CERCARBONO
Certified Carbon Standard

Forestry Consulting Group

Methodology M/UT/F-A01

To Implement GHG Removal Projects Through Reforestation, Forest Restoration and the Establishment of Woody Crops

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Version 1.1

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Acronyms

Abt	Aboveground tree biomass
Asb	Aboveground shrub biomass
Btb	Belowground tree biomass
CCMP	Climate Change Mitigation Programme or Project
CDM	Clean Development Mechanism
CO_2e	Carbon dioxide equivalent
Dw	Deadwood
GHG	Greenhouse Gases
GPS	Global Positioning System
IPCC	Intergovernmental Panel for Climate Change
ISO	International Organization for Standardization
L	Litter
MRV	Monitoring, Reporting and Verification System
PDD	Project Description Document
PRA	Participatory Rural Appraisal
RF	Reforestation
RT	Restoration
SDG	Sustainable Development Goals
Soc	Soil organic carbon
WC	Woody crop

Terms and definitions

The terms and definitions relevant to this methodology are presented below. For the content of each of these, please refer to the document "***Terms and Definitions of the Voluntary Certification Programme of Cercarbono***", available at www.cercarbono.com, section: Documentation.

- above ground biomass
- accreditation period
- activity data
- additionality
- agricultural activity
- agricultural land
- agroforestry system
- baseline scenario
- below ground biomass
- biomass
- bush
- carbon credit
- carbon dioxide equivalent
- carbon pool
- carbon stock
- Carboncer
- CCMP activity
- CCMP area
- CCMP developer
- CCMP duration
- CCMP holder
- CCMP lifespan
- CCMP start date
- climate change mitigation
- climate change mitigation action
- climate change mitigation programme
- climate change mitigation programme or project
- climate change mitigation project
- co-benefit
- confusion matrix
- dead wood
- deforestation
- eligibility
- emission factor
- forest
- forest activity
- forest degradation
- forest land
- forest plantation
- governance
- greenhouse gas
- greenhouse gas emissions
- greenhouse gas removal
- grouped programme
- grouped project
- instance
- inventory
- land use
- leakage
- litter
- methodology
- monitoring
- non-forest
- non-permanence
- overlap
- holdership
- principle
- Project Description Document
- project scenario

- reduction of greenhouse gas emissions
- reforestation
- removal factor
- restoration
- segment
- soil organic carbon
- source of greenhouse gas emissions
- stratum
- sustainable development
- timber product
- tree
- uncertainty
- validation
- verification
- verification period
- voluntary carbon market
- woody biomass
- woody crop
- woody species

Summary

This methodology provides the necessary elements to design and implement Climate Change Mitigation Programs or Projects (CCMP), which include the activity of removing GHG through reforestation processes, restoration in the forestry sector and the establishment of woody crops in the agricultural sector to qualify for payments for results or similar compensation due to its implementation supported by the voluntary certification programme of Cercarbono.

CCMPs must be developed according to the principles established by Cercarbono, and specifically those that correspond to the activity to be implemented, complying with the guidelines of this methodology, including, among others, the object and applicability conditions established (***Section 3***), the guidelines to determine the eligibility of the areas in which a CCMP of this type can be implemented (***Section 4***), the elements to delimit the scope and framework of action of this, including the types of carbon pools and sources of GHG emissions (***Section 5***), the baseline and project scenarios and their reassessments in three types of defined segments and the procedures for estimating GHG emission sources and GHG removals under these scenarios (***Sections 6*** and ***7***), how to report co-benefits or contributions of the CCMP to the achievement of the SDGs (***Section 8***), the basis for monitoring consistent with the activities integrated in the CCMP and generating the results achieved by the CCMP (***Section 9***) as well as other required complementary actions.

Foreword

Cercarbono, as a voluntary carbon certification programme, has supported and financed the elaboration of this methodology, developed in conjunction with Forestry Consulting Group, reviewed by its internal technical team and endorsed by its board of directors and CEO.

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This document will be updated when its scope needs to be broadened or adapted to national and international circumstances.

A draft of the methodology has been made available for public consultation on the Cercarbono website and through invitations to individuals and public and private organisations. Their contributions have been considered in the elaboration of the final version.

1 Introduction

The land use sector is quite relevant to human performance and survival. It is still the primary basis for their livelihoods, including food supply and other services provided by their constituent ecosystems. According to the Intergovernmental Panel on Climate Change (IPCC), this sector comprises six categories: Forest Land, Cropland, Grassland, Wetlands, Settlements, and Other Land. Although these categories may vary from one country to another, for climate change mitigation, those established by the IPCC are used, which are those reported in each country's national GHG inventory.

Internationally, it has been repeatedly pointed out that land use contributes directly to climate change, as they are attributed between 21 % and 37 % of the total net anthropogenic GHG emissions present in the atmosphere (IPCC, 2019), mainly due to deforestation, oxidation of timber products, soil cultivation or poor modes of production, fertiliser use and land use change, which in many cases generate degradation and desertification.

It is also well known that land use has a dual role, not only as a source of GHG emissions but also as a sink (due to anthropogenic and natural factors), by storing GHG in carbon pools such as living biomass, mainly woody biomass.

Therefore, land use categories such as forest and agricultural land can play a significant role in mitigation actions to reverse the adverse impacts of climate change through activities that encourage the planting, growth or maintenance of tree and shrub vegetation through reforestation or forest restoration and the establishment of sustainably managed woody crops.

There are currently numerous initiatives to promote climate change mitigation actions in these sectors and generate GHG removals and reductions of GHG emissions leading to carbon credits.

Consequently, it is relevant to develop a methodology for quantifying GHG removed in the categories of forest and agricultural lands that allow the participation in the voluntary carbon market of all stakeholders. In that sense, Cercarbono developed the present methodology considering the guidelines established in ISO 14064-2:2019 Standard, focused on GHG removing through reforestation and forest restoration activities and the establishment of woody crops.

2 Principles

The principles set out the basis for the justifications and explanations required in this document and the CCMP should reference the relevant principles and how they have been applied per the Cercarbono's Protocol and ISO 14064-2:2019 Standard. The principles listed here aim for a fair representation and credible accounting of carbon credits achieved by CCMPs focused on GHG removal or reductions of GHG emissions through reforestation or forest restoration processes or the establishment of woody crops.

Accuracy

Measurements made in the CCMPs agree with or reasonably close to the actual values.

Coherence

The results of the GHG emissions inventories, both in the baseline and project scenarios, must be comparable over time. Any changes in the data, scope, calculation methods, or other factors that are relevant to the time series need to be clearly documented.

The calculations performed by the CCMP must be reproducible and technically validated, so that they can generate consistently well-supported results.

Comparability

Results obtained by the CCMP activity must be comparable with the use of methodologies, guides, and protocols, among others, so that the estimation and calculation of GHG emissions and removals, and reductions of GHG emissions achieved by the CCMP can be independently evaluated and homologated.

Completeness

All significant GHG emission sources generated by the CCMP must be included, as appropriate to the type of programme or project. Those sources that, added together, do not exceed 5 % of the total emissions generated by the CCMP throughout its period of accounting for results are considered non-significant. Likewise, all relevant information that supports decision-making and the results expected or achieved by the CCMP, as well as the procedures to achieve said results, must be included.

Conservativeness

Conservative assumptions, methodologies, values, and procedures should be used to ensure that CCMP GHG emissions are not underestimated and that CCMP GHG removals and reductions of GHG emissions are not overestimated.

The data, assumptions and procedures used for calculations of GHG emissions and removals, and reductions of GHG emissions must be technically correct, consistent, and

reproducible. On the feasibility of using two values of the same parameter at the same scale, the most conservative one should be used.

Consistency

The assumptions, values and procedures used by the CCMP for the calculation of GHG emissions and removals, and reductions of GHG emissions shall be technically correct, consistent, comparable, and reproducible.

Do not generate net damage

It must be ensured that the programme or project activities contemplated by the CCMPs do not generate net damage to the areas or communities surrounding it, in social, environmental, or legal aspects, due to the benefits achieved around the mitigation of climate change.

Evidence

The evidence used by the CCMP must be sufficient and appropriate to ensure that rational, reliable, and reproducible methods are employed to ensure that GHG removals and reductions of GHG emissions are genuine and correctly calculated.

Exhaustiveness

All relevant information should be included to support decision-making, minimising uncertainty, increasing confidence in the data and results expected or achieved by the CCMP, as well as the procedures for achieving those results, to generate comprehensive, accurate, consistent, comparable, complete, and reproducible accounting and reporting of GHG emissions and removals, and reductions of GHG emissions under consideration.

Integrity

All GHG emission sources and carbon pools should be included along with quantification of their GHG emissions and removals in the baseline scenario, as well as GHG emissions and removals, and reductions of GHG emissions generated in the project scenario, using data and parameters from recognised sources, as well as technically supported modelling.

No double counting

A tonne of carbon dioxide equivalent (tCO_2e) resulting from the removal of GHG or the reduction of GHG emissions generated by the CCMP may not:

- Be counted more than once to demonstrate compliance with the same GHG mitigation goal.
- Be accounted for to demonstrate compliance with more than one GHG mitigation goal.
- Be used more than once to obtain remuneration, benefits, or incentives.

- Be verified, certified, or accredited through the implementation of more than one GHG mitigation initiative.

In this regard, Cercarbono has developed the guidelines "***Carboncer Issuance and Retirement Procedures and Double-Counting Prevention Policies***", available at www.cercarbono.com, section: Documentation.

Precision

Efforts should be made to reduce the variability or dispersion (standard deviation) of the information obtained in the measurement of GHG emissions and removals, and reductions of CCMP GHG emissions, minimising the standard deviation between data. Efforts should also be made to ensure the accuracy of the information, raising its credibility, and strengthening the principles of accuracy and transparency.

Reliability

Data and parameters from recognized sources must be included, as well as technically supported models that support the GHG removals and reductions of GHG emissions calculated, accounted for, or monitored by the CCMP. The data, variables and parameters must be representative of the reality or context in which the CCMP is developed, for which it is urged to use direct measurement methods that integrate statistical representativeness.

Recognized sources are those included in the Good Practice Guide of the IPCC in its most up-to-date version, or in previous versions if their use is technically justified, as well as the methodological tools of the Clean Development Mechanism (CDM). Academic articles published in indexed journals are also valid.

Transparency

Genuine, clear, honest, justified, justified, appropriate, understandable, truthful, timely, transparent, robust, sufficient, and auditable information related to the CCMP's processes, assumptions, processes, and intrinsic limitations shall be used, so as to ensure the reliability and credibility of its GHG removal and reduction of GHG emission results. All references and sources of information must be explicitly mentioned and made available to third parties, ensuring that they are public and permanent, so that any calculations can be reconstructed and generate results equal to those obtained by the CCMP.

