GHGenius 5.02b User Guide
Grain Ethanol

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Executive Summary

This guide is intended to assist ethanol producers and suppliers in determining the carbon intensity of fuel delivered to British Columbia (BC) using GHGenius 5.02b.

The guide covers the steps that a GHGenius user must use to model a specific grain ethanol plant. This includes ensuring that Excel can properly run the model, setting up the model with correct region, year and using the Global Warming Potentials (GWPs) specified in the BC regulations, and inputting the plant specific data.

It covers running the model more than once for activities that occur in multiple regions and describes where the results are found.

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Glossary

BC	British Columbia
CCS	Carbon Capture and Storage
CO_2	Carbon Dioxide
DDGS	Dried Distillers Grains with Solubles
GWP	Global Warming Potential
ICM	ICM Inc. The developer of the ethanol production process used in about half of the North American ethanol plants.
IPCC	Intergovernmental Panel on Climate Change
Kg	Kilogram
kWh	Kilowatt-hour
LCA	Lifecycle Analysis
LCFS	Low Carbon Fuel Standard
MJ	Mega Joule
NaOH	Sodium hydroxide, also know as caustic soda.
PADD	Petroleum Administration for Defense Districts

1 Introduction

This guide is intended to assist ethanol producers and suppliers in determining the carbon intensity of fuel delivered to British Columbia (BC) using GHGenius 5.02b.

GHGenius is an Excel based lifecycle assessment (LCA) model that has been developed over the past twenty years. It is available for download at www.ghgenius.ca.

The model has some unique features compared to some other models. In many instances it uses time series of data rather than single data points. The time series of data combined with the use of some government forecasts allows the model to be used to show how emissions have changed and could change in the future. These time series also allow the model to "refresh" itself as GHGenius users change the year. This has allowed the model to continually provide lifecycle emissions that are relevant.

The model also has data for a number of countries and regions throughout the world. This allows the same process to be modelled in different regions to determine the impact of local conditions and allows the modelling of fuels that might be produced in one region of the world and used in another region.

1.1 Process Overview

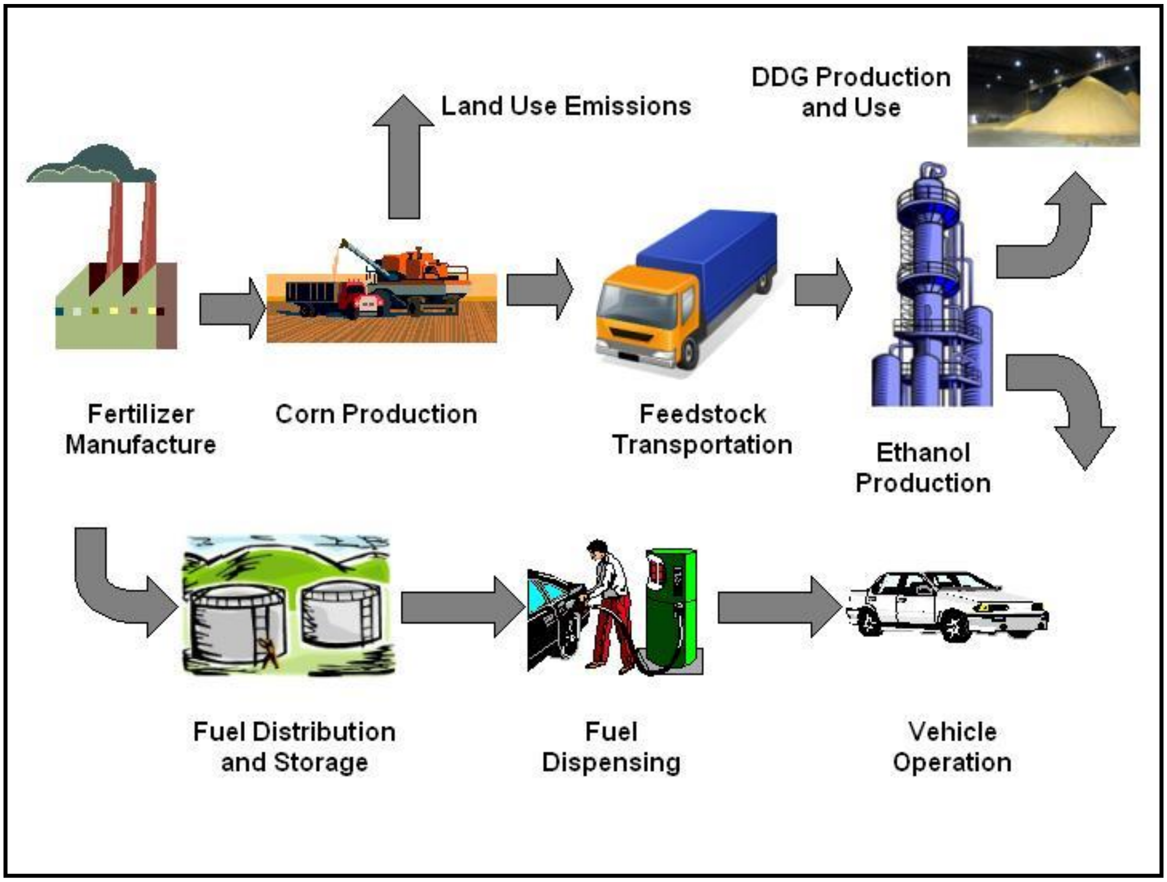
Ethanol is produced from sugar and grain crops throughout the world. There are more than 200 ethanol plants located in North America that process mainly corn but some also process wheat, barley, and sorghum. The list of ethanol pathways in GHGenius are shown in the following table.

