

GUIDANCE O

GHG Emission Reductions

Version 1





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AUDIENCE

This guidance is targeted for use by large farms, individually certified farms, and group management.

WHAT IS A GREENHOUSE GAS (GHG)?

A greenhouse gas (or GHG for short) is any gas in the atmosphere that absorbs and re-emits heat, thereby keeping the earth's atmosphere warmer than it otherwise would be. GHGs occur naturally in the earth's atmosphere; however, human activities, such as burning fossil fuels, are increasing atmospheric GHG levels. Increased GHG levels cause a rise in temperature in the earth's atmosphere, leading to changes in climatic conditions (such as rainfall, temperature).

HOW TO CALCULATE GHG?

The main greenhouse gases related to agriculture production are carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). Each of these gases has a different severity when released into the atmosphere. This is due to how long the gas lasts in the atmosphere and the amount of heat the gas absorbs. The term Carbon Dioxide Equivalent (CO₂e) is used to describe all greenhouse gases as a standard unit. Using CO₂e allows the three gases to be expressed as a single number and allows like-for-like comparisons. This is the technical unit of measurement for the GHG emissions calculations and indicators for requirement 6.9.1 in the Standard.

To calculate net GHG emissions, you need to identify key activities and processes that generate greenhouse gas emissions. Net emissions are calculated by adding all greenhouse gas emissions for different sources (in CO₂e) identified on the farm and subtracting from these any Greenhouse gas removals. Greenhouse gas removals refer to the amount of carbon that has been captured due to good crop management and trees absorbing carbon dioxide from the atmosphere. The core elements for calculating net GHG emissions are shown in Figure 1 below:

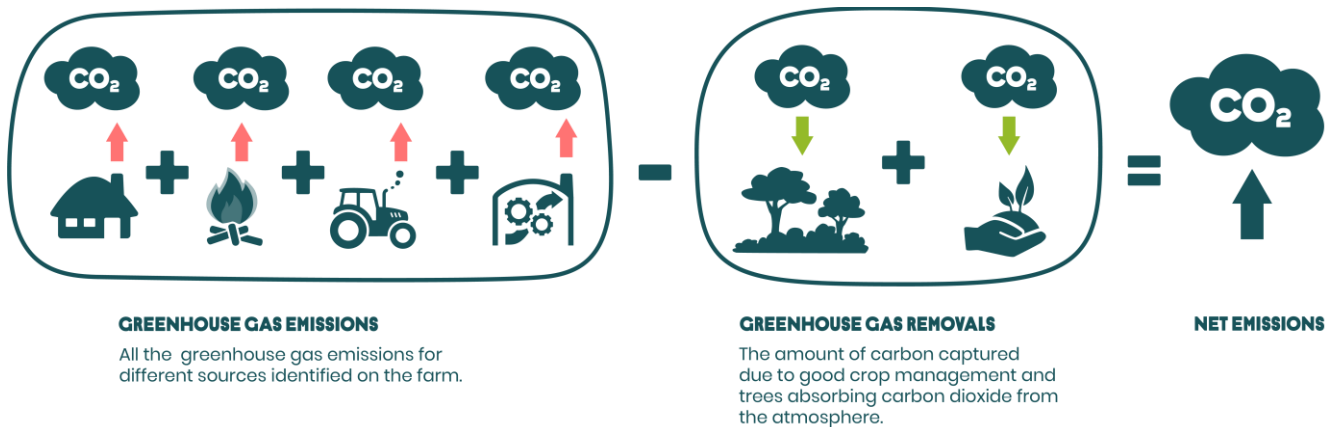


Figure 1: Elements for Calculating the Net GHG emissions



GHG IN THE STANDARD



➤ Self-selected smart meter

Requirement 6.9.1 Producers document net Greenhouse Gases (GHG) emissions from main sources in production and processing operations. This includes emissions from use of fossil fuels and electricity, fertilizer, waste and wastewater and land use change.