3 Purpose and conditions of applicability

This methodology can be applied by any natural or legal person, public or private, that intends to establish a CCMP focused on the GHG removal in the categories of forest and agricultural land through reforestation[1] or forest restoration processes or the establishment of woody crops, to qualify for payments for results or similar compensation, because of actions to GHG remove that generate the increase of carbon content in the carbon pools in these land uses. CCMPs may include agroforestry systems in the woody crops segment if such systems do not have a livestock component.

This methodology applies to CCMPs that meet the standards described in this section.

The conditions to be met by the CCMP are:

- The areas in which the CCMP is implemented must not have been covered by forest for at least ten years before the activity's start date.
- In the case of activities on agricultural land, the primary or exclusive component of the crops to be established must include perennial woody species, if the species considered are native or naturalised in the country where the CCMP is implemented or, otherwise, that they have been used in traditional or commercial crops for more than 10 years, in a total area at least equal to the area to be implemented by the CCMP.
- CCMPs must demonstrate their additionality by meeting the criteria established by Cercarbono in the "***Cercarbono's Tool to Demonstrate Additionality of Climate Change Mitigation Initiatives***", available at www.cercarbono.com, section: Documentation.
- This methodology does not apply to wetlands or floodplains. Drainage of wetlands (due to N_2O emissions) and flood irrigation (due to CH_4 emissions) are not allowed.
- The CCMP must demonstrate holdership or administrative capacity of the areas where it implements its activities.

All the above items must have their respective supporting documentation.

The retroactivity period accepted as the CCMP's pre-operational start date is defined in the Cercarbono's Protocol.

The following rules are established for the proper interpretation and adoption of some verbs or concepts used throughout this methodology:

a) Must (shall) is a mandatory requirement.
b) Explain/justify is to state how/why procedures or activities have been established or selected or implemented.

[1] This methodology does not distinguish between the concepts of "afforestation" and "reforestation" since the difference between the two does not affect the conditions of applicability.

c) May is an optional compliance requirement.
d) Official refers to processes generated by state institutions.
e) Recommendation is a guideline to perform an optional action.
f) Representative and its derivatives is a purely statistical interpretation.
g) Significant is considered to be the categories that group 95 % or more of the total of the measured variable.

4 Eligibility and inclusion requirements

4.1 General eligibility requirements

The following are the basic eligibility requirements for the inclusion of areas in a CCMP:

- Areas must have been free of forest for at least ten years before implementing the CCMP.
- Implementation of the CCMP must not cause disturbance to natural forests.
- Areas located in wetlands or mangroves are not eligible, as their management conditions require the use of a specific methodology.

In case of not having the cartographic or documentary information to support the analysis of eligible areas, a Participatory Rural Appraisal (PRA) is allowed, which must be supported considering adequately recognised methodologies for this type of social work.

To support the eligibility of areas, the CCMP shall:

1. Provide evidence of mapping with a reliable source of drone or Global Positioning System (GPS) information[2], which shall be proportional to the scale of the project following the guidelines defined by ISO 19157:2013 Standard or by the institution in charge of the official cartography of the country where the CCMP is implemented.

2. Define the cartography compatible with a Geographic Information System in *shapefile* format *(.shp)* in the coordinate system defined by the institution in charge of the official cartography of the country where the CCMP is implemented.

3. The minimum mappable area, understood as the minimum unit of interpretation of cartographic sources and corresponding to the scale of work, must be equal to the minimum size established in the forest definition of the country where the CCMP is implemented.

Note: The management unit for agricultural activities is the plot (woody crop segment) or stand (reforestation or forest restoration segment), which can be a continuous unit or be made up of a maximum of two polygons that may have areas smaller than the minimum forest area defined by the country where the CCMP is located for the CDM, which may be separated by a land feature (power line, forest road, water network, protection zones, among others), as long as such separation is no more than 20 meters between the closest points.

4. Meet the applicability conditions defined in ***Section 3***.

5. Comply with the environmental legal regulations in force in the country where the CCMP is implemented.

[2] The use of free map viewers as a source of complementary information is allowed as long as the images used, or maps are from the same date of the period evaluated.

6. The use of cartographic information with date differences of no more than one year to the analysed date is permitted.

7. Participatory Rural Appraisal is an allowed mechanism for information collection in case gaps in the multi-temporal or spatial eligibility analysis need to be filled.

4.2 Eligibility analysis

The eligibility analysis comprises the following steps:

4.2.1 Collection of cartographic information

Information sources from remote sensing, orthophotos, land cover or land-use planning tools developed by institutions in charge of official cartography in the country where the CCMP is implemented are allowed, classified in medium spatial resolution and high spatial resolution.

- **Medium spatial resolution:** information with a spatial resolution of 30 m to 100 m, allowing working scales smaller than 1: 50,000 to be defined, from spectral sensitivity systems or satellite images such as Landsat, SPOT, ALOS, AVNIR-2, ASTER and IRSS.

- **High spatial resolution:** information with a spatial resolution of less than 30 m, allowing working scales greater than 1: 50,000 to be defined, from spectrally sensitive systems, satellite, or aerial imagery such as Sentinel, RapidEye, orthophotos and LiDar.

Consideration should be given to the final scale of outputs and the relevance of information sources according to the size of the discrete areas included and the total area of the CCMP.

The following table shows the structure of how CCMP **can** present the information.

Table 1. Possible structure of presentation of CCMP support information.

Department	Geographical location detail or sub-scene	Type of information source*	Area of coverage (ha)	Date of information source

* Image, orthophoto, official map or other applicable sources.

4.2.1.1 Participatory Rural Appraisal (PRA)

This methodology allows the use of a PRA (a methodological tool developed by the *World Resources Institute*) to support the formulation and implementation of the CCMP. PRA is adapted in this document so that social actors (direct and indirect) are involved in validating information on the coverage of the areas. These stakeholders help analyse and identify the areas of intervention of the CCMP in line with local guidelines or national mandates.

To carry out the PRA, the developer or holder of the CCMP must formulate a work plan for its implementation that includes, but is not limited to:

- The planning of the PRA (call, attendance, and planning documents, among others).
- The development of the PRA (workshops and leaders) in which attendance lists (see ***Table 2***), participatory construction of ideas or documents, collection of information, generation of minutes, among others, are generated. Participation should be guaranteed through the accompaniment of local authorities for the development of the evaluation workshops. These workshops must ensure the attendance of community leaders, local governance structures and inhabitants of the populations involved in the CCMP. At least two moments should be guaranteed: in the first moment, information can be gathered about the communities and institutions surrounding the CCMP area, whose process should be documented with traceable and verifiable evidence; in the second moment, the coverage maps generated in the first moment can be validated with the support of the communities and institutions.
- The evaluation and conclusions of the PRA (documents supporting the analyses carried out and the commitments reached).

The following table shows the structure of how the CCMP **can** present the supporting information for assistance during the participatory evaluation at different stages of its implementation.

Table 2. Sample PRA event attendance list.

Stage*	Date	Name	Town or municipality	Position or role and institution

* Stage refers to the level of implementation of the CCMP, which may be in design, formulation, or implementation.

4.2.1.2 Information in raster format

Information in raster format must be used with specialised software for the interpretation of the images. In addition, each process must be documented: pre-processing, corrections, enhancements, classification, assignment, and final interpretation of images.

4.2.1.3 Information in vector format

The sources of vector information used must be identified, described, and supported. If vectorisation of images is required, the procedure used should be documented.

Whether raster or vector information is used, the procedure for arriving at the land cover maps at each of the dates of analysis must be supported.

4.2.1.4 Documentary information

The documentation used for the analysis must consider the entire area to be included in the CCMP and must support the existing land covers at the date for which the analysis is made. The cartographic interpretation must be complemented to support the land covers at the start date of the CCMP and those at the time of legal support.

4.2.2 Map cross-referencing and land cover changes

With the maps generated in each period, a matrix of changes or confusion should be made, showing in the two periods of analysis which land covers remain as forest and which change to non-forest.

A change or confusion matrix is a square matrix of *n* x *n*, where *n* refers to the number of land covers. This matrix shows the relationship between two years of analysis corresponding to the area under study. The first row corresponds to the land covers determined in Year 1 (the start date of the CCMP). The first column corresponds to the land covers specified in Year 2 (ten years before the start date of the CCMP). It includes the areas for each period of analysis to corroborate the accuracy of the classification and the changes in land covers to be considered in the eligibility analysis.

The following table shows how the CCMP **can** present the information for the change or confusion matrix.

Table 3. Example of change or confusion matrix structure.

Crossover Year1/Year2	Forest 1	Land cover 1-1	Land cover 1-2	Land cover 1-n	Total Year 1
Forest 2					
Land cover 2-1					
Land cover 2-2					
Land cover 2-n					
Total Year 2					

4.2.3 Eligible areas

Eligible areas must be determined according to the cross-referenced information and presented in a traceable way, in ***shapefile*** (*.shp*) format where the data is evidenced and presented transparently.

The following table presents the structure of how CCMP **can** submit information for eligible areas.

Table 4. Example of structure for the presentation of eligibility related information.

ITEM	Forest	Land cover LB1*	Land cover LB2*	Land cover LBn*	Total
Eligible Area					
Ineligible Area					
Total (ha)					

* Land cover LB1: Land cover at the first point in time; Land cover LB2: Land cover at the second point in time; Land cover LBn: Land cover at the n-th point in time.

4.3 Compatibility with land use categories, land use planning and applicable environmental legislation

The CCMP shall demonstrate the compatibility of the actions developed with the land use categories, if any, in the country where it is implemented.

If the initiative intends to be implemented in areas of environmental protection, a permit or authorisation must also be obtained, as appropriate, from the environmental authority with jurisdiction in the intervention area, which will verify the compatibility of the CCMP with the management instrument and the zoning established therein.

The CCMP should specify all applicable laws, statutes, and regulatory frameworks (local, regional, national, etc.) in force regarding land categorisation or management and should identify, implement, and periodically evaluate compliance with them.

4.4 Demonstration of the ability to act on CCMP areas

The CCMP must demonstrate or obtain the express authorisation of the holder, possessor, or administrator, individually or collectively, of the property(ies) or boundary(ies) where the programme or project is intended to be developed.

In privately owned properties, express proof must be provided by the owner, possessor, or holder of the property(ies) authorising the implementation of the CCMP. The delimitation of the area of possession corresponds to a declaration of holdership or administration.

4.5 Additionality

Additionality under this methodology follows the criteria set out in the Cercarbono document "***Cercarbono's Tool to Demonstrate Additionality of Climate Change Mitigation Initiatives***", available at www.cercarbono.com, section: Documentation.