Table 1-1 Ethanol Pathways in GHGenius

Starch Based	Sugar Based	Cellulosic
Corn	Sugar Cane	Corn Stover
Wheat	Sugar Beet	Wheat straw
Barley		Wood
Sorghum		Switchgrass
Peas		Hay

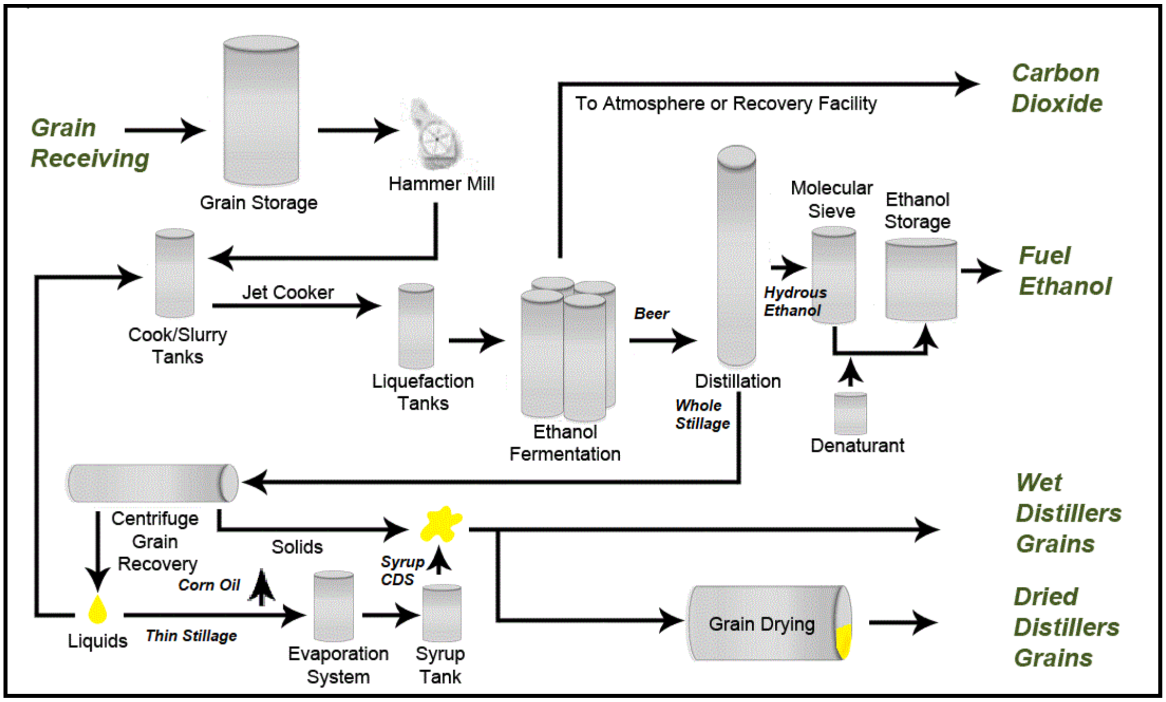
This guidance document is focused on the starch-based pathways. The lifecycle system boundary for corn ethanol is shown in the following figure. Other crops have similar system boundaries.

