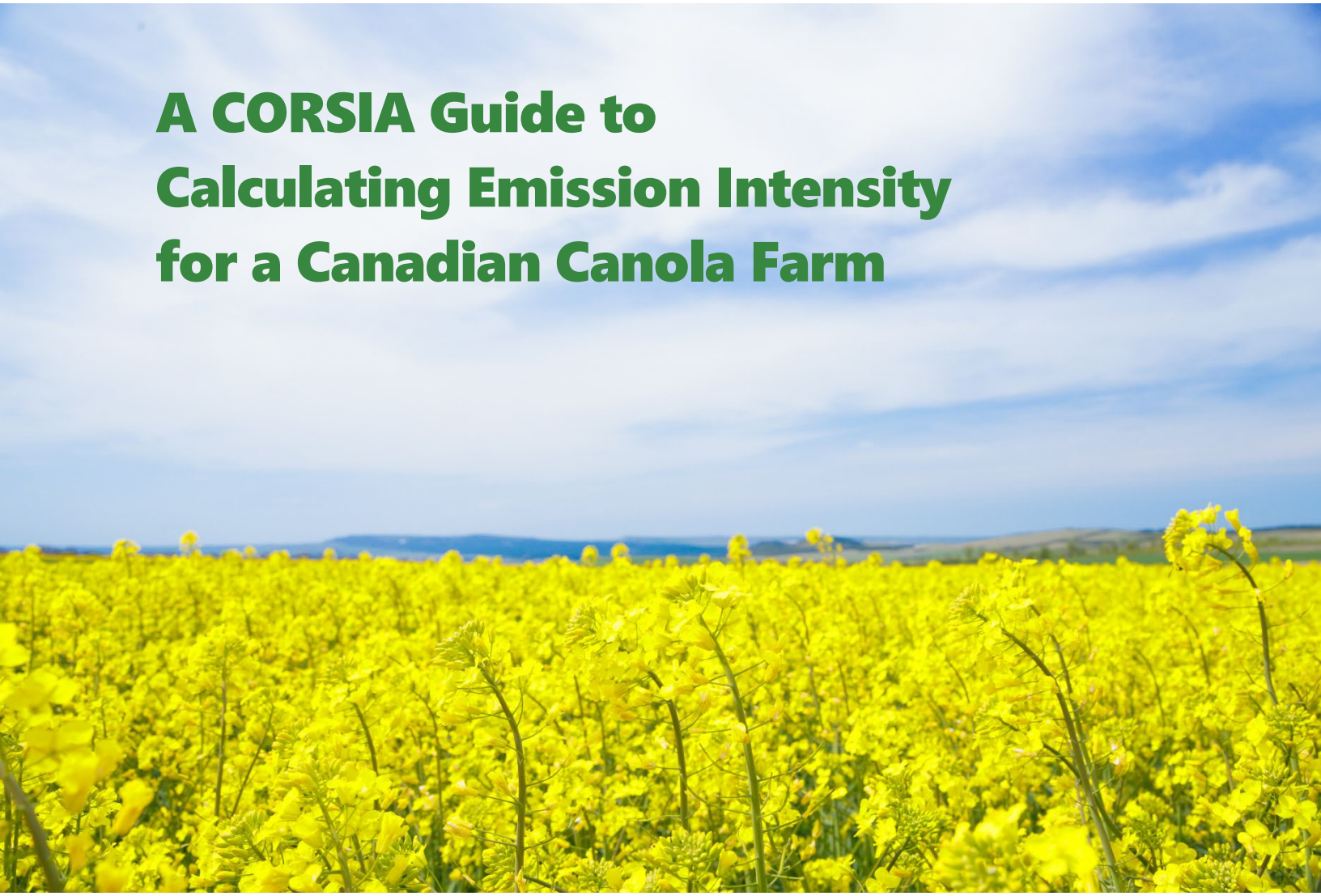
BIOLOGICAL CARBON CANADA

A CORSIA Guide to Calculating Emission Intensity for a Canadian Canola Farm



April 2026

Canola Scope Manual Calculator

Instructions

The calculator below asks for total numbers. To begin the process, locate all the following records from your on-farm data.