5 CCMP delimitation

The delimitation of the CCMP requires the definition of the different elements that specify its geographic and temporal scope, activities, emission sources and carbon pools. Some of these elements are definitively established for the validation of the CCMP. Therefore, they cannot be modified (start date and duration, activities, emission sources and carbon pools considered). In contrast, others can be modified due to changes in its implementation (segments, their spatial limits, net GHG removals estimated in the baseline and project scenarios and those achieved during its implementation).

5.1 Time limits

The temporal limits of the CCMP must be explicitly defined in the Project Description Document (PDD). GHG removal credits can only be obtained during the period determined within these time limits. They must be defined in terms of the **start date of the CCMP** (day.month.year), **duration or lifetime**[3] (in years) and **crediting period** (in years) and may not be modified after validation. They shall be the same for the baseline and project scenarios and the reassessment of these scenarios.

5.2 Activities considered - Segments

As mentioned in ***Section 3***, this methodology can be used to implement CCMPs focused on the GHG removal through reforestation, forest restoration and the establishment of woody crops. The set of areas of a CCMP comprising each of these processes is called a segment.

This methodology defines three types of segments: reforestation, restoration, and woody crops. A CCMP **may** include any or all three types of segments, but once the project has been validated, new segments may not be included, or segments already included may not be excluded. Segment activities may be implemented separately or together in the same CCMP, if the conditions set out in ***Section 3*** are met.

5.3 Spatial boundaries - Initial definition

The segments that will be considered, their area and strata must be explicitly delimited once the activity to be implemented has been defined. The eligible areas that will be part of the CCMP have been identified.

Each segment must meet specific eligibility requirements and cannot overlap either spatially or temporally with another segment. Segments (portions of the land where reforestation, forest restoration or establishment of woody crops will take place) must be explicitly identified, among others, to avoid double counting of results. All segments must be in the CCMP area.

[3] The crediting period must include at least one harvest or growing cycle but may include more than one such cycle.

Strata are the potential **types** of plots or stands that can be established (in the reforestation segment and the woody crops segment) and restored (in the restoration segment), grouped by having characteristics in common for calculation purposes, at different stages of the implementation of the CCMP (e.g., based on planting, restoration or seeding plans or species used).

The spatial boundaries of the segments considered in the CCMP may change during its implementation, either because sites are added or removed. The rules and calculations for these are presented in ***Section 7***.

5.4 Sources of GHG emissions

The sources of GHG emissions considered in this methodology are those that occur from burning and fires, fertiliser application and fossil fuel consumption in agricultural machinery in the segment of woody crops.

Fires are conservatively excluded from the baseline scenario and its reassessments but included in **all** segments of the project scenario and its reassessments.

Burning can only be considered in the baseline scenario and its reassessment if it is common practice in the region where the CCMP is implemented for the woody crops or the type of plantation to be implemented. In the project scenario, burning can only be used if permitted by law, in which case it must be estimated according to the guidelines explained in ***Section 7.2.2***. Possible GHG emission sources are presented in ***Table 5***.

Table 5. GHG emission sources considered.

Source of emission		Baseline scenario	Project scenario	Justification
Reforestation and restoration				
Fires				
	CO_2	No	No	Considered in carbon stock calculations.
	No-CO_2	No	Yes	Conservatively excluded in the baseline scenario.
Biomass burning				
	CO_2	No	No	Considered in carbon stock calculations.
	No-CO_2	Optional	Optional	In the baseline scenario, only if it is common practice in the region and only if it is included in the project scenario. In the project scenario, only if permitted by law.
Use of synthetic and organic fertilisers				
	N_2O	No	No	Nitrification/denitrification of fertilisers and organic supplements applied to soils.
	CH_4	No	No	Emissions of this gas from this source are not expected to occur at this type of activity.
Woody crops				
Fires				
	CO_2	No	No	Considered in carbon stock calculations.
	No-CO_2	No	Yes	Conservatively excluded in the baseline scenario.

Source of emission		Baseline scenario	Project scenario	Justification
Biomass burning				
	CO_2	No	No	Considered in carbon stock calculations.
	No-CO_2	Optional	Optional	In the baseline scenario, only if it is common practice in the region and only if it is included in the project scenario. In the project scenario, only if permitted by law.
Use of synthetic and organic fertilisers				
	N_2O	Yes	Yes	Nitrification/denitrification of fertilisers and organic supplements applied to soils.
	CH_4	No	No	Emissions of this gas from this source are not expected to occur at this type of activity.
Fossil fuel consumption in agricultural machinery				
	CO_2	Yes	Yes	Main GHG of this emission source.
	N_2O	No	No	Potentially very low emission.

5.4.1 GHG Emissions from biomass burning and fires

In reforestation and restoration processes, burning for soil preparation or crop harvesting is not permitted. Therefore, although burning could occur in the baseline scenario, it is conservatively excluded for the segments above.

In the case of woody crops, it is possible to consider controlled burning for site preparation and harvesting of crops, if it is permitted by law; otherwise, these activities should not be considered, even if they occur in the baseline scenario.

Since the estimate of this emission source may be subject to change due to a different implementation of the CCMP than presented during validation and therefore a reassessment of the baseline or project scenario is required, this estimate is presented in ***Sections 7.2.1*** and ***7.2.2***.

5.4.2 GHG emissions from use of fertilisers

GHG emissions associated with fertiliser use are considered only in the woody crops segment.

The estimation of this emission source may be subject to changes due to a different implementation of the CCMP than the one presented during validation. In such a case, a reassessment of the baseline or project scenario is required. This estimation is presented in ***Section 7.2.3***.

5.4.3 GHG emissions from fossil fuel consumption in agricultural machinery

GHG emissions from fossil fuel consumption in agricultural machinery are considered only in the woody crops segment for both the baseline and project scenarios.

The estimation of this emission source may be subject to changes due to a different implementation of the CCMP than the one presented during validation. In such a case, a

reassessment of the baseline or project scenario is required. This estimation is presented in ***Section 7.2.4***.

5.5 Carbon pools

The carbon pools included in a CCMP are those significant pools that can be measured to assess carbon content in the baseline scenario and whose changes are evaluated in the project scenario associated with the implemented activities.

The carbon pools contemplated from the baseline scenario correspond, at a minimum, to those significant carbon-containing pools in the baseline scenario land covers that are susceptible to significant change due to CCMP implementation, as presented in ***Table 6***.

Table 6. Carbon pools.

Land use / Carbon pool	Reforestation	Restoration	Woody crop	Justification
Aboveground tree biomass (***Atb***)	Yes	Yes	Yes	Main carbon pool.
Belowground tree biomass (***Btb***)	Yes	Yes	Yes	Main carbon pool.
Aboveground shrub biomass (***Asb***)	Optional	Optional	Optional	They can be conservatively excluded.
Deadwood (***Dw***)	No	Optional	No	
Litter (***L***)	No	Optional	No	
Soil organic carbon (***Soc***)	Optional	Optional	Optional	

Since the estimation of carbon stocks in carbon pools may be subject to change due to a different implementation of the CCMP than presented during validation. Therefore, a reassessment of the baseline or project scenario is required, as explained in ***Section 7.3***.

6 Identification of the baseline scenario, definition of segments and strata

The baseline scenario in this methodology consists of estimating the amount of carbon in carbon pools and significant source emissions (as applicable to the segments considered) that would have occurred within the CCMP boundary in the absence of the activities planned to be implemented. Potential emission sources and carbon pools to be included are detailed in ***Table 5*** and ***Table 6***, respectively.

Segments represent the different activities that are eligible in this methodology. They should be projected in the project scenario and implemented in the field. Therefore, segments, their specific areas and corresponding strata must be defined from the beginning.

Usually, land cover is used as the **stratification criterion** for the baseline scenario, with the possibility of using additional stratification criteria (either higher or lower hierarchy) such as region, climate, among others.

Eligible land covers of the baseline scenario of the areas to be intervened are presented in ***Table 7***. Biomass and carbon contents of these land covers can be taken from IPCC or from national forest inventories applicable to the country where the CCMP is to be developed, considering the most recent versions, the most conservative and the least uncertain values. The CCMP can determine its parameters and data if they are consistent with the methodologies reported by these sources.

Land covers that are considered eligible and ineligible in each segment are presented below. In addition, those defined in the country implementing the CCMP should be considered.

Table 7. Eligible and ineligible land covers of the baseline scenario.

Eligible coverages	Ineligible coverages
Reforestation	
Heterogeneous agricultural areas without woody crops	Shrublands
Areas with little or no vegetation	Forests
Non-woody permanent crops	Woody crops
Short-term crops	Forest plantations
Grasslands	Peatlands
Low secondary vegetation	High secondary vegetation
	Swampy areas
Restoration	
Heterogeneous agricultural areas	Forests
Areas with little or no vegetation	Peatlands
Non-woody permanent crops	Swampy areas
Short-term crops	
Grasslands	
Forest plantations	
Low secondary vegetation	

Eligible coverages	Ineligible coverages
Woody crops	
Heterogeneous agricultural areas without woody crops	Shrublands
Areas with little or no vegetation	Forests
Non-woody permanent crops	Woody crops
Short-term crops	Forest plantations
Grasslands	Peatlands
Low secondary vegetation	High secondary vegetation
	Swampy areas

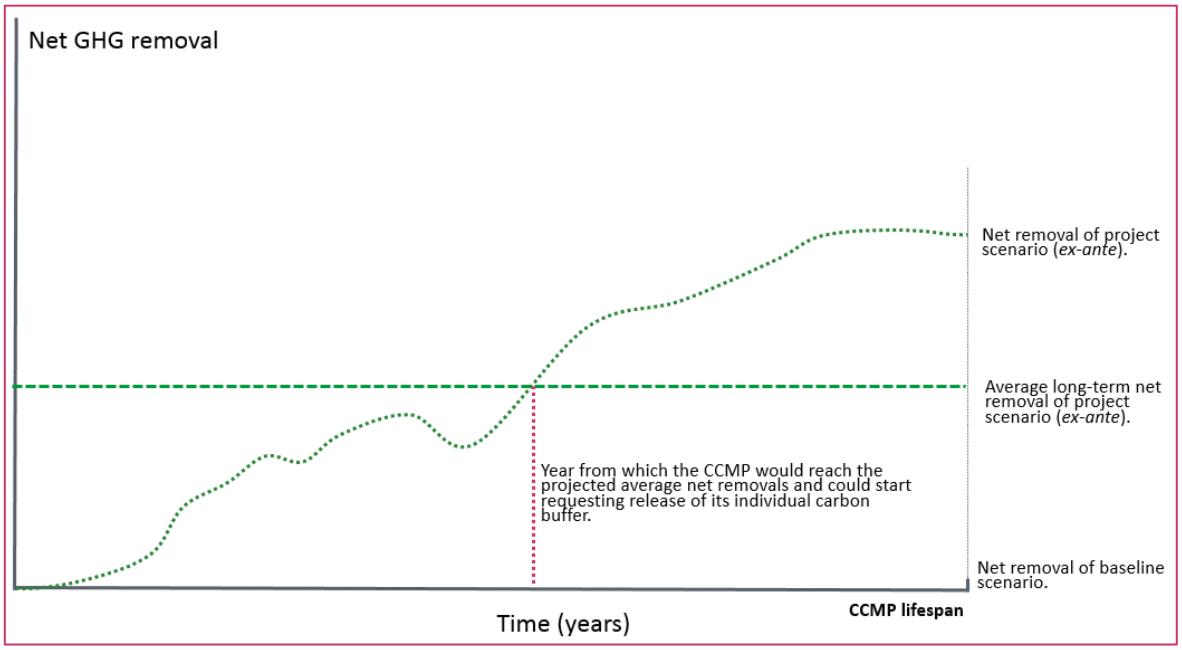
7 Generic process for estimating and reassessing baseline and project scenarios

For each CCMP segment, it is necessary to estimate the net GHG removals occurring under baseline and project scenario during its lifetime and reassess them (where required), according to the sequence described below.