Figure 1-1 Corn Ethanol System Boundary



The ethanol plants in North America are quite similar in concept but there are some variations in the details from plant to plant. A typical process flow diagram is shown in the following figure.

Figure 1-2 Basic Ethanol Process Diagram



2 Initializing the Model

GHGenius is available to download at https://ghgenius.ca/index.php/downloads/74-ghgenius-5-02b. There is no cost to download the model, but GHGenius users must register at the website to be able to access the model.

When the model is downloaded and the file unzipped, it is an .xls file. This provides maximum compatibility with older versions of Excel. While this .xls file is larger than if it was saved as a .xlsm file, it will run faster and it will zip to a smaller file size. The.xls file cannot be saved as a .xlsx file due to the macros included in the file. If the file is converted to a .xlsm file, it cannot be converted back to an .xls file or .xlsx file. Some of the macro buttons in a converted .xlsm file will lose their functionality unless they are manually reassigned. It is best to run the model as a .xls file.

Before any facility specific data is entered in the model there are certain selections that must be made in the model.

2.1 Excel Macro Settings

GHGenius relies on macros to set up appropriate Excel settings, calculate many output values, and provide additional tools for GHGenius users. The model will not function properly without macros enabled.

To make Microsoft Office more secure, macros have become more difficult to enable when a file is downloaded from the internet. After downloading the model, macros can be unblocked by navigating to the file in File Explorer, right-clicking on the file, choosing Properties, and selecting Unblock on the General tab.

More information about this change and alternative ways to unblock macros can be found at https://learn.microsoft.com/en-us/deployoffice/security/internet-macros-blocked.

2.2 Reset Model

The Reset Model macro will run a series of smaller macros in an attempt to return GHGenius to the state in which it was downloaded. It will run the Canada regional default, set the GWP settings to the 2013 100-year values and the short-lived gases to carbon weighted, run most default buttons on the Input sheet and the Chemical Defaults button on the Alt Fuel Prod sheet. It does not set the year for the model.

The Reset Model macro can not fix any broken formulas or changes made outside of those stated above.

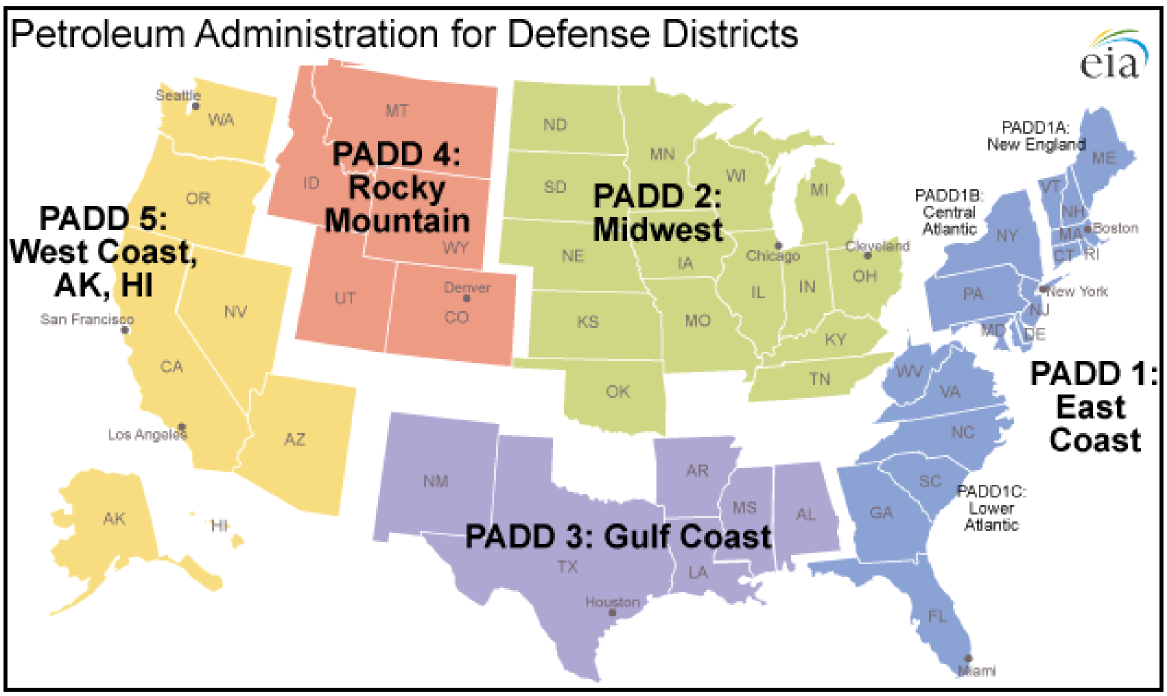
The Reset Model macro does not make any changes to the Coprods sheet. Nor does it change any of the values on the Alt Fuel Prod sheet related to the emission intensity of the chemicals included on the sheet (rows 104 to 172).