Producer establish GHG reduction targets, develop and implement a strategy to meet these targets, and monitor annually against these targets

Indicators:

- Total annual net GHG emissions from the above indicated sources (tons of CO₂e)
- Net GHG emissions from the above indicated sources per unit of the final product (tons of CO₂e per unit)

Topic 6.9 Greenhouse Gases Reduction contains a single Self-Selected Smart Meter (6.9.1). The smart meter is used by Certificate Holders who want to measure and reduce their Greenhouse Gas (GHG) emissions on farms from main sources in production and or processing operations. Key areas that must be considered include emissions from fossil fuels and electricity, fertilizer, land-use change, waste, and wastewater. This document provides producers with the relevant guidance to fulfill the requirement.

The four major steps required to comply with this requirement for the certificate holder are:

- Document and quantify net greenhouse gas emissions.
- Establish greenhouse gas reduction targets.
- Develop and implement a strategy for target reduction.
- Monitor targets annually.

To document and estimate emissions, Rainforest Alliance recommends the use of the Cool Farm Tool (CFT) (<https://coolfarmtool.org/>), which is based on the Tier 2 methodology of the Intergovernmental Panel on Climate Change (IPCC). The CFT is one of the simplest yet comprehensive and freely available GHG calculators that facilitate producers' calculations of crop products' net emissions.

The Cool Farm Tool supports farmers to identify key activities and processes that generate greenhouse gas emissions. The tool also makes it easy for farmers to identify practices that can reduce emissions or increase greenhouse gas removal (capture and absorption). It identifies those practices that will have the most positive impact in reducing net GHG emissions. However, it is not necessary to use this tool. It is also acceptable to carry out a GHG quantification exercise using any reputable standard or methodology.

Once farm or group management has calculated GHG emissions, they need to set targets and define a strategy to meet these targets. Targets for greenhouse gas reductions set by producers, and strategies identified to meet these targets, should be put together in a GHG emissions reduction plan and included as a section in the Farm Management plan. The GHG emissions reduction plan should be monitored regularly and updated annually. This will make it easier for management to track the progress to be measured in the Smart Meter (6.9.1).



INSIGHTS ON THE COOL FARM TOOL

The Cool Farm Tool can be used in all countries across the globe and is available online. CFT is non-crop specific. In the CFT, Emissions can be divided into three groups of activities (or scope):

- Scope 1: All Direct emissions from the activities of an organization or under their control.
- Scope 2: Indirect emissions from electricity purchased and used by the organization.
- Scope 3: All other indirect emissions from activities of the organization, occurring from sources that they do not own or control¹.

The scopes for calculating GHG emissions are pre-selected in the Cool Farm Tool. Farmers, however, do not have to assess their emissions based on all the 3 scopes of the Cool Farm Tool laid out in the table below. **Farm management and group management can focus exclusively in scope 1 and scope 2.** In addition, Supply chain actors can also use the CFT to quantify and monitor their emissions and implement and monitor emission reductions.

Scope definition	Eligible scope under CFT
Scope 1: All Direct Emissions Direct emissions and emission removals within the farm boundary or which are owned or controlled on the farm.	<ul style="list-style-type: none"> • Fuel and energy use (on-farm and contracted) • Soil management practices • Incorporated crop residues • Fertility and biomass inputs • Land-use changes • Carbon sequestration by woodland • Waste and wastewater
Scope 2: Indirect Emissions related to electricity use Emissions associated with the generation of purchased electricity used on the farm or group management sites.	<ul style="list-style-type: none"> • Electricity production
Scope 3: All other Indirect Emissions Indirect emissions associated with the production, processing, and distribution of inputs into the farming systems. This also includes embedded emissions in machinery, building materials, and farm infrastructure.	<ul style="list-style-type: none"> • Production of fertilizers • Primary processing • Primary distribution

Table 1: Scope for Net GHG Emissions calculations in the Cool Farm Tool.²

GHG emission calculations must be made in relation to a specific time period (*temporal boundaries*) and a specific geographical area (*spatial boundaries*). Rainforest Alliance recommends that the data should be collected, and the emissions should be calculated yearly following an annual cycle. The spatial boundary should include all activities within the geographical boundaries of a certified farm and are under the producer's control and influenced by farm activities. Any additional area added into the farm or farm unit must be documented and included in the calculation. Any land removed from the farm or farm unit must be removed from the calculation, including any activities on that land that contribute to a reduction in emissions or count as emissions removals. Each producer or group manager must clearly define the spatial boundary of the farm/s before collecting data for input into the Cool Farm Tool. Maps delineating boundaries should be added to documentation where possible.