Reassessment is necessary to recalculate the total long-term mitigation potential, which varies if the implementation of the CCMP results in a different baseline scenario (e.g., if areas are expanded or changed) or in a different net GHG removal than presented in the initial project scenario (e.g., due to inclusion or exclusion of new areas, correction of areas, different growth rates or years of implementation than planned, etc.).

Figure 1 presents a generic project scenario, with its estimate of net carbon accumulated over the implementation period of the CCMP, which is the basis for the calculation of the point in time from which the CCMP can request the release of its credit pool, as set out in the "***Cercarbono's Tool for Estimating the Carbon Buffer in Climate Change Mitigation Initiatives in the Land Use Sector***" (hereafter the **Buffer Tool**).

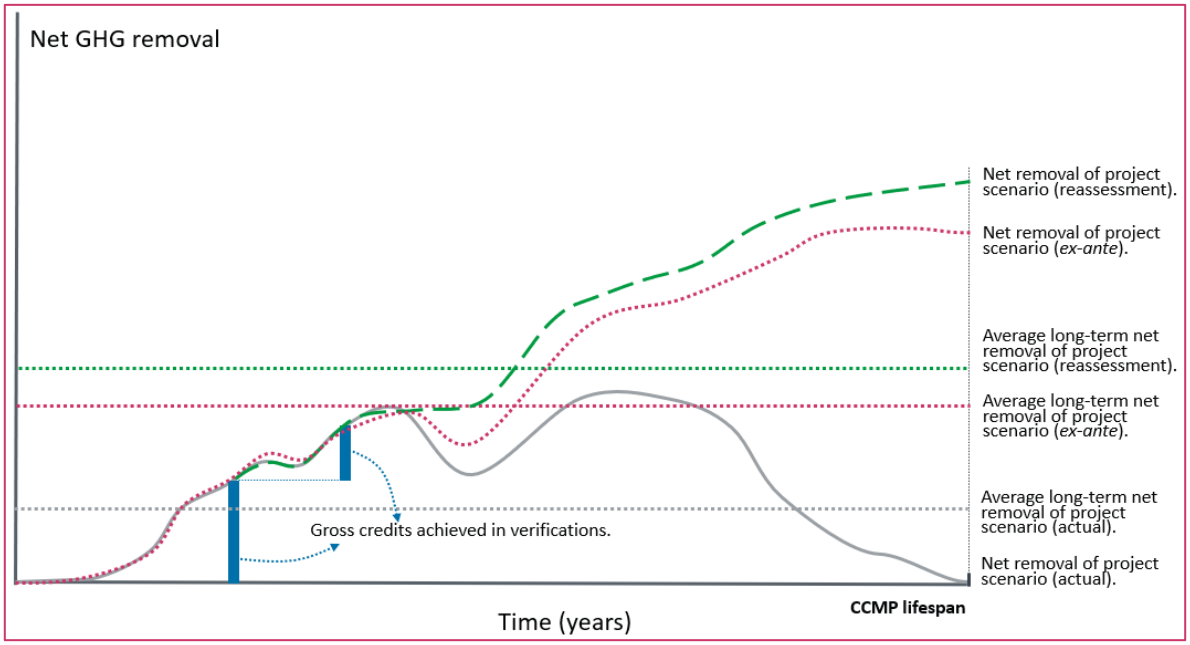
Figure 1. Representation of a generic project scenario and its long-term average net removal.



However, it is likely, especially in land use related CCMPs, that project implementation will differ from what was planned, either due to technological changes, external events or the inclusion of new areas in the segments, as in the case of grouped projects. In this case, average net carbon may increase relative to the baseline or project scenario (as shown by the fuchsia lines in ***Figure 2*** in the case of the project scenario), or it may decrease relative

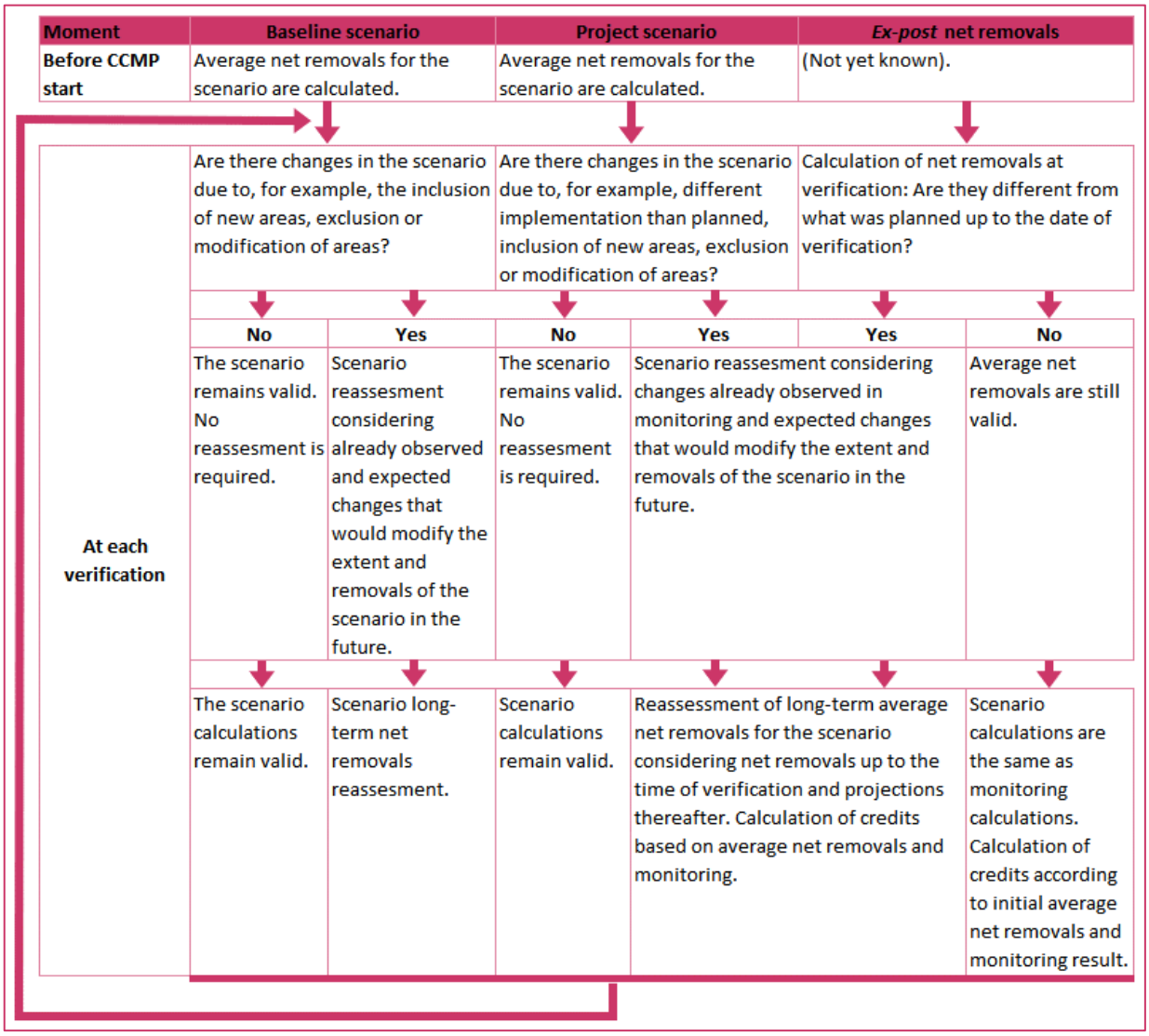
to what was initially planned, or even to what was reprojected during a previous verification, as shown by the grey lines in the same figure.

Figure 2. Representation of two possible reassessments of the project scenario of a CCMP with the inclusion of additional areas from the first verification and subsequent decline of the CCMP in the long term.



If the projected net removals from the CCMP change from what was initially projected in the PDD, a reassessment of the baseline or project scenario will be necessary, as it is the project's net removals that determine the point at which release of the individual CCMP carbon pool is possible. Because a project's change in area also affects its baseline scenario calculations, it is likely that a project will need to perform reassessments of its baseline and project scenarios at each verification to update the CCMP's average net removals and determine the pools to be sequestered or released at each verification. This sequence of reassessments is outlined in ***Figure 3***.

Figure 3. Calculation cycle of baseline and project scenarios and reassessment of these scenarios due to different implementation than planned.



7.1 Spatial boundaries

The spatial boundaries may change over time due to differences in implementation by excluding or adding areas from the different component segments. These potential changes in CCMP boundaries would imply, once they occur, differences in the baseline and project scenario estimates, as well as other values for long-term average net removals, which set a baseline limit for the number of credits the CCMP can earn.

As mentioned in ***Section 5.3***, in the cases of project scenario and CCMP reassessment, the total area of the segment should be the same as that defined for the baseline scenario. However, suppose the implemented area is different from the planned area and therefore different from the baseline scenario. In that case, it will be necessary to redo the baseline scenario estimates as described in the remainder of this section.

The variables related to the definition of spatial boundaries are presented in ***Table 8***.

Table 8. Variables related to the definition of spatial limits of the CCMP.