If the file is closed without saving, the next time it opens it will open to the last saved version of the file.

2.3 Production Region

The region in which a plant is located in should be selected. This should be the Province in Canada or the region in the United States. The US regions are aligned with the US Energy Information Administration's Petroleum Administration for Defense Districts (PADDs) as shown in the following figure and table.

Figure 2-1 US Regions



Source: US Energy Information Administration

The GHGenius regions are listed in the following table.

Table 2-1 GHGenius Regions

GHGenius Region	Province or PADD
US East	1
US Central	2 and 3
US West	4 and 5
Canada West	BC, Alberta, Saskatchewan, Manitoba
Canada Central	Ontario, Quebec
Canada East	New Brunswick, Nova Scotia. Prince Edward Island, Newfoundland

Most ethanol plants draw their feedstock from the same PADD that the plant is located in. There are a few plants that move the feedstock a long distance or the feedstock is produced in one region and processed in another. Modelling this scenario is discussed later.

After the desired region is selected in the drop-down menu in cell B3, the "Install Regional Defaults" button must be selected. Check to ensure the appropriate region has a 1.00 in row 9.

2.4 Model Year

The model should be set to the same year as the data entered into the model represents. When the data extends over two or more years, the model should be set for the latest year in the data set. The year must be input in two places in the model, in cell Input B7 (Target Year) and in row 241 (Base year for Alt Fuel Production) on the Input sheet.

2.5 GWP

The default GWPs that are selected by the model are the IPCC 5th Assessment Report values (cell B11 (2013 100 years) and D11 "Carbon Weighted" on the Input sheet). These are also selected if the Reset Model button is pushed.

To change the GWP values used in the model a GHGenius user can select alternative values in the drop-down menus in cells B11 and D11 (GWP Selector & Short-Lived Gases).

3 Feedstock

If the plant processes more than one feedstock, the model must be run for each feedstock separately. Since it is unlikely that the plant will have separate data on the energy requirements, ethanol yield and chemical requirements, the same values should be used for each feedstock.

The feedstock weights for grain ethanol are entered on an as received basis. There is no requirement to adjust them to dry weight.

3.1 Feedstock Production

Ethanol plants generally do not have any influence over the feedstock production data so no changes should be made to any of the default feedstock production parameters except the transportation of the feedstock to the ethanol plant.

3.2 Feedstock Transportation

Feedstock transportation is set on the Input sheet in rows 76 though 86. The one-way distance in kilometres is input in rows 76 to 80. The tonnes-shipped/tonnes-produced (rows 82 to 86) will typically add up to 1.00 or higher, but it should not be less than one. A sum greater than one would indicate a multi model route where the feedstock might be shipped by truck to a rail loading facility and then shipped by rail to the ethanol plant. The sum of the modes of transportation can be found on the Transport sheet in row 58 for feedstock and row 97 for finished fuels.

Corn, in column F of the Input sheet, is an example of a straightforward default scenario. For example, the distance that the feedstock travels by truck is 100 km (F80) and 100% of the feedstock is moved by truck (F86).

Whole corn, in column G, is an example of multiple transportation modes. The distance by rail (G76) and truck (G80) are both 200km. Only half of the feedstock is moved by rail (G82) while the other half is moved by truck (G86).

There are no ethanol feedstocks with default modes that add up to more than 1.00 tonnes-shipped/tonnes-produced. A possible scenario to produce that would be: if a plant was located within trucking distance of rail, but not on it. Then 100% of the feedstock would be transported by rail, followed by 100% of the feedstock being transported by truck. Both rows 82 and 86 would have a value of 1.00 for that feedstock.

