet

The OR-GREET4.0 Worksheet contains predefined input values from the OR-GREET4.0 model. These input values cannot be modified without written permission from DEQ, which will elevate the application to a Tier 2 pathway.