Variable	Description	Units	Segment		
			RF*	RT*	WC*
TSA	Total area of the segment in the corresponding baseline, project, or reassessment scenario.	ha	X	X	X
AS_f	Total area of stratum f of the segment in the corresponding baseline, project, or reassessment scenario.	ha	X	X	X
TNS	Total number of segment strata in the corresponding baseline, project, or reassessment scenario.	N/A	X	X	X

* RF: Reforestation
RT: Restoration
WC: Woody crops

7.2 Estimation of GHG emission by sources

7.2.1 GHG emissions from fires

Fires are conservatively excluded in all segments of the baseline scenario and its reassessments.

In the project scenario and its reassessments, fire emissions for a particular occurrence are estimated using the CDM *A/R Methodological Tool*[4]. Total emissions for a fire segment are calculated using the following equations, as appropriate:

For the project scenario:

$$PFE = \sum_{t=1}^{T} \sum_{f=1}^{TNS} PFE_{f,t} \qquad \textit{Equation 1}$$

For reassessments of the project scenario:

$$PFE = \sum_{t=tvx+1}^{T} \sum_{f=1}^{TNS} PFE_{f,t} \qquad \textit{Equation 2}$$

Where ***t*** = ***tvx+1*** through ***T*** come from *ex-ante* calculations.

[4] *A/R Methodological Tool: Estimation of non-CO_2 GHG emissions resulting from burning of biomass attributable to an A/R CDM project activity (Version 04.0.0).*

Variable	Description	Units	Segment		
			RF	RT	WC
PFE	Non-CO_2 GHG emissions per segment fires, in the project scenario or its reassessment.	t-CO_2e	X	X	X
$PFE_{f,t}$	Non-CO_2 GHG emissions from fires in stratum ***f*** and in year ***t*** of the segment, in the project scenario or its reassessment.	t-CO_2e	X	X	X
f	Index of the segment stratum in the baseline, project or re-assessment scenario considered.	N/A	X	X	X
t	CCMP year index.	N/A	X*		
tvx	Year of verification counted from the CCMP start date.	N/A	X*		
T	Total duration of the CCMP.	years	X*		
TNS	Total number of strata of the segment in the corresponding baseline, project, or reassessment scenario.	N/A	X	X	X

* Similar variables and indices defined or calculated at the project level do not take values for each segment, so they are combined in the variable tables of the corresponding equations.

7.2.2 GHG Emissions from burning

The calculation of GHG emissions from burning (for site preparation or disposal of harvest residues) is performed for the baseline and project scenarios only if burning is allowed by law; in this case, a reassessment of both scenarios may be necessary if they differ from those of the PDD.

Emissions from biomass burning for a particular occurrence are estimated using the CDM tool referenced in the previous section. Total emissions from burning are estimated using the following equations, as appropriate:

For the baseline and project scenario:

$$EB = \sum_{t=1}^{T} \sum_{f=1}^{TNS} EB_{f,t} \qquad \textit{Equation 3}$$

For reassessments:

$$EB = \sum_{t=tvx+1}^{T} \sum_{f=1}^{TNS} EB_{f,t} \qquad \textit{Equation 4}$$

In the baseline scenario reassessments, $EB_{f,t}$ values come from models, survey data or extrapolations. In the project scenario reassessments, only $EB_{f,t}$ values between $t = tvx+1$ to T are considered from *ex-ante* estimates.

Variable	Description	Units	Segment		
			RF	RT	WC
EB	Non-CO_2 GHG emissions from burning of the segment, in the corresponding baseline, project or reassessment scenario.	t-CO_2e	X	X	X
$EB_{f,t}$	Non-CO_2 GHG emissions from ***f*** and in year ***t*** of the segment, in the corresponding baseline, project or reassessment scenario.	t-CO_2e	X	X	X
f	Index of the segment stratum in the baseline, project or reassessment scenario considered.	N/A	X	X	X
t	CCMP year index.	N/A	X		
tvx	Year of verification, counted from the CCMP start date.	N/A	X		
T	Total duration of the CCMP.	years	X		
TNS	Total number of strata of the segment in the corresponding baseline, project, or reassessment scenario.	N/A	X	X	X

Reassessments in the baseline and project scenario are carried out when required due to modification of areas or variations in the implementation of the CCMP with respect to what was established in the PDD.

Although the calculation of GHG emissions from fires and burning could be done jointly, in a single procedure, it is separated because it is possible that the latter is done based on the biomass to be burned and not based on the area affected.

7.2.3 GHG Emissions from fertiliser use

To calculate GHG emissions associated with fertiliser use, first calculate GHG emissions from fertilisation of the woody crop segment strata using ***Equation 5***, and then estimate GHG emissions from fertiliser use using ***Equation 6*** or ***Equation 7***, as appropriate.

This estimate is made only in the segment of woody crops, for the baseline and project scenarios, as well as for the reassessment of these scenarios, when required by modification of areas or variations in the implementation of the CCMP with respect to what is established in the PDD.

$$EF_{f,t} = \left(NSF_{f,t} + NOF_{f,t}\right) * NEF \qquad \textit{Equation 5}$$

Variable	Description	Units	Segment		
			RF	RT	WC
$EF_{f,t}$	GHG emissions from fertiliser use of stratum ***f*** and in year ***t*** of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	t-CO_2e			X
$NSF_{f,t}$	Annual amount of nitrogen from synthetic fertiliser applied in stratum ***f*** and in year ***t*** of the woody crop segment, adjusted for volatilisation as NH_3 and NOx in the corresponding baseline, project, or reassessment scenario.	t-N			X

Variable	Description	Units	Segment		
			RF	RT	WC
$NOF_{f,t}$	Annual amount of organic nitrogen fertiliser applied in stratum ***f*** and in year ***t*** of the woody crops segment, adjusted to reflect volatilisation in the form of NH_3 and NOx in the corresponding baseline, project, or reassessment scenario.	t-N			X
NEF	N_2O emission factor per N input.	kg of N from N_2O/kg of provided N.			X
f	Index of the segment stratum in the baseline, project or reassessment scenario considered.	N/A			X
t	CCMP year index.	N/A		X	

For the baseline and project scenario:

$$EF = \sum_{t=1}^{T} \sum_{f=1}^{TNS} EF_{f,t} \qquad \textit{Equation 6}$$

For reassessments:

$$EF = \sum_{t=tvx+1}^{T} \sum_{f=1}^{TNS} EF_{f,t} \qquad \textit{Equation 7}$$

Variable	Description	Units	Segment		
			RF	RT	WC
EF	GHG emissions from fertiliser use of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	t-CO_2e			X
$EF_{f,t}$	GHG emissions from fertiliser use of stratum ***f*** and in year ***t*** of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	t-CO_2e			X
f	Index of the segment stratum in the baseline, project or reassessment scenario considered.	N/A			X
t	CCMP year index.	N/A		X	
tvx	Year of verification, counted from the CCMP start date.	N/A		X	
T	Total duration of the CCMP.	years		X	
TNS	Total number of strata of the segment in the corresponding baseline, project, or reassessment scenario.	N/A			X

In the baseline scenario reassessments, $EF_{f,t}$ values come from models, survey data or extrapolations. In the project scenario reassessments, only $EF_{f,t}$ values between $t = tvx+1$ to T are considered, which come from *ex-ante* estimates.

7.2.4 GHG emissions from fossil fuel consumption in agricultural machinery

Emissions from fossil fuel consumption in agricultural machinery in the woody crops segment are estimated based on the annual consumptions of the different types of fuels used in all strata of the corresponding scenario segment for each of the CCMP years and multiplying each quantity by the CO_2 emission factor. For a fuel type ***m***, used in any of the scenarios or in the CCMP implementation, the annual GHG emissions are estimated using *Equation 8*.

$$EFF_{m,t} = FF_{m,t} * ECFF_m \qquad \textit{Equation 8}$$

Variable	Description	Units	Segment		
			RF	RT	WC
$EFF_{m,t}$	GHG emissions from consumption of fossil fuel type ***m*** consumed in year ***t*** by agricultural machinery of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	t-CO_2e			X
$FF_{m,t}$	Amount of fossil fuel type ***m*** consumed in year ***t*** in agricultural machinery of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	l or gal			X
$ECFF_m$	CO2 emission coefficient of fossil fuel type ***m*** consumed by agricultural machinery of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	According to units of FF_m.			X
m	Fuel type index consumed in the woody crops segment in the corresponding baseline, project, or reassessment scenario.	N/A			X
t	CCMP year index.	N/A	X		

From the emissions calculated for each fossil fuel type, the total GHG emissions from consumption of all fossil fuel types by agricultural machinery in the woody crops segment, in the baseline, project or reassessment scenario, are estimated using the following equations, as appropriate:

For the baseline and project scenario:

$$EFF = \sum_{t=1}^{T} \sum_{m=1}^{TFF} EFF_{m,t} \qquad \textit{Equation 9}$$

For reassessments:

$$EFF = \sum_{t=tvx+1}^{T} \sum_{m=1}^{TFF} EFF_{m,t} \qquad \textit{Equation 10}$$

In the baseline scenario reassessments, $EFF_{m,t}$ values come from models, survey data or extrapolations. In the project scenario reassessments, only $EFF_{m,t}$ values between $t = tvx+1$ to T are considered, which come from *ex-ante* estimates.

Variable	Description	Units	Segment		
			RF	RT	WC
EFF	Total GHG emissions from consumption of all fossil fuel types by agricultural machinery of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	t-CO_2e			X
$EFF_{m,t}$	GHG emissions from consumption of fossil fuel type ***m*** consumed in year ***t*** by agricultural machinery of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	t-CO_2e			X
m	Fuel type index consumed in the woody crops segment in the corresponding baseline, project, or reassessment scenario.	N/A			X
t	CCMP year index.	N/A		X	
tvx	Year of verification, counted from the CCMP start date.	N/A		X	
T	Total duration of the CCMP.	years		X	
TFF	Total number of fossil fuels used in agricultural machinery in the woody crops segment, in the corresponding baseline, project or reassessment scenario.	N/A			X

7.2.5 Total emissions by sources

Total GHG emissions by sources in the baseline, project or corresponding reassessment scenario are estimated according to ***Equation 11***.

$$TE = \sum_{s=1}^{Ns} PFE_s + EB_s + EF + EFF \qquad \textit{Equation 11}$$

Variable	Description	Units	Segment		
			RF	RT	WC
TE	Total GHG emissions by source in the corresponding baseline, project, or reassessment scenario.	t-CO_2e	X	X	X
PFE_s	Non-CO_2 GHG emissions per segment ***s*** fires, in the project scenario or its reassessment.	t-CO_2e	X	X	X
EB_s	Non-CO_2 GHG emissions from burning of the segment ***s***, in the corresponding baseline, project or reassessment scenario.	t-CO_2e	X	X	X
EF	GHG emissions from fertiliser use of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	t-CO_2e			X

Variable	Description	Units	Segment		
			RF	RT	WC
EFF	Total GHG emissions from consumption of all fossil fuel types by agricultural machinery of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	t-CO_2e			X
s	Index of the segments to be implemented in the CCMP (maximum 3, reforestation, restoration, and woody crops).	N/A	X		
Ns	Total number of segments to be implemented in the CCMP (maximum 3, reforestation, restoration, and woody crops).	N/A	X		

The inclusion or exclusion of variables in ***Equation 11*** is done as presented in ***Table 9***.