This area of the Input sheet is shown in the following figure. Columns G and H are for a pathway that envisioned transporting whole corn to a central facility where the corn kernels would be removed, and the remaining material (stalks and cobs) would be used for cellulosic ethanol production. This pathway has never been commercialized. Corn ethanol producers would only enter data in column F (highlighted). Typically, the producers would have information for truck and rail modes.

Figure 3-1 Transportation Inputs

	A	B	C	D	E	F	G	H
73	**TRANSPORTATION OF FEEDSTOCKS**							
74		**Crude Oil**	**Coal**	**Coal**	**Coal**	**Corn**	**Whole Corn**	**Elevator**
75	**Average km shipped**		**to power**	**to liquid fuel**	**to H2**	**to Plant**	**to Elevator**	**to plant**
76	By Rail	54	451	0	0	0	200	0
77	Domestic water	Calculated	594	0	0	0	0	0
78	International water	Calculated	Calculated	0	0	0	0	0
79	Pipeline, tram, conveyor (Defaults)	1,698	0	10	10	0	0	0
80	Truck	7	2	0	0	100	200	80
81	Tonnes-shipped/tonne-produced							
82	By Rail	0.46	0.40	0.00	0.00	0.00	0.50	0.00
83	Domestic water	0.01	0.34	0.00	0.00	0.00	0.00	0.00
84	International water	Calculated	Calculated	0.00	0.00	0.00	0.00	0.00
85	Pipeline, tram, conveyor	0.85	0.00	1.00	1.00	0.00	0.00	0.00
86	Truck	0.58	0.62	0.00	0.00	1.00	0.50	1.00

4 Ethanol Production

The input data for the ethanol pathway is input into the model on a per litre of denatured ethanol basis.

4.1 Year

When modelling a specific plant, on the Input sheet it is important to match the target year in B7, the base year in row 241, and the date that data was collected.

4.2 Mass and Energy

The main mass and energy inputs are on the Input sheet in rows 243 to 248. If default values are not used, then it is necessary to change the base year in row 241 to match the year that the data was collected.

4.2.1 Electricity

The net electricity purchased value is entered in cell AE243 for corn-based ethanol, and the other ethanol pathways are in neighbouring cells in row 243. The input unit for electricity is kilowatt-hours (kWh) per litre of undenatured ethanol. Some plants may generate some of their electricity as part of the process, for example from a steam pressure let-down turbine. This internal production should not be included as electricity purchased. Plants which have wind or solar power production which is connected to the grid should use the net power purchased from the grid as the model input.

4.2.2 Diesel Fuel

There can be a small amount of diesel fuel used at some ethanol plants for rail car shuttles, front end loaders, or other diesel-fueled equipment used at the plant. This value, litres of diesel/litre of ethanol is entered in row 244.

4.2.3 Natural Gas

The natural gas value is entered in cell AE245 for corn-based ethanol, and other ethanol pathways are in neighbouring cells in row 245. The input unit for natural gas is megajoules per litre (MJ/litre) on a higher heating value basis.

4.2.4 Feedstock

The feedstock input for an ethanol pathway may be on different rows depending on whether it is a grain crop or a cellulosic crop.

For grain crops such as corn, wheat, barley, or sorghum the input row is 248. For cellulosic crops such as switchgrass, wheat straw, or wood the input row is 247. The input unit for both rows of data is kilograms (kg). It is input on an as received basis for grains and a dry weight basis for cellulosic feedstocks.

4.2.5 Chemicals

Chemical inputs into an ethanol pathway can be specified on the Alt Fuel Prod sheet. There are six chemicals that are common in a conventional ethanol plant. All chemical inputs are based on 100% purity and input values may need to be adjusted based on their purity. For example, a 93% pure sulphuric acid should be multiplied by 0.93 before being input into the model.

In previous versions of GHGenius, urea was input as 50% concentration ammonia, but urea is now a separate input in GHGenius 5.02b. These inputs are all input on a kilogram per litre of undenatured ethanol basis. Not all ethanol plants will use all six products.