- Wetlands and riparian zones to the historic high-water mark are also part of the Crown lease category.
- Record fertilizers as the actual nitrogen applied.
- Burning requires an estimate of the total dry matter consumed. Extension papers have used the bushel weight x yield (bu/ac) to approximate stover.
- Fuels required a record of all fuels (litres and gigajoules) consumed.
- Soil sequestration requires hectares under management, new croplands added, and land sold for development in the year assessed.
- The calculator uses coefficients from Canada's GHG National Inventory Report and Agriculture and Agri-Food Canada.
- There is a new section from older versions addressing a farm's scope 3 emissions.
- Farm data should be a yearly total.
- The 2026 Scope 3 standards have added emissions for irrigated crops, leakage, and industry land conversion.

Multiply the amount by the emission factor. Once done, add all the emissions together at the bottom.

Offset Warning

The CORSIA1 Offsets are implemented in Canada through the Clean Fuel Regulations and are part of the Canadian offset framework. Farm records are needed to ensure an offset created on a parcel is not double-counted through any other regulated offset, voluntary credit, or scope 3 sale.

[1] The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is the first global market-based scheme that applies to a sector. It complements other aviation in-sector emissions reductions efforts such as technological innovations, operational improvements and sustainable aviation fuels to meet the ICAO aspirational goal of carbon neutral growth. The implementation in Canada is with the Canada's Clean Fuel Regulations (CFR).

Agricultural Operations for Canola

Yearly Farm Operations for Canola			
Source	(A) Amounts	(B) Emission Factor[2]	(A x B) Estimated Emissions per year
Operations	As Applied		
Inorganic Fertilizer (kg of nitrogen)	kg of N	0.01 kg of N2O	= kg
Organic Fertilizer (kg of nitrogen)	kg of N	0.01 kg of N2O	= kg
Animal Manure Applied (kg of nitrogen)	kg of N	0.01 kg of N2O	= kg
Organic Fertilizer (kg of nitrogen)	kg of N	0.01 kg of N2O	= kg
Burning of Annual Crops	Tonnes of Dry Matter	0.06 kg per 1000 tonnes of N2O	= kg
Total N2O		(a)	**= kg**
Burning of Annual Crops	Tonnes of Dry Matter	2.5 kg per 1000 tonnes of CH4	= kg
Total CH4		(b)	**= kg**
Limestone	kg	0.000125 kg of CO2	= kg
Urea	kg	0.0002 kg of CO2	= kg
Total CO2		(c)	**= kg**
(a)	(a) x 265		= kg
(b)	(b) x 28		= kg
(c)	(c) x 1		= kg
Total CO2e Emissions from Fertilizers and Other Sources			= (A) (a+b+c) kg

[2] Based on 2021 ECCC IPCC Background Tables

Yearly Farm Energy and Fuels for Canola			
Source	(A) Amounts	(B) Emission Factor	(A x B) Estimated Emissions per year
Farm Diesel		2.89 kg per liter	= kg
Farm Gasoline		2.23 kg per liter	= kg
Farm Natural Gas		52.6 kg per Gj	= kg
Farm Propane		1.565 kg per liter	= kg
Farm Electricity		Per Kwh (see Table)	= kg
Total CO2e Emissions from Energy Consumption			= (B) kg

Yearly Farm Pesticides for Canola			
Source	(A) Total kg of Active Ingredient	(B) Emission Factor[3]	(A x B) Estimated Emissions per year
Canola Herbicide		48.3 per kg ai	= kg
Canola Insecticide		48.3	= kg
Canola Fungicide		48.3	= kg
Seed Treatment		48.3	= kg
Total CO2e Emissions from Pesticide Consumption			= (C) kg

[3] E. Audsley, K. Stacey, D.J. Parsons, A.G. Williams, Estimation of the greenhouse gas emissions from agricultural pesticide manufacture and use., Cranfield University Cranfield Bedford MK430AL

Land and Sinks

Land and Soil Sinks for Canola			
Source	(A) Amounts	(B) Emission Factor	(A x B) Estimated Emissions per year
Private Owned Lands	# Hectares		
Annual Owned Cropland (Dryland)		See the Ecozone Table	= kg
Annual Cropland Rented (Dryland)		See the Ecozone Table	
Crops Under Irrigation		272 kg[4]	= kg
Additional Cropping Management	AA	See Table Below	= kg
Wetlands Farmed Through		9000 kg	= kg
Conversion of Forrest to Cropland	New Hectares Added in the crop year.	See the Ecozone Table	= kg
Conversion of Grassland to Cropland	New Hectares Added in the crop year.	58,500 kg	= kg
Conversion of Cropland to Urban	New Hectares Added in the crop year.	37,200 kg	= kg
Conversion of Grassland to Urban	New Hectares Added in the crop year.	90,000 kg	= kg
Total CO2e Net Emissions from Land Sources			Sum = kg (D)

[4] A emission charge for headworks, reservoir and canal land conversion.