Table 9. Inclusion or exclusion of GHG emission sources in the different segments and scenarios.

Source	Variable	Scenario	RF	RT	WC
Fires	***PFE***	LB	No	No	No
		P	Yes	Yes	Yes
Burns	***EB***	LB	Yes	Yes	Yes
		P	Yes*	No	Yes*
Fertilisers	***EF***	LB	Optional	Optional	Optional
		P	No**	No**	Yes
Fuels	***EFF***	LB	Optional	Optional	Optional
		P	No**	No**	Yes

* If they apply to the CCMP and are permitted by law.
** Emissions are excluded because they are not significant.

7.3 Carbon stock estimation in carbon pools

Carbon stocks in carbon pools are estimated separately for each of the segments.

As with emissions, calculations will need to be made for the baseline and project scenarios, as well as monitored and calculated for verification events.

Reassessment of the baseline and project scenarios will be necessary to recalculate the total long-term mitigation potential when required due to changes in areas or variations in CCMP implementation from the PDD.

Carbon stocks in carbon pools accumulated up to a specific year are calculated as the sum of all carbon pools to be considered in each segment. Aboveground tree biomass, belowground tree biomass and soil organic carbon should be included in all segments. Aboveground shrub biomass is optional for all segments, while Deadwood and litter can only be optionally included in the restoration segment.

For a segment ***s*** and given year ***t***, the carbon stocks in the carbon pools in the strata of a segment are calculated according to ***Equation 12*** (noting that deadwood and litter carbon pools can only be included in the restoration segment).

$$RCP_{s,t} = \sum_{f=1}^{TNS} Atb_{f,s,t} + Btb_{f,s,t} + Asb_{f,s,t} + Dw_{f,s,t} + L_{f,s,t} + Soc_{f,s,t} \qquad \textit{Equation 12}$$

In the baseline scenario reassessments, the values of the different carbon pools (***Atb***, ***Btb***, ***Asb***, ***Dw***, ***L*** and ***Soc***) are derived from models, survey data or extrapolations. In the reassessments of the project scenario, only the values of these carbon pools between ***t*** = ***tvx+1*** to ***T*** are considered, which come from *ex-ante* estimates.

Variable	Description	Units	Segment		
			RF	RT	WC
$RCP_{s,t}$	Carbon pool removals in the strata of segment ***s*** in year ***t***, in the corresponding baseline, project or reassessment scenario.	t-CO_2e/ha	X	X	X
$Atb_{f,s,t}$	Aboveground tree biomass of stratum ***f*** of segment ***s*** in year ***t*** in the corresponding baseline, project, or reassessment scenario.	t-CO_2e/ha	X	X	X
$Btb_{f,s,t}$	Belowground tree biomass of stratum ***f*** of segment ***s*** in year ***t*** in the corresponding baseline, project, or reassessment scenario.	t-CO_2e/ha	X	X	X
$Asb_{f,s,t}$	Aboveground shrub biomass of stratum ***f*** of segment ***s*** in year ***t***, in the corresponding baseline, project or reassessment scenario.	t-CO_2e/ha	X	X	X
$Dw_{f,s,t}$	Deadwood of stratum ***f*** of segment ***s*** in year ***t***, in the corresponding baseline, project or reassessment scenario.	t-CO_2e/ha		X	
$L_{f,s,t}$	Litter of stratum ***f*** of segment ***s*** in year ***t*** in the corresponding baseline, project, or reassessment scenario.	t-CO_2e/ha		X	
$Soc_{f,s,t}$	Soil organic carbon of stratum ***f*** of segment ***s*** in year ***t*** in the corresponding baseline, project, or reassessment scenario.	t-CO_2e/ha	X	X	X
s	Index of the segments to be implemented in the CCMP (maximum 3, reforestation, restoration, and woody crops).	N/A	X		
f	Index of the segment stratum in the baseline, project or reassessment scenario considered.	N/A	X	X	X
t	CCMP year index.	N/A	X		
TNS	Total number of strata of the segment in the corresponding baseline, project, or reassessment scenario.	N/A	X	X	X

Equation 12 should be calculated for each of the segments considered in the CCMP. The sum of the three segments will constitute the total carbon stocks in pools for the relevant baseline, project, or reassessment scenario, as shown in ***Equation 13***.

$$RCP_t = \sum_{s=1}^{Ns} RCP_{s,t}$$ *Equation* 13

Variable	Description	Units	Segment		
			RF	RT	WC
RCP_t	Total removals by carbon pools in all segments in year ***t***, in the corresponding baseline, project or reassessment scenario.	t-CO_2e/ha	X	X	X
$RCP_{s,t}$	Removals by carbon pool in the strata of segment ***s*** in year ***t***, in the corresponding baseline, project or reassessment scenario.	t-CO_2e/ha	X	X	X
s	Index of the segments to be implemented in the CCMP (maximum 3, reforestation, restoration, and woody crops).	N/A	X		
t	CCMP year index.	N/A	X		
Ns	Total number of segments to be implemented in the CCMP (maximum 3, reforestation, restoration, and woody crops).	N/A	X		

Carbon stock changes in tree and shrub biomass in these sectors can be estimated using the CDM *A/R Methodological AR-Tool* 14[5]. For this, the CDM *A/R Methodological Tool* should also be considered[6].

Changes in Deadwood and litter carbon stocks in these sectors can be estimated using the CDM *A/R Methodological Tool* 12[7].

And changes in soil carbon stocks in these sectors can be estimated using the CDM *A/R Methodological Tool*[8].

7.4 Leakage estimation

This methodology only considers leakage due to the displacement of agricultural activities (livestock and crops), estimated using the CDM *A/R Methodological Tool* 15[9].

[5] AR-Tool *14* - *Methodological tool: Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities (Version 04.2).*

[6] A/R *Methodological Tool*: *Demonstrating appropriateness of allometric equations for estimation of aboveground tree biomass in A/R CDM project activities (Version 01.0.0).*

[7] *AR-Tool 12* - *A/R Methodological tool: Estimation of carbon stocks and change in carbon stocks in Deadwood and litter in A/R CDM project activities (Version 03.1).*

[8] *A/R Methodological Tool*: *Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities (Version 01.1.0).*

[9] *AR-TOOL 15* - *A/R Methodological tool: Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity (Version 02.0).*

Estimated leakage is named AL (leakage from the displacement of agricultural activities associated with crops) and LL (leakage from the displacement of agricultural activities associated with livestock).

Although these tools assume that no leakage occurs after five years from the start of CCMP implementation, this will only be the case if project implementation areas do not increase. If the areas increase, it will be necessary to perform a leakage calculation and monitor their leakage for the next five years.

Total leakage due to displacement of agricultural or livestock activities attributed to CCMP implementation is calculated as:

For the project scenario:

$$TL = \sum_{t=1}^{T} AL_t + \sum_{t=1}^{T} LL_t \qquad \textit{Equation 14}$$

For monitoring:

$$TL = \sum_{t=1}^{tvx} AL_t + \sum_{t=1}^{tvx} LL_t \qquad \textit{Equation 15}$$

For reassessment of the project scenario:

$$TL = \sum_{t=tvx+1}^{T} AL_t + \sum_{t=tvx+1}^{T} LL_t \qquad \textit{Equation 16}$$

Variable	Description	Units	Segment		
			RF	RT	WC
TL	Total leakage due to displacement of agricultural or livestock activities attributed to CCMP implementation.	t-CO_2e	X	X	X
AL_t	Leakage due to displacement of agricultural activities attributed to CCMP implementation in year t of the project scenario or its reassessment.	t-CO_2e	X	X	X
LL_t	Leakage due to displacement of livestock activities attributed to CCMP implementation in year t of the project scenario or its reassessment.	t-CO_2e	X	X	X
t	CCMP year index.	N/A	X		
T	Total duration of the CCMP.	years	X		

Variable	Description	Units	Segment		
			RF	RT	WC
tvx	Year of verification counted from the CCMP start date.	N/A	X		

7.5 Estimation of the average gross and net removals for the baseline, project, or corresponding reassessment scenario

If ***Equation 13*** is repeated for each of the CCMP years, either in the baseline scenario, in the project scenario or for the reassessment of these scenarios, the average gross removals for the baseline scenario or reassessment can be estimated using ***Equation 17***.

$$LAGR = \sum_{t=1}^{T} \frac{RCP_t}{T} \qquad \textit{Equation 17}$$

Variable	Description	Units	Segment		
			RF	RT	WC
LAGR	Long-term average gross removals by carbon pools in all segments, in the corresponding baseline, project or reassessment scenario.	t-CO_2e	X		
RCP_t	Total removals by carbon pools in all segments in year ***t***, in the corresponding baseline, project or reassessment scenario.	t-CO_2e	X	X	X
t	CCMP year index.	N/A	X		
T	Total duration of the CCMP.	years	X		

RCP_t values for all years from CCMP inception to total duration ***T*** will be derived from estimates based on field data or from applicable models for baseline and project scenarios. In the case of reassessments, the data will come from a combination of **monitored** data from the start of the CCMP up to the verification year ***tvx*** and estimates or models from the verification year ***tvx*** onwards.

Reassessment of the baseline scenario is mandatory when additional areas are included in the verifications compared to the *ex-ante* baseline or the previous verification. In addition, reassessment of the CCMP (combining the results monitored **annually** until the time of verification and an *ex-ante* scenario from the time of verification until the end of the CCMP) is required at each verification unless the CCMP implementation is the same as foreseen in the *ex-ante* scenario or in the previous reassessment.

If the CCMP does not monitor carbon stocks in carbon pools annually in the years before verifications, **conservative** models may be used to estimate carbon stocks. However, the

CCMP's GHG emissions will need to be continuously monitored to be properly considered in reassessments and verifications.

The average **net** removals for the baseline, project or corresponding reassessment scenarios will be calculated in two steps.

