

VCS Methodology Template, v5.0

This template is for developing methodologies and methodology revisions under the VCS Program.

Follow the instructions in this template to draft the methodology. Ensure the methodology meets the rules and requirements in the most recent versions of the *VCS Standard* and *VCS Methodology Requirements*. Refer to these documents when drafting the methodology.

Note that the instructions in this template serve as a guide and do not necessarily represent an exhaustive list of the information the author must provide under each template section.

INSTRUCTIONS FOR COMPLETING THE DRAFT METHODOLOGY

1. On the title page, replace the placeholders in square brackets with the relevant information.
2. Complete the header (to appear on each page) with the following information, replacing the square bracket placeholders with the relevant information, based on the methodology development stage:
	1. For draft methodologies: “[Development ID], Draft Methodology”
	2. For approved methodologies: “[Methodology Number], v[version number]”
3. Propose a clear and concise title using the following guidance:
	1. Do not include words like “projects,” “activities,” “emission reductions,” or “removals.”
	2. Preferably, do not include “methodology.”
	3. Do not include terms related to the quantification or monitoring method.

Examples of appropriate titles are:

* + 1. Refrigerant Leak Detection
		2. Afforestation, Reforestation, and Revegetation

Rather than:

1. Methodology for Refrigerant Leak Detection Project Activities
2. Methodology for Afforestation, Reforestation, and Revegetation Using a Standardized Method
3. Follow the instructions under each section heading in this template.
4. Use clear, logical, concise, and precise language to aid readability and ensure consistent application and interpretation.
5. Only include relevant procedures and requirements in the main sections of the methodology. Use appendices to provide detailed background information, explanation, and justification of key methodological components. Brief summaries of background information or explanations may be included within the body or footnotes of the methodology where it is helpful for the reader to follow the logic of the methodology when applying the procedures.
6. Third-level (e.g., 8.1.1) and fourth-level (8.1.1.1) headings may be added where it is helpful to the reader for information to be grouped in this way (e.g., if there are multiple options for one type of calculation). Do not change or add first-level headings (except in Section 7 as per the instructions). Do not change second-level headings. Try to avoid adding second-level headings. If you must add second-level headings, only add them at the end of a first-level section, to avoid the other heading numbers changing.
7. When citing references, give the author(s) and year of publication in parentheses and then provide the full reference information in Section 10. If giving more than one citation in a set of parentheses, separate each citation with a semi-colon. Do not use footnotes to provide full reference information.
8. The methodology must use the keywords “must,” “should,” and “may” appropriately:
	1. **must**: indicates a firm requirement
	2. **should**: indicates a (non-mandatory) recommendation
	3. **may**: indicates a permissible or allowable option
	4. **shall**: do not use “shall” in methodologies*;* “*s*hall” is reserved for VCS Program documents.
9. Complete all sections using Franklin Gothic Book 10.5 point, black, regular (non-italic) font.
10. Use italic font to reference VCS Program documents, methodologies, and tools (e.g., “the most recent version of the *VCS Methodology Requirements*”).
11. Delete all instructions, including this introductory text, from the final document.

Draft VCS Methodology

[Development ID]

[Methodology Title]

Draft Version

[Date of version release]

Sectoral Scope [number]: [Name of sectoral scope]

This draft methodology was developed by [name(s) of developer(s)].

[add any relevant developer logos here]

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# Summary Description

|  |
| --- |
| **Additionality, Crediting Method, and Mitigation Outcome** |
| Additionality | <Project/Performance/Activity Method> |
| Crediting Baseline | <Project/Performance Method> |
| Mitigation Outcome | <Reductions/Removals/Reductions and Removals> |

Indicate using the above table whether the methodology uses a project, performance, or activity method for determining additionality, and a project or performance method for determining the crediting baseline (see the VCS Methodology Requirements for further information on these methods). If not worldwide, indicate the country/regions where the standardized approach applies. Indicate the mitigation outcome (reductions, removals, or both) quantified by the methodology.

Provide a brief summary description of the methodology, including a description of the project activities to which the methodology applies and the methodological approach (e.g., general GHG quantification and monitoring approach). The summary should be concise (aim for no more than two pages).

# Sources

Indicate key methodologies, modules, tools, guidance, and other documents upon which the proposed methodology is based. Here, only include documents that have informed large parts of the methodology (e.g., if all of the ideas in the methodology have come from a single document). Any documents that were generally used for information while writing the methodology or that should be referred to for certain specific aspects (e.g., emission factors) should be listed in Section 10 (References) instead.

For methodology revisions, identify the methodology and the associated GHG program upon which the revision is based.

Identify any modules or tools used by the methodology.

Use italics for document names in the sources, as shown in the example below.

Example

This methodology is based on the following [methodologies/documents]:

* *VM0042 Methodology for Improved Agricultural Land Management, v2.0*

This methodology uses the most recent versions of the following tools and modules:

* *VMD0053 Model Calibration, Validation, and Uncertainty Guidance for Biogeochemical Modeling for Agricultural Land Management Projects*
* *CDM TOOL16 Project and Leakage Emissions from Biomass*
* *CDM TOOL24 Common Practice*

# Definitions

Using the format in the example below, provide, in alphabetical order, definitions of key terms and acronyms that are used in the methodology. Ensure all defined terms are used in the methodology. Do not include terms already defined in the VCS Program Definitions.

Examples

In addition to the definitions set out in the *VCS Program Definitions*, the following definitions apply to this methodology.

Commercial timber harvest

Removal of merchantable trees from a forest to obtain income from the wood products

Logging slash

Dead wood residues (including foliage) left on the forest floor after timber removal

# Applicability Conditions

Describe the project activities to which the methodology applies. Then, set out specific applicability criteria that define project eligibility, such as geographic location, technology type, historical land use, and any other conditions under which the methodology is applicable. Use a numbered list to make it easier to reference individual applicability conditions. Continue the numbering when listing non-eligible conditions rather than starting a new numbered list.