Table 4-1 Chemical Inputs

Chemical	Row on Alt Fuel Prod
Ammonia	30
Enzymes	41
NaOH (Sodium hydroxide)	53
Sulphuric acid	72
Urea	76
Yeast	77

4.3 Coproducts

The quantity of coproducts for grain ethanol production are calculated in the model automatically on a mass balance basis that uses the ethanol yield as the determining factor. Corn goes into the process and ethanol is produced, there is a stochiometric amount of carbon dioxide produced and the non fermentables becomes the coproduct. The non-fermentables include corn oil, dried distillers' grains, wet distillers' grains, condensed syrup and other forms of the fibre, protein, and minerals.

No GHGenius user inputs are required for the primary coproducts for grain ethanol.

The default settings in the model provide for a displacement credit for the ethanol coproducts. The displaced products are the original grain and a protein meal. For corn ethanol the distillers' grains displaces corn and soybean meal.

Some ethanol plants capture some of the CO_2 for use as an industrial gas where it can be used for beverage carbonation, or flash freezing. This is not sequestration as the gas is almost always eventually released to the environment. Many ethanol plants sell the CO_2 to an industrial gas company who is responsible for the electricity used for compression.

Capturing CO_2 from an ethanol plant usually requires less energy than capturing it from other sources. Captured CO_2 from an ethanol plant can displace other sources of CO_2. This energy savings can be captured in GHGenius. On the Input sheet the quantity of CO_2 captured is entered in cell B261, and the extra electricity for the CO_2 purification and compression of the gas must be included in the ethanol plant electricity entered in row 243 on the Input sheet. The avoided emissions are then included in the fuel coproducts.

4.4 Carbon Capture and Sequestration

Some plants have started to capture the fermentation CO_2 and sequester that material in underground storage. This can be modelled in the Sequestration sheet. To include carbon capture and sequestration in the final calculation, enter 1 into cell B69 on the Input sheet.

On the Sequestration sheet there are two GHGenius user inputs, the fraction of CO_2 that is sequestered (row 19) and the energy used for the sequestration process (rows 22 to 26). Since ethanol plants already generate CO_2 that is concentrated, they usually only have electricity used in the capture and sequestration process.

4.5 Ethanol Transportation

On row 91 of the Input sheet is a dropdown asking if transloading (transferring the product from one mode of transport to another, e.g., from truck to rail) should be included. Most modelled scenarios will include these emissions once, while some will include the emissions multiple times if there are multiple locations where the fuel is stored while awaiting change of transportation mode.

In a typical corn ethanol plant, the dropdown will be set to “No” when running results in the production region and “Yes” when running results in BC for final distribution. This means that the fuel is loaded onto a rail car at the ethanol plant and travels to BC where the rail car is unloaded. If the ethanol plant has to truck the ethanol from the plant to another location where it is loaded onto the rail, then “Yes” must be selected and the truck distance entered in the model.

The ethanol is received at a terminal in BC where it is stored prior to blending with the gasoline. The blended product is then transported to a service station. The selection of “Yes” for this last leg of the transportation will include the default value for the electricity used for storage and blending.

All fuels will have 80 km of truck transportation in the BC region. The average distance for this distribution leg has been set at 80 km in the model. This distance was developed with input from the petroleum sector. In GHGenius, it does vary with the region that the model is set for. This value is entered in row 86 on the Input sheet and a 1.0 is entered on row 102 for the mode.

5 Corn Ethanol Example

Any fuels produced outside of BC will require at least two runs of the model to accurately calculate the results. In the case of ethanol fuels, the most common scenario is feedstock and fuels produced in US Central and moved via rail to BC. Below is an example of that using some assumed inputs.

The first run will be in the US Central region. Be sure to click the Install Regional Defaults button after setting cell B4 to the appropriate region. The following table shows the values used for this modelling exercise. A GHGenius user would replace these values with their actual values.

Table 5-1 Model Inputs for US Central Emissions Run

Sheet	Parameter	Cell	Value
Input	Region	B4	US Central
Input	Year	B7	2023
Input	GWP	B11	2013 (100 year)
Input	Short lived gases	D11	Carbon Weighted
Input	Truck Distance	F80	80
Input	Transloading	AD91	No
Input	Rail Distance	AD92	3000
Input	Truck Distance	AD96	0
Input	Rail Mode	AD98	1
Input	Year	AE241	2023
Input	Electricity, kWh/l	AE243	0.2
Input	Natural Gas, MJ/litres	AE245	7.5
Input	Coal, kg/l	AE246	0
Input	Corn. Kg/litre	AE248	2.35
Alt Fuel Prod	Ammonia, kg/l	AM30	0.005
Alt Fuel Prod	Enzymes, kg/l	AM41	0.002
Alt Fuel Prod	NaOH, kg/	AM53	0.005
Alt Fuel Prod	Sulphuric acid, kg/l	AM72	0.01
Alt Fuel Prod	Urea, kg/l	AM76	0.0000
Alt Fuel Prod	Yeast, kg/l	AM77	0.0001

The transportation emissions are based on the distance and the mode. Either a zero distance or a zero mode will result in no emissions being calculated.