In a first step, the baseline scenario case will be calculated as ***BLLANR*** if it is an *ex-ante* estimate for CCMP validation, or as BLANRv1, BLANRv2... BLANRvx for verifications 1, 2... x that require reassessments. If these variables are represented generically as ***BLLANR***, the average net removals are calculated by the following equation:

$$BLLANR = BLLAGR - BLTE \qquad \textit{Equation 18}$$

Variable	Description	Units	Segment		
			RF	RT	WC
BLLANR	Long-term average net removals by carbon pools in all segments, in the baseline scenario or its reassessment.	t-CO_2e	X		
BLLAGR	Long-term average gross removals by carbon pools in all segments, in the baseline or reassessment scenario, calculated with ***Equation 17***.	t-CO_2e	X		
BLTE	Total emissions from all segments (those corresponding, according to ***Table 9***), in the baseline or reassessment scenario, calculated with ***Equation 11***.	t-CO_2e	X		

In a second step, the average net removals of the scenario or CCMP reassessment will be calculated as ***PLANR*** (for the CCMP validation) and as PANRv1, PANRv2... PANRvx for verifications 1,2...x requiring reassessments. If we represent these variables generically as ***PLANR***, the average net removals are calculated according to ***Equation 19***.

$$PLANR = AGR_{vx} - TE_{vx} - TL_{vx} - BLANR_{vx} \qquad \textit{Equation 19}$$

Variable	Description	Units	Segment		
			RF	RT	WC
PLANR	Long-term average net long-term average removals by carbon pools in all segments, in the project scenario or its reassessment.	t-CO_2e	X		
AGR_{vx}	Average gross removals for the ***vx*** verification of the same baseline scenario or reassessment to which ***PNLAR*** refers.	t-CO_2e	X		
TE_{vx}	Total GHG emissions by source for the ***vx*** verification of the same baseline scenario or reassessment to which ***PNLAR*** refers.	t-CO_2e	X		
TL_{vx}	Total leakage due to displacement of agricultural or livestock activities, for the ***vx*** verification of the same baseline scenario or reassessment to which ***PNLAR*** refers.	t-CO_2e	X		
$BLANR_{vx}$	Average net removals for the ***vx*** verification of the same baseline scenario or reassessment to which ***PNLAR*** refers.	t-CO_2e	X		

The average net removals from the project scenario or its reassessment represent the maximum potential credits that the CCMP can receive in its verifications. However, this maximum potential may vary if the actual implementation is different from the planned one.

7.6 Uncertainty

The CCMP must include the quantification of the aggregate uncertainty of the mitigation results, that is, the product of the uncertainties in each of its components: activity data, emission factors, projection method and all subsequent factors of these calculations, as well as a risk analysis under a justified approach that includes the probabilistic measurement of adverse events to the CCMP, which would affect its potential results.

It is recommended to include at least the following sources of uncertainty:

a) Uncertainty due to measurement error and bias: error in observed quantities such as data capture or dasometric parameters.

b) Uncertainty in the calculation process: probability of doing typing, arithmetic, or interpretation errors in the results.

c) Model uncertainty: misspecification of model structure or interpretation.

d) Estimation uncertainty: the uncertainty that may arise from one, or a combination, of the uncertainties described above, resulting in inaccuracy and imprecision in the annual volume of CCMP outputs.

e) Implementation uncertainty: the consequence of variability resulting from a management policy, i.e., the failure to achieve the objective of a mitigation strategy. Sources of uncertainty include statistical errors in detecting population status and environmental trends or errors in population analysis, poor decisions, and an inefficient management framework.

7.7 Risks and non-permanence

The requirements of this methodology seek to ensure that all components of the quantification provide accurate and precise CCMP results, resulting from the thorough implementation of the principles.

However, by the very nature of the GHG removals, these are considered non-permanent. This is because they come from planting and harvesting or life and death cycles, which can be affected by internal and external events (such as disasters, land use changes, infrastructure developments). In this methodology, this non-permanence is controlled by setting aside a percentage of credits earned by CCMPs, in proportion to their identified risks. This percentage is calculated using the Buffer Tool. At the same time, the rules for its calculation and subsequent return are detailed in the Guidelines for the Buffer Tool, both of which are available at www.cercarbono.com, section: Documentation.

8 Co-benefits and contributions to the UN Sustainable Development Goals

Co-benefits are the positive results that the CCMP generates in the environment and in the different actors that are located or intervene in the project area, different from those generated in the context of climate change mitigation. Co-benefits can be social, environmental, economic, or political.

For the parallel and cross-cutting reporting of these co-benefits, Cercarbono has developed the "***Cercarbono's Tool to Report Contributions from Climate Change Mitigation Initiatives to the Sustainable Development Goals*",** which is available at www.cercarbono.com, section: Documentation.

9 Results monitoring and quantification

CCMP should be monitored during its implementation, both in its area and in terms of external leakage, as a basis for quantifying the results and credits obtained at each verification.

GHG removals and associated GHG emissions should be monitored continuously throughout the implementation period. GHG removals may be monitored annually or less frequently, while GHG emissions should be monitored more regularly, depending on the identified sources of GHG emissions. For verification events, carbon stock estimates need to be based on field measurements. For intermediate years between verification events, monitoring can be done by direct field measurements or by projections of recent field measurements using conservative and well-supported models.

9.1 Description of the monitoring plan

The CCMP shall establish and maintain a monitoring and quality management plan that includes procedures for measuring or otherwise obtaining, recording, collecting, and analysing relevant data and information to quantify and report relevant GHG emissions and removals. The monitoring plan should include the following aspects, as applicable:

a) Purpose.
b) List of parameters to be measured and monitored.
c) Types of data and information to be communicated, including units of measurement.
d) Origin of the data.
e) Monitoring methodologies, including estimation, modelling, measurement, calculation approaches and uncertainty.
f) Frequency of monitoring, considering the needs of the CCMP.
g) Monitoring roles and responsibilities, including authorising, approving, and documenting changes to recorded data.
h) Controls that include an internal check of data in terms of input, transformation and output elements, and procedures for corrective actions.
i) GHG information management systems, including the location and retention of stored data and data management, including a procedure for transferring data between different forms of systems or documentation.

[Taken from ISO 14064-2:2019 Standard].

The following sections outline the elements that should be subject to monitoring.

9.2 Boundaries monitoring

As part of monitoring, it is necessary to periodically verify that the CCMP has been established in the initially validated areas or, in the case of clustered projects, added to at later

stages during validations. Boundary monitoring includes checking that the different areas remain under the control of the participants.

9.3 Emissions monitoring

The CCMP must monitor the GHG emissions identified in the project scenario that occur during its implementation.

Emission sources should be permanently monitored in the CCMP area during the results period to be verified.

9.3.1 Monitoring of GHG emissions from burning and fires

The CCMP shall keep a log of burning and fire occurrences, where the information shown in ***Table 10*** shall be reported.

Based on this table, and according to the procedures established in the corresponding CDM tool mentioned in ***Section 7.2.1***, GHG emissions shall be estimated for each occurrence and then the annual sum and for the corresponding verification periods as shown in ***Table 10***.

Table 10. Possible structure of the fire and burn occurrence reporting table.

Date	Stratum	Area affected (ha)	Biomass burned (%)	Comments

9.3.2 Monitoring GHG emissions from use of fertilisers

The estimation of GHG emissions from fertilisers use should also be done through a fertiliser consumption log, where the information shown in ***Table 11*** should be reported. It is acceptable to use data linked to its automated recording or accounting systems or warehouse inventories for this table.

Based on this table, and according to the procedures set out in ***Section 7.2.3***, GHG emissions shall be estimated for each occurrence and then summed annually and for the corresponding verification periods.

Table 11. Possible structure of the fertiliser consumption reporting table.

Date	Fertiliser	Composition	Applied quantity (t)	Place of application (lot or stand)	Comments

9.3.3 Monitoring of GHG emissions from fuel consumption

As in the case of burns and fires, the CCMP must keep a logbook to record the consumption of fossil fuels in agricultural machinery or an equivalent record linked to the company's accounting, which allows the calculation of the annual consumption of each type of fuel used, as shown in ***Table 12***.

Based on this table, and according to the procedures established in the corresponding CDM *Methodological Tool* 15[10], GHG emissions will be estimated for each occurrence, the annual sum, and the corresponding verification periods.

Table 12. Possible structure of the fossil fuel consumption reporting table.

Date/month	Type of fuel	Total consumption	Units	Comments

9.4 Leakage monitoring

In the case of CCMP that do not undergo area expansions during their lifetime, leakage monitoring should be conducted during the first three years of implementation. In the case of additions or changes in areas of implementation, monitoring shall be performed during the first three years of implementation and during the year and the following two years in which such expansions or changes in areas occur. In the case of area reductions, these will not imply the need for monitoring.

9.5 Monitoring of contributions to the Sustainable Development Goals

The monitoring of contributions to the Sustainable Development Goals of the United Nations is carried out according to the "***Cercarbono's Tool to Report Contributions from Climate Change Mitigation Initiatives to the Sustainable Development Goals***", which is available at www.cercarbono.com, section: Documentation.

9.6 Monitoring of carbon stocks

Monitoring of carbon stocks in carbon pools should be conducted annually, as annual stock data are required to calculate long-term average net removals and calculate the maximum number of credits that can be achieved by the CCMP. In the absence of annual monitoring of carbon stocks, it will be necessary to at least monitor before each verification event and estimate annual stocks conservatively and based on transparent and technically sound procedures. Annual average increments can only be used if they do not lead to overestimation and only for periods no longer than five years.

9.7 Calculation of the net removals achieved by the CCMP during the verification period

As explained in ***Section 7***, particularly in ***Figure 1***, the maximum possible net removals achieved by the CCMP is calculated as the average of net removals over its duration. At each verification, the net removals achieved during the period are obtained by calculating the

[10] *Tool 15 - Methodological tool: Upstream leakage emissions associated with fossil fuel use (Version 02.0).*

net removals in the verification period and subtracting those already achieved and certified in previous verification periods (including the corresponding credit buffers), as shown in *Equation 20*.

$$NER_x = PRCP_{tvx} - BLRCP_{tvx} + BLTE_x - PTE_x - TL_x - NER_{x-1} \quad \textit{Equation 20}$$

PRCP$_{tvx}$ and ***BLRCP$_{tvx}$*** are calculated by *Equation 13*, ***BLTE$_x$*** and ***PTE$_x$*** by *Equation 11* and ***TL$_x$*** by *Equation 15*.