¹ For more information, please see Greenhouse Gas Protocol (<https://ghgprotocol.org/>)

² Adapted from https://www.goldstandard.org/sites/default/files/documents/cft_methodology_-_draft_for_public_comment_v1.pdf



IMPLEMENTATION OF SELF-SELECTED SMART METER (6.9.1)

Step 1: Document and quantify net greenhouse gas emissions

1.1 Record and document all sources of greenhouse gases from farm productions and processing at least for the following sources: fossil fuel and electricity; land-use change; agricultural waste and wastewater; and fertilizer. Emissions covered in the Cool Farm tool and accounted for are CO₂, CH₄, and N₂O. The table below offers some examples of GHG emission sources covered in the Cool Farm Tool.

Component	Activity of GHG emission source	Description	Greenhouse gas
Crop management	Conversion of land-use	Changes in soil and biomass carbon stocks due to conversion of other lands to agriculture.	CO ₂
	Change of tillage	Changes in soil carbon due to tillage practice.	CO ₂
	Use of fertilizers	Emissions from the fertilizer production process, and processes such as leaching of applied fertilizers.	CO ₂ , N ₂ O
	Use of pesticides	Emissions resulting from the use of machinery to apply pesticides.	CO ₂
	Residue management	Emissions due to the way crop residues are treated.	CH ₄ , N ₂ O
	Cover cropping	Changes in soil carbon due to the growing of cover crops, and incorporating the residues into the soil.	CO ₂
	Manure management	Emissions due to the application of manure.	CH ₄ , N ₂ O
	Livestock feed	Emissions from the production of the livestock feed	CO ₂
Fuel	Energy use	Emissions from energy used in field operations, e.g. tillage, spreading, etc.	CO ₂
		Emissions from energy used in primary processing.	CO ₂
		Emissions from energy used in irrigation.	CO ₂
		Emissions from energy used in transporting inputs to and products from the farm	CO ₂
Waste	Wastewater	Emissions due to the decomposition of organic matter in wastewater.	CH ₄

Table 2: GHG emission sources covered in the Cool Farm Tool³

³ Adapted from https://www.goldstandard.org/sites/default/files/documents/cft_methodology_-_draft_for_public_comment_v1.pdf



1.2 Identify the farm activities that are carried out on the farm that contributes to capturing carbon. The table below offers some examples of Carbon pools that capture carbon covered in the Cool Farm tool.

Carbon pool	Items
Above-ground tree and non-tree biomass	Stem, branches, bark, grass, herbs, etc.
Below ground tree and non-tree biomass	Roots of grass, trees, herbs.
Deadwood.	Standing and lying deadwood.
Litter	Fallen leaves, small fallen branches.
Soil organic carbon	Organic material.
Wood products	Furniture, construction material, etc.

Table 3: Carbon pools covered in the Cool Farm Tool⁴

1.3 Use the Cool Farm Tool, which is available [here](#), to calculate total annual net greenhouse gas emissions. The total net GHG emissions are the total GHG emissions less the carbon sequestered as a result of farm activities (See *Carbon pools above*).

⁴ Adapted from https://www.goldstandard.org/sites/default/files/documents/cft_methodology_-_draft_for_public_comment_v1.pdf



1.4 The following data is required to effectively use the tool in calculating the total annual net greenhouse gas emissions⁵ :

Component	Data requirements
Crop data	<ul style="list-style-type: none"> • Crop type • Year of harvest • Area of cultivation • Gross yield • Net yield • Quantity of crop residue and management system • Co-products (type of co-product and relative value to main crop)
	<ul style="list-style-type: none"> • Texture • Organic matter percentage • Moisture average • Drainage • Acidity
Farm inputs	<ul style="list-style-type: none"> • Fertilizer application (application rate weight/area, application method, type, fertilizer weight) • Crop protection inputs (pesticides, fumigants, fungicides – application goal, and doses)
Fuel and energy	<ul style="list-style-type: none"> • Energy source (e.g. petrol, electricity) • Consumption (e.g. gallons, kWh, costs) • Category (e.g. field (e.g. plow) and processing facility (e.g. dryer)) • Wastewater (volume, treatment process)
Water use	<ul style="list-style-type: none"> • Irrigation energy use
Carbon changes and sequestration	<ul style="list-style-type: none"> • Data on land-use conversions • Tillage practices over 20 years • Cover crops planting or destruction
Transport⁶	<ul style="list-style-type: none"> • Mode • Weight of goods for each transportation mode and event. • Distance of transportation for each mode and event.