The chemicals should be entered on a 100% basis, caustic soda (NaOH is often sold and used at a 50% concentration. Similarly, the standard concentration of sulphuric acid is 93%.

The default value for all other chemicals for the grain ethanol pathways is zero.

The results for the year 2023 are shown in the following table. These values are from the BC LCFS sheet. Column N, rows 8 to 16.

Table 5-2 US Central Emissions 2023

Stage	Emissions, g CO_2eq/GJ (HHV)
Direct land use change	0
Feedstock production or cultivation	23,287
Feedstock upgrading	0
Feedstock transport	1,045
Feedstock coproducts production	0
Avoided emissions	0
Fuel production	26,524
Fuel coproducts production	-11,679
Fuel distribution and storage	2,022

The first run includes everything from growing the corn up to the ethanol arriving in Vancouver. The second run will be in the BC region to calculate final distribution of 80 km, dispensing, and fuel use emissions. After the BC region is selected in cell B4 the “Install Regional Defaults” button must be pressed. Most of the inputs can be left the same as the first US Central run. Only the changes as outlined in the following table are required to get the BC emissions. These changes can be made to the version of the model used for the US Central run or a fresh version of the model. These are the only changes required to get the BC emissions.

Table 5-3 Model Inputs for BC Emissions Run

Sheet	Parameter	Cell	Value
Input	Region	B4	BC
Input	Transloading	AD91	Yes
Input	Rail distance	AD92	0
Input	Truck Distance	AD96	80
Input	Truck mode	AD102	1

The results for the BC region are below. These are again from the BC LCFS sheet, column N rows 16 to 18.

Table 5-4 BC Emissions 2023

Stage	Emissions, g CO_2eq/GJ (HHV)
Fuel distribution and storage	643
Fuel dispensing	133
Vehicle or Vessel operation	2,397

The results from the two regions can be combined to produce a final CI of 44.37 g CO_2eq/MJ. The values in the first two columns are summed to produce the values in the right-hand column.

Table 5-5 Total Emissions 2023

Stage	US Central Emissions	BC Emissions	Total Emissions
	g CO_2eq/GJ (HHV)		
Direct land use change	0		0
Feedstock production or cultivation	23,287		23,287
Feedstock upgrading	0		0
Feedstock transport	1,045		1,045
Feedstock coproducts production	0		0
Avoided emissions	0		0
Fuel production	26,524		26,524
Fuel coproducts production	-11,679		-11,679
Fuel distribution and storage	2,022	643	2,665
Fuel dispensing		133	133
Vehicle or Vessel operation		2,397	2,397
Total	41,199	3,173	**44,372**
Total, g CO_2eq/MJ	41.20	3.17	**44.37**

6 Wheat Ethanol Example

The previous example covered the most common scenario for producing ethanol, a corn feedstock in the same region as the ethanol plant. A more complicated scenario would be if the feedstock was grown in one region, and the ethanol plant was in another. This example will look at a hypothetical wheat ethanol plant in Saskatchewan that imports wheat feedstock from Manitoba.

The first run will be in the Manitoba region. This will be used to generate the emissions for the following stages: direct land use change emissions, feedstock production or cultivation, and feedstock transport. Be sure to click the Install Regional Defaults button after setting cell B4 to the appropriate region. The following table shows the values used for this modelling exercise. A GHGenius user would replace these values with their actual values.

Table 6-1 Model Inputs for Manitoba Run

Sheet	Parameter	Cell	Value
Input	Region	B4	Manitoba
Input	Year	B7	2023
Input	Rail Distance	AI76	700
Input	Truck Distance	AI80	0
Input	Rail Mode	AI82	1.00
Input	Year	AF241	2023
Input	Electricity	AF243	0.2
Input	Diesel	AF244	0
Input	Natural gas	AF245	10.0
Input	Wheat	AF248	2.50

The energy inputs of AF243 through AF246 are not needed until the second run, but there is no harm in entering them at this point since the adjacent cells with year (AF241) and yield (AF248) are necessary. These two inputs are required to scale the feedstock production to one GJ of ethanol produced.