Variable	Description	Units	Segment		
			RF	RT	WC
NER$_x$	Effective net removals achieved by the CCMP during reporting period ***x***.	t-CO_2e		X	
PRCP$_{tvx}$	Total removals by carbon pools in all segments in the verification year ***tvx*** in the CCMP or reassessment scenario.	t-CO_2e		X	
BLRCP$_{tvx}$	Total removals by carbon pools in all segments, in the verification year ***tvx*** in the baseline or reassessment scenario.	t-CO_2e		X	
BLTE$_x$	Total emissions from all segments during the verification period ***x***, in the baseline or reassessment scenario.	t-CO_2e		X	
PTE$_x$	Total emissions from all segments during the verification period ***x***, in the CCMP or reassessment scenario.	t-CO_2e		X	
TL$_x$	Total leakage due to displacement of agricultural or livestock activities attributed to CCMP implementation during the verification period ***x***.	t-CO_2e		X	
NER$_{x-1}$	Net effective removal achieved by the CCMP during reporting period ***x-1***.	t-CO_2e		X	
tvx	Year of verification, counted from the CCMP start date.	N/A		X	
x	Ordinal of the reporting or verification period.	N/A		X	

9.8 Variables to be monitored

The variables to be monitored are presented in *Table 13*.

Table 13. Variables to be monitored.

Variable/parameter/data		Units	Segment			Data origin and measurement procedure	Frequency
			RF	RT	WC		
$AB_{f,t}$	Area burnt by controlled burn in stratum ***f*** and in year ***t*** of the segment in the corresponding baseline, project, or reassessment scenario.	ha	X	X	X	Field measurement of affected areas or by remote sensors. Estimation of biomass burned and GHG emissions according to pre-established factors.	Continuous, depending on the occurrence of burns.
ADA_t	Area of land from which displacement of agricultural activities attributed to CCMP implementation in year ***t*** occurs.	ha	X			Field measurements.	At each check.
$AF_{f,t}$	Area burnt by fires in stratum ***f*** and in year ***t*** of the segment in the project scenario or its reassessment.	ha	X	X	X	Field measurement of affected areas or by remote sensors. Estimation of biomass burned and GHG emissions according to pre-established factors.	Continuous, depending on the occurrence of fires.
AL_t	Leakage due to displacement of agricultural activities attributed to CCMP implementation in year ***t*** of the project scenario or its reassessment.	t-CO_2e	X	X	X	Calculation according to tool.	During the first three years of implementation and two years of adding areas.
AS_f	Total area of stratum ***f*** of the segment in the corresponding baseline, project, or reassessment scenario.	ha	X	X	X	Updating map layers through field measurements or remote sensing.	Every time there is any modification of AS_f and each of the elements that compose it.
$Asb_{f,s,t}$	Aboveground shrub biomass of stratum ***f*** of segment ***s*** in year ***t***, in the corresponding baseline, project or reassessment scenario.	t-CO_2e/ha	X	X	X	Field measurements or properly supported estimates, where ***s*** represents each of the implemented segments.	At each check.
$Atb_{f,s,t}$	Aboveground tree biomass of stratum ***f*** of segment ***s*** in year ***t*** in the corresponding baseline, project or reassessment scenario.	t-CO_2e/ha	X	X	X	Field measurements or properly supported estimates, where ***s*** represents each of the implemented segments.	At each check.
BBO	Default aboveground biomass in the forest in the region or country where the CCMP is located.	t-d.m./ha	X	X	X	Field measurements or properly supported estimates.	At each check.
$BHARVEST_t$	Harvested biomass that will be burned to clear the area of harvest residues before planting in year ***t***.	t-d.m.	X	X	X	Field data corresponding to the CCMP.	Continuous, according to occurrence.

Variable/parameter/data		Units	Segment			Data origin and measurement procedure	Frequency
			RF	RT	WC		
$Btb_{f,s,t}$	Belowground tree biomass of stratum ***f*** of segment ***s*** in year ***t*** in the corresponding baseline, project or reassessment scenario.	t-CO_2e/ha	X	X	X	Field measurements or properly supported estimates, where ***s*** represents each of the implemented segments.	At each check.
$bTREE_f$	Average biomass per hectare in stratum ***f*** at the start of the CCMP.	t-d.m./ha	X	X	X	Estimated using CDM tool.	During CCMP design.
$Dw_{f,s,t}$	Deadwood of stratum ***f*** of segment ***s*** in year ***t***, in the corresponding baseline, project or reassessment scenario.	t-CO_2e/ha		X		Field measurements or properly supported estimates, where ***s*** represents each of the implemented segments.	Calculation at each check.
$fBR_{f,t}$	Fraction of biomass left as residues after harvesting of stratum ***f*** and in year ***t*** of the woody crop segment, in the baseline, project or reassessment scenario considered.	N/A			X	Field measurements or properly supported estimates.	
$FF_{m,t}$	Amount of fossil fuel type ***m*** consumed in year ***t*** in agricultural machinery of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	l or gal			X	Fuel consumption logbook or equivalent record linked to the company's accounting.	Annual.
$Fsc_{f,t}$	Proportion of shrub canopy cover of the area that is burnt or set on fire of stratum ***f*** and in year ***t*** of the woody crops segment, in the corresponding baseline, project or reassessment scenario.	N/A			X	Field measurements or properly supported estimates.	Continuous, according to occurrence.
$L_{f,s,t}$	Litter of stratum ***f*** of segment ***s*** in year ***t*** in the corresponding baseline, project, or reassessment scenario.	t-CO_2e/ha		X		Field measurements or properly supported estimates, where ***s*** represents each of the implemented segments.	Calculation at each check.
LBL_t	Leakage due to biomass losses resulting from animal displacement or fodder production attributed to CCMP implementation in year ***t***.	t-CO_2e		X		Calculation according to tool.	During the first three years of implementation and two years of adding areas.
LFD_t	Leakage due to animal displacement or fodder production in perennial crops attributed to CCMP implementation in year ***t***.	t-CO_2e		X		Calculation according to tool.	

Variable/parameter/data		Units	Segment			Data origin and measurement procedure	Frequency
			RF	RT	WC		
LFI_t	Leakage due to increased fertiliser use resulting from animal displacement or fodder production attributed to CCMP implementation in year ***t***.	t-CO_2e		X		Calculation according to tool.	
LL_t	Leakage due to displacement of livestock activities attributed to CCMP implementation in year ***t*** of the project scenario or its reassessment.	t-CO_2e	X	X	X	Calculation according to tool.	
LO_t	Leakage due to overgrazing resulting from animal displacement attributed to CCMP implementation in year ***t***.	t-CO_2e		X		Calculation according to tool.	
$NOF_{f,t}$	Annual amount of organic nitrogen fertiliser applied in stratum ***f*** and in year ***t*** of the woody crops segment, adjusted to reflect volatilisation in the form of NH_3 and NOx in the corresponding baseline, project, or reassessment scenario.	t-N			X	Inventory tracking, purchase orders or activity planning.	Annual.
$NSF_{f,t}$	Annual amount of nitrogen from synthetic fertiliser applied in stratum ***f*** and in year ***t*** of the woody crop segment, adjusted for volatilisation as NH_3 and NOx in the corresponding baseline, project, or reassessment scenario.	t-N			X	Inventory tracking, purchase orders or activity planning.	Annual.
$RASB_{f,t}$	Ratio of average shrub biomass per hectare of stratum ***f*** and in year ***t*** of the woody crops segment, in the corresponding baseline, project or reassessment scenario to tree biomass.	N/A			X	Field measurements or properly supported estimates.	During CCMP design.
$Soc_{f,s,t}$	Soil organic carbon of stratum ***f*** of segment ***s*** in year ***t*** in the corresponding baseline, project, or reassessment scenario.	t-CO_2e/ha	X	X	X	Field measurements or properly supported estimates, where ***s*** represents each of the implemented segments.	At each check.
TFF	Total number of fossil fuels used in agricultural machinery in the woody crops segment, in the corresponding baseline, project or reassessment scenario.	N/A			X	Monitoring of fuel consumption in the CCMP.	Continued.

Variable/parameter/data		Units	Segment			Data origin and measurement procedure	Frequency
			RF	RT	WC		
TNS	Total number of strata of the segment in the corresponding baseline, project, or reassessment scenario.	N/A	X	X	X	Field measurements, follow-up to CCMP implementation. Updating of map layers through field measurements or remote sensing.	Every time there is any modification of AS_f and each of the elements that compose it.
TSA	Total area of the segment in the corresponding baseline, project, or reassessment scenario.	ha	X	X	X	Updating map layers through field measurements or remote sensing.	Every time there is any modification of ***TSA*** and each of the elements that compose it.

10 Grouped CCMPs

Grouped CCMPs have a binding factor defined in advance, which allows the addition of new participants or operational units that are not known at the time of design or at the start of implementation.

Addition or subtraction of operating units (in the case of CCMPs related to this methodology, new areas, or participants in any of the segments) may be done at verifications, complying with related requirements of the Cercarbono's Protocol and will require the reassessment of scenarios, as explained in ***Section 7***.

11 Information management

The CCMP shall establish and implement quality management procedures, consistent with the principles of this methodology, for receiving, managing, and controlling data, databases, and information, including the assessment of uncertainty.

The CCMP should reduce, to the extent possible, uncertainties related to the quantification of GHG removal and reduction of GHG emissions by identifying and addressing any errors or omissions detected.

The CCMP should apply monitoring criteria and procedures, in which consistent reviews or audits are conducted to ensure the accuracy of the quantification of GHG removal and reduction of GHG emissions per the monitoring plan.

Where measuring and monitoring equipment is used, CCMP shall ensure that the monitoring and measuring equipment is used and maintained as appropriate.

All data and information related to the monitoring of the CCMP should be recorded and documented.

[Taken from ISO 14064-2:2019 Standard].

Note: The CCMP proponent may apply the principles of ISO 9001:2008 and ISO 14033:2019 Standard for data quality management.

11.1 Documentary control

The CCMP shall establish and maintain a document control system to support all its legal and administrative documentation, as well as all processes of measurement and data collection, calculations, and quantification of GHG emissions and removals.

11.2 Management of mapping quality

For the presentation of cartographic information to guarantee traceability in the eligible areas that make up the geographical limits of the CCMP, the information of each management unit (year of establishment, species, area in hectares, planting density, owner) can be included in a geographic information system that considers at least the structure presented in ***Table 14***.

Table 14. Cartographic information of the CCMP.

Owner	Year of establishment	Species	Area (ha)	Seeding density	Real estate registration

11.2.1 Storage

For storage, the GIS structure can be used: *Geodatabase* (GDB) or *shapefile* format, where at least the availability of the primary information used and the processing of this to reach the result is guaranteed.

There must be consistency in the coordinate system (same datum and origin) used within the GIS.

11.2.2 Topology

Compliance with the topological rules must be ensured concerning:

- The minimum area included and permitted within the CCMP.
- Overlapping polygons that generate duplicity in the areas.
- Gaps in the *shapefile*, generated by polygon editing.
- Polygon displacement.

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13 Document history

Version	Date	Comments or changes
1.0	01.10.2021	Initial version of the document open for public consultation from 01.10.2021 to 31.10.2021.
1.1	25.11.2021	Final version with comments from the public consultation duly addressed.