Canola Emission Summary

Summary of Emissions				
Total CO2e Fertilizer Emissions and Other Sources	(A)	➲		kg CO2e
Total CO2e Energy Emissions	(B)	➲		kg CO2e
Total CO2e Pesticides	(C)	➲		kg CO2e
Total CO2e Land Emissions	(D)	➲		kg CO2e
Scope 3 Emissions	(E + F+ G)	➲		kg CO2e
Total GHG Footprint CO2e	Sum			kg CO2e

Canola Yield

Parcel	Total Tonnes from Parcel
Total Tonnes	=

Canola GHG Intensity

Canola CO2e	Canola Yield Tonnes	Canola Crop CO2e Intensity CO2e kg per Tonne
	/	=

Ecozone Sink Tables

Ecozone	Cropland remaining cropland kg/ha	Forest converted to cropland kg/ha
Boreal Plains	-360	9098
Subhumid prairies	-887	6087
Semiarid prairies	-887	9706
Taiga Plain	1996.5	2781
Montane Cordillera	249	10897
Pacific Maritime	1558	29671
Boreal Shield East	333	11227
Atlantic Maritime	215	11391
Mixed-wood Plains	203	13137
Boreal Shield West	141	6627

Electricity Table

Province	Factor per kwh	Province	Factor per kwh
BC	0.001 kg	PQ	0.001 kg
AB	0.590 kg	NB	0.280 kg
SK	0.580 kg	PEI	0.001 kg
MB	0.001 kg	NS	0.680 kg
ON	0.025 kg	NL	0.028 kg
YK	0.1 kg	NT	0.280 kg

Scope 3 Emissions

Item Purchased	CO2e per Unit	Yearly Quantity Purchased	CO2e total
Example 2x4 8 ft board	8 kg	100	= 800 kg
Example Baler Twine	4.77 kg/kg	100 units or 1120 kg/unit	= 5,342 kg
		Totals	= (E)

Scope 3 Leakage Emissions

Crop	Yield (bushels)	Leakage to Fuels	Coefficient	CO2e total
Corn		x 30 %	x 2.76 kg	= kg
Wheat		x 13%	x 1.13 kg	= kg
Canola		x 23%	x 12.84 kg	= kg
			Totals	= (F)