The results below are needed from Column Q, rows 8 through 13 of the BC LCFS sheet.

Table 6-2 Manitoba Emissions 2023

Stage	Emissions, g CO_2eq/GJ (HHV)
Direct land use change	0
Feedstock production or cultivation	-5,338
Feedstock upgrading	0
Feedstock transport	1,328
Feedstock coproducts production	0
Avoided emissions	0

The second run will be in the Saskatchewan region and the B7 and AF241 to AF 248 values are the same as the first run. This run will use urea as an input instead of ammonia, but ammonia has a non-zero default value that must be set to zero.

Table 6-3 Model Inputs for Saskatchewan Run

Sheet	Parameter	Cell	Value
Input	Region	B4	Saskatchewan
Input	Year	B7	2023
Input	Transloading	AF91	No
Input	Rail Mileage Ethanol	AF92	1600
Input	Truck Mileage Ethanol	AF96	0
Input	Rail mode	AF98	1.00
Input	Year	AF241	2023
Input	Electricity	AF243	0.2
Input	Diesel	AF244	0
Input	Natural gas	AF245	10.0
Input	Wheat	AF248	2.50
Alt Fuel Prod	Ammonia	AN30	0
Alt Fuel Prod	Enzymes	AN41	0.002
Alt Fuel Prod	NaOH	AN53	0.005
Alt Fuel Prod	Sulphuric acid	AN72	0.01
Alt Fuel Prod	Urea	AN76	0.025
Alt Fuel Prod	Yeast	AN77	0.0002

This second run will include results only related to producing the ethanol and transporting it to BC.

Table 6-4 Saskatchewan Emissions Run

Stage	Emissions, g CO_2eq/GJ (HHV)
Fuel production	33,401
Fuel coproducts production	-10,452
Fuel distribution and storage	984

The final region for this example is a BC run that is set up very similarly to the previous example. It calculates the fuel use emissions, the fuel dispensing and has a contribution to the fuel distribution and storage emissions.

Table 6-5 Model Inputs for BC Emissions Run

Sheet	Parameter	Cell	Value
Input	Region	B4	BC
Input	Transloading	AF91	Yes
Input	Rail Distance	AF92	0
Input	Truck Distance	AF96	80
Input	Truck mode	AF102	1

The results for the BC region are below. These are again from the BC LCFS sheet, column Q rows 16 to 18.

Table 6-6 BC Emissions 2023

Stage	Emissions, g CO_2eq/GJ (HHV)
Fuel distribution and storage	643
Fuel dispensing	133
Vehicle or Vessel operation	2,397

The results from all three regions can be combined to get the total CI of this example plant.

Table 6-7 Total Emissions 2023

Stage	Manitoba Emissions	Saskatchewan Emissions	BC Emissions	Total Emissions
	g CO_2eq/GJ (HHV)			
Direct land use change	0			0
Feedstock production or cultivation	-5,338			-5,338
Feedstock upgrading	0			0
Feedstock transport	1,328			1,328
Feedstock coproducts production	0			0
Avoided emissions	0			0
Fuel production		33,402		33,402
Fuel coproducts production		-10,451		-10,451
Fuel distribution and storage		984	643	1,627
Fuel dispensing			133	133
Vehicle or Vessel operation			2,397	2,397
Total	-4,010	23,935	3,159	23,084
Total, g CO_2eq/MJ	-4.01	23.94	**3.16**	**23.08**

Need more information?

Please see the Renewable and Low Carbon Fuel website at http://gov.bc.ca/lowcarbonfuels or email us at lcfs@gov.bc.ca

This information is for your convenience and guidance only and does not replace or constitute a legal interpretation of the legislation. It is recommended that parties who may be a Fuel Supplier review the Low Carbon Fuels Act (Act), the Low Carbon Fuels (General) Regulation and the Low Carbon Fuels (Technical) Regulation, and seek independent legal advice to confirm their status, legal obligations and opportunities. The Act and regulations can be found on the internet at: http://www.bclaws.ca.