Table 4: Data requirements for net GHG emissions calculation in the Cool Farm Tool

1.2 Calculate net greenhouse gas emissions per unit of the final product such as green tea leaves and dried cocoa beans (e.g. tons of CO₂e per kg of dried cocoa beans). To do this, divide the net total annual carbon equivalent emissions by the total harvested yield of the same reporting period.

1.3 Greenhouse gas quantified for the period becomes the base period for emission reduction targets to be based on.

⁵ Template for data collection has been made available here to facilitate data collection process for entry into the CFT.

⁶ Each transportation event should be captured separately



Step 2: Establish greenhouse gas reduction targets

- 2.1 Based on calculations from above, set reduction targets below the level of emissions quantified in step 1 above (e.g. 5% reduction in net GHG emissions), including a specific period to achieve the reduction (e.g. three years).
- 2.2 Establish emissions reduction targets per source of emissions that will contribute to the total value of emissions reduction (e.g. 25% reduction in GHG emissions from wastewater by reducing the amount of wastewater and changing the wastewater treatment to a more energy-efficient method)

Step 3: Develop and implement a strategy for target reductions

- 3.1 Use the Cool Farm Tool to run “what if” scenarios of what can be done differently from current practices to see what gains in reductions can be achieved.
- 3.2 Identify the appropriate activities that can contribute to the emissions reductions target established in Step 2. The table below gives some examples of activities that can contribute to emission reductions on a farm, as shown in the Cool Farm Tool.

Component	Activity	Example
Crop management	1. Conservation tillage	Changing from conventional tillage to minimum tillage.
	2. Reducing/switching/improving fertilizer use	Reducing amount of fertilizer applied.
		Switching from inorganic fertilizer to organic fertilizer.
		Improving the application of fertilizers.
	3. Reducing pesticide use	Reducing amount/dose of pesticides applied.
		Mulching.
	4. Residue management	Compost application.
5. Cover cropping	Growing of any cover crops on the farm.	
6. Agroforestry	Integrating shade trees e.g. with coffee.	
7. Improving manure application	Changing manure application method.	
Energy use	8. Reducing/avoiding GHG emissions from energy use	Changing source/type of energy used in field operations.
		Changing source/type of energy used in primary processing.
		Changing source/type of energy used in irrigation.
		Changing source/type of energy used in transport.
	9. Reducing/avoiding GHG emissions from wastewater	Reducing amount of wastewater.
Changing wastewater treatment method.		

Table 5: Activities that can contribute to emission reductions on farm



3.3 Add timelines to emission reduction activities and include these targets and timelines in the GHG emissions reduction plan. This plan should also be included as part of the Management Plan.

4.4 Implement activities in the plan.

Step 4: Monitor targets annually

4.1 Keep a farm log to record activity data and GHG emissions reduction actions taken on the farm. Monitoring helps to measure and keep track of the efforts pursued in greenhouse gas emissions reductions.

4.2 At least once a year, compare the total reduction of GHG emissions with the targets for GHG emissions reduction included in the Farm Management Plan.

4.3 Make a new calculation of net emissions per unit of the final product as specified in 1.5 of this guide. Make sure to also take account of changes in the volume of production as this will affect the overall calculation.

4.4 Compare reductions achieved for each of the specific farm productions and processing activities which are sources of GHG emissions, with the targets set for each source.

4.5 Identify any areas where targets have not been achieved. Identify why the targets have not been reached and what actions are needed to address these issues and improve GHG emission reductions in these areas.

4.6 Identify any additional areas where GHG emissions can be reduced and what actions can be taken to achieve this

4.7 Actions identified in steps 4.5 and 4.6 should be included in your GHG emissions reduction plan and as part of the Farm Management Plan for the next year.