USER-INSTRUCTIONS
DRAFT SIMPLIFIED CI CALCULATOR
—
Sugarcane-Derived Ethanol
Version posted August 4, 2017

This document includes an overview of the input fields in the draft Simplified CI Calculator for Tier 1 sugarcane ethanol pathway applications, which could be used to determine the carbon intensity (CI) value for ethanol produced from cane juice and/or molasses in Brazil. Staff requests stakeholder review and feedback on the draft calculator.

Download the draft Simplified CI Calculator here:
https://www.arb.ca.gov/fuels/lcfs/lcfs_meetings/sugarcane_etoh_calculator.xlsm

The draft calculator has been automated to perform CI calculations using the current, Board-approved version of the CA-GREET 2.0 model and is available as a spreadsheet download from the LCFS meetings page. Once staff has developed the new CA-GREET 3.0 model, the Simplified CI Calculator will be updated to determine CI values using that model. The calculator would potentially replace the existing Tier 1 calculator and the operational data template that are currently required in pathway application packages. All yellow cells are site-specific and staff suggests that all data entered in them should be subject to verification. Most site-specific inputs require 24 months of data (except finished fuel transport) in the Calculator. The calculator requires the applicant provide facility information and verifiable feedstock information, operational energy use data, fuel and co-product production data, and feedstock and finished fuel transport distance by mode, all of which are used in calculating the CI of sugarcane-derived ethanol pathways.

The tab labeled Reference includes standard values and assumptions used in the calculation of CI for this fuel pathway. The applicant should start at the tab labeled "Calculator" and enter the company name (cell E1) and the physical address of the fuel production facility (cell 1) in the top row.

Inputs Related to Feedstock Production

In cell D5, the applicant would click the pull-down menu and either accept a fixed value for mechanized harvesting or choose the site-specific mechanized harvest option. Selecting standard mechanized harvesting will grey-out cells G9-G32, signifying that this is no longer a site-specific input. The applicant would then click F9 to refresh the sheet. Applicants who select site-specific would be required to input monthly weighted average mechanized harvesting percentage in cells G9-G32. ARB staff, in collaboration with Brazilian producers, will provide guidance to demonstrate mechanized harvest fractions for applicants who elect to use site-specific mechanized harvesting option.

The applicant would then input information related to sourcing and transport of feedstock. Applicants would enter monthly total quantities of cane sourced from self-owned farms in cells B9-B32 (metric tons). In cells C9-C32, applicants would then enter the monthly weighted average transport distance of cane sourced from self-owned farms to the ethanol facility (km). Monthly total quantities of cane purchased from other farms would be input in cells D9-D32 (metric tons). The monthly weighted average transport distance associated with cane sourced from other farms would be input in cells E9-E32 (km).

For applicants who choose the standard mechanized harvesting percentage option from the pull-down menu in cell D5, the "Mechanized Harvesting" cells G9-G32 will be greyed out and this input will not be subject to verification. If the applicant chooses the site-specific fraction from the pull-down menu, the applicant would enter monthly weighted mechanized harvesting fractions in cells G9-G32.

Moving to the right in the sheet, applicants would provide monthly total bagasse purchased from external mills and monthly bagasse sourced as inter-mill transfers in cells I9-I32 (metric tons). This needs to be input only if applicable to the facility. If either of these are not applicable, applicants would input the number zero for cells I9-I32.

The next input is the monthly total quantity of molasses purchased from third-party sources and/or inter-mill transfers. This would be entered in cells K9-K32 (metric tons). Ethanol produced from molasses procured outside of the mill would be entered in cells L9-L32 (cubic meters). If there are no purchases of molasses from either third-party sources or inter-mill transfers, applicants would input the number zero for cells K9-K32 and L9-L32.

The next set of inputs are the monthly total purchased electricity from the grid in Brazil. This would be entered in cells M9-M32 (kWh). If applicable, an applicant would enter monthly total electricity sourced as inter-mill transfer between mills in cells N9-N32 (kWh). The applicants would be required to input monthly total gross surplus electricity generated and exported to the grid if applicable to the facility; this is reported in cells O9-O32. If supporting information for exported electricity is deemed insufficient during validation, the Executive Officer may choose to alter the electricity credit awarded to the applicant to account for the uncertainty.

For the net surplus electricity credit calculation, the electricity generated from purchased bagasse, purchased electricity from the grid, and inter-mill electricity transfers would be deducted from applicants' reported gross surplus electricity. Similarly, the ethanol produced from purchased molasses will be deducted from applicants' total reported ethanol produced.

The applicant should next enter a monthly weighted average percentage of the Juice-to-Sugar share in cells P9-P32. This should be followed by the monthly weighted average of sucrose at the gate in cells Q9-Q32.

The applicant would then enter monthly anhydrous ethanol production volumes in cells R9-R32 (cubic meters). Moisture content for the anhydrous ethanol would be reported in cells T9-T32 as a percentage. Moving right, hydrous ethanol volumes would be entered in cells U9-U32 (cubic meters), along with the weighted average moisture content (percentage) for the hydrous ethanol in cells W9-W32. Lastly, sugar production quantities would be reported in cells X9-X32 (metric tons).

Staff is seeking input from applicants on the proposed inputs for juice-to-sugar share and percentage sucrose measured at the facility gate. Staff appreciates feedback on type of measurement used for these quantities and appropriate measurement tolerances to be considered during verification. Staff also appreciates feedback to ensure reported quantities of hydrous and anhydrous ethanol reported can be substantiated by receipts or other production records.

Finally, applicants would specify total ethanol transportation distance and modes, including transport within Brazil and transport from Brazilian port(s) to California port(s). The standard transportation mode for transport within Brazil is heavy-duty diesel truck (HDDT) and ocean tanker from a Brazilian port to a California port (all in Km). Also included are two additional modes (to account for non-traditional or non-typical modes of transport). The applicant would consult with staff to develop emission factors for any of the two additional modes of transport). Truck distance (Km) from the ethanol facility to a port in Brazil from where the fuel is loaded onto an ocean tanker would be entered in cell AG9, and its share of total transport mileage in cell AF9. Ocean tanker distance from the Brazilian port to a California port where the fuel is unloaded would be reported in km (nautical miles would be converted to Km for reporting) and entered in cell AG12, and its share of total transport mileage in cell AF12. Mileage for the first additional mode of transport would be entered in cell AG16 in Km, and its share of total transport mileage in cell AF16. Mileage for the second additional transport mode would be entered in Km in cell AG17, and its share of total transport mileage in cell AF17. Emissions from transport modes are additive to reflect all the legs included in the transport of finished fuel to California.

To enable CI calculation[1], the applicant should go to the "Data" section in the Excel ribbon, and select "Solver". A "Solver Parameters" dialogue box will appear listing the variable cells and constraints. Click "Solve" at the bottom of the dialogue box to match the reported and modeled values for ethanol and sugar production. After solving, a "Solver Results" dialogue box will appear saying that a solution has been found. After clicking OK, the applicant will be able to see their weighted average composite CI (cell E2), and the total volume of ethanol produced (cell G2). Note that the Gopal-Kammen model parameters are very sensitive, and the Calculator will likely not be able to solve until all the necessary applicant data has been entered.

[1] Note that these instructions pertain specifically to Microsoft Excel 2016. Using an earlier version of Microsoft Excel should not hamper functionality of the tool, but the steps may be slightly different than those listed here.