Scope 3 Land Conversion

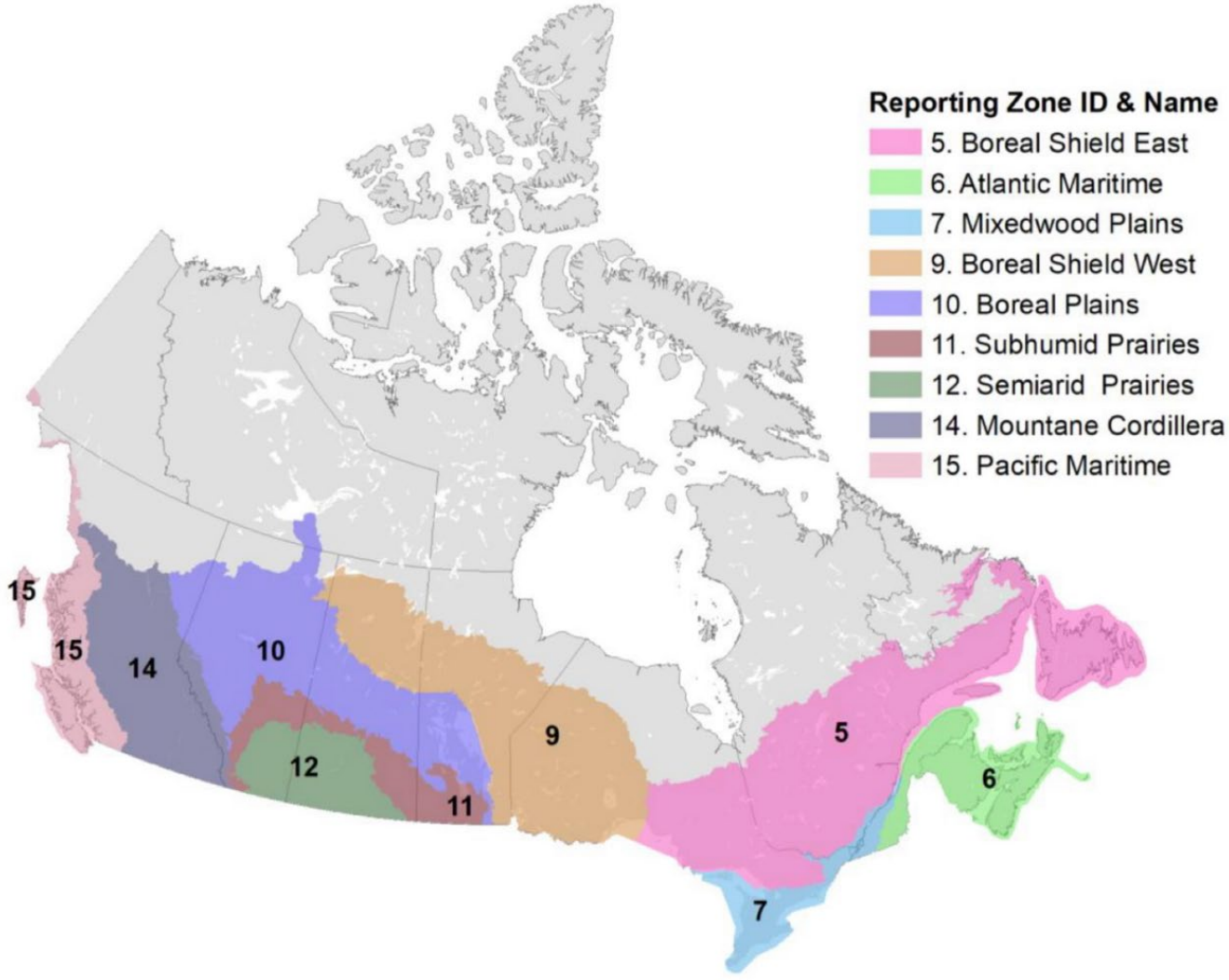
Private Lands Under Management # Hectares	Coefficient[5]	CO2e total
	x 200 kg	= kg
	Totals	= (G)

[5] This coefficient is a charge on a parcel for the sector's loss of farmland.

Additional Crop Management

AAFC Additional Management For Cropping Year	Additional CO2e cropland kg/ha (a)	# Hectares using (b)	Total kg = a x b
Winter Cover Crop	-180	x	= kg
Intercropping	-290	x	= kg
Fertilizer Inhibitors	-120	x	= kg
Split Fertilizer Application	-60	x	= kg
Organic Amendments	-440	x	= kg
Legume in Rotation	-81	x	= kg
Fertilizer Spring Application	-37	x	= kg
Fertilizer Fall Application	37	x	= kg
Fall Tillage	20	x	= kg
Tame pastures with Legumes	-40	x	= kg
Other Known Coefficients			
Easement to Prevent Conversion on Private Native Grasslands	-195	x	= kg
Emission savings from the application of fertilizer delivered with **individual boot sectional controls** on the implement.	3% of the total GHG from purchased fertilizers.	deduct	= kg
Sale 1 _____ kg	Yearly total kg sold.	Add back	= kg
Sale 2_____ kg	Yearly total kg sold.	Add back	= kg
TOTALS	(AA)		= kg

Ecozone Maps



CORSIA Verification and On-Farm Evidence

The CORSIA offset is a verified offset and is subject to a verification process (audit).

Canola grower attestation is not sufficient. CORSIA requires the verifier to test at a reasonable level of assurance. This means the verifier must be able to conclude that the emissions report is materially correct and a fair representation

The verifier will also seek to ensure that the units have not been used by the operator to offset any other emissions.6 This means testing to ensure the canola grower has not double-sold an offset or credit.

For the Canola grower, this means they will require records to confirm the fuel and energy use, and fertilizer and pesticide applications as applied to the canola field.

Factors and Coefficients

BCC knows of many good discussions and debates on the coefficients used to identify and measure greenhouse gas emissions and sinks. Therefore, this worksheet uses the ECCC and AAFC coefficients. For grasslands and forage, we recognize that better soil and grazing management increase net energy and build soil carbon over time. The coefficients used are conservative.

As other coefficients become better known and our scientific community expands their on-farm coefficient work, BCC commits to revising our calculator.

[6] CORSIA Handbook, 2024

For Membership and Other Extension Information

Biological Carbon Canada

www.biologicalcarbon.ca