Authors should keep the following in mind when writing the applicability conditions:

* Applicability conditions must be specified clearly, and in a manner that allows easy determination and validation of whether an activity being undertaken by a potential project proponent is eligible.
* Applicability conditions must not contain procedures or obligations upon the project proponent. Rather, they must be conditions against which project eligibility can be determined at the time of validation and must not require the project proponent to undertake ongoing actions to ensure continued eligibility. Any items that require the project proponent to undertake ongoing actions (e.g., monitoring) should be listed elsewhere in the methodology. If you cannot find anywhere else suitable to list them, they may be listed directly in Section 9 (Monitoring), before Section 9.1 (Data and Parameters Available at Validation).
* For performance methods, this section must specify the technologies and/or measures (or examples of technologies and/or measures) that may be implemented (in order to achieve substantial performance improvement relative to the crediting baseline) under the methodology.
* For activity methods (i.e., methodologies using a positive list approach for additionality), the applicability conditions represent the positive list. Section 7 (Additionality) only needs to address the VCS Program regulatory surplus requirements.
* The list of applicability conditions may contain exclusions (i.e., may describe types of project activities to which the methodology does not apply).

This methodology applies to project activities that…

This methodology is applicable under the following conditions:

1. <Condition>
2. <Condition>
3. …

This methodology is not applicable under the following conditions:

1. <Condition>
2. …

# Project Boundary

*Describe the project* boundary and identify the GHG sources, sinks, and reservoirs (controlled by the project proponent, related to the project, or affected by the project) accounted for in the project boundary and as leakage. Use Table 1 *to list carbon pools considered in agriculture, forestry and other land use (AFOLU) methodologies. Remove Table 1 for non-AFOLU methodologies*. Use Table 2 to list GHG sources and sinks included in baseline, project, and leakage emissions. Ensure assumptions to include or exclude sources, sinks, and reservoirs are accurate/conservative, and justify these assumptions. Specify where GHG sources, sinks, and reservoirs are optional. Include any procedures and diagrams, as appropriate*. Remove or include further rows in Table 2 as needed and change the example text in the “source/sink” and “type” columns.*

The spatial extent of the project boundary encompasses…

The carbon pools accounted for in the project boundary and as leakage are shown in Table [1](#Table1). The greenhouse gas (GHG) sources and sinks accounted for, including as leakage, are shown in Table [2](#Table2).

Table 1. Carbon pools accounted for in the project boundary and as leakage

|  |  |  |
| --- | --- | --- |
| Carbon pool | Included? | Justification/Explanation |
| Aboveground woody biomass |  |  |
| Aboveground non-woody biomass |  |  |
| Belowground woody biomass |  |  |
| Belowground non-woody biomass |  |  |
| Dead wood |  |  |
| Litter  |  |  |
| Soil organic carbon (SOC) |  |  |
| Wood products |  |  |

Table 2. GHG sources and sinks accounted for as baseline, project, and leakage emissions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Source/Sink | Type | Gas | Included? | Justification/Explanation |
| Baseline | Source/Sink 1 | Sink or Source | CO2 |  |  |
| CH4 |  |  |
| N2O |  |  |
| Other |  |  |
| Source/Sink 2 | Sink or Source | CO2 |  |  |
| CH4 |  |  |
| N2O |  |  |
| Other |  |  |
| Example:Fuel combustion for electricity generation | Sink | CO2 | Yes | Major source |
| CH4 | No | Conservative to exclude |
| N2O | No | Conservative to exclude |
| Other | No | No other greenhouse gases |
| Project | Source/Sink 1 | Sink or Source | CO2 |  |  |
| CH4 |  |  |
| N2O |  |  |
| Other |  |  |
| Source/Sink 2 | Sink or Source | CO2 |  |  |
| CH4 |  |  |
| N2O |  |  |
| Other |  |  |
| Example:Atmospheric CO2 captured and stored in depleted oil and gas reservoir | Sink | CO2 | Yes |  |
| CH4 | No |  |
| N2O | No |  |
| Other | No |  |
| Leakage | Source 1 | Source | CO2 |  |  |
| CH4 |  |  |
| N2O |  |  |
| Other |  |  |
| Source 2 | Source | CO2 |  |  |
| CH4 |  |  |
| N2O |  |  |
| Other |  |  |

# Baseline Scenario

For methodologies applying a project method, describe the criteria and procedures for identifying alternative baseline scenarios and determining the most plausible scenario. This may be done within the methodology or through reference to other tools. Explain how the procedure/baseline scenario is conservative.

For AFOLU methodologies, describe the procedures for establishing land-use and land-cover change rates, identifying historical management practices, establishing common practice, and/or identifying current and/or historical ecological characteristics, as applicable.

For methodologies applying a standardized method, describe the most plausible baseline scenario or aggregated baseline scenario, including the technologies or measures that constitute this scenario. Note that the control data represent the most plausible baseline scenario for methodologies establishing a dynamic performance benchmark. Such methodologies must include requirements for control data source(s), an approach to match control data with monitored data (including an acceptable range for matched data), and how frequently control data must be updated.

For methodologies applying a performance method for determining the crediting baseline, identify the level of the performance benchmark metric for the crediting baseline. Use [Appendix 1](#_APPENDIX_X:_Performance) to describe the data, analysis, and process used to establish the benchmark.

# Additionality

For methodologies applying a project method for demonstrating additionality, describe the criteria and procedures for assessing and demonstrating additionality. Methodologies may establish their own procedures, use an additionality tool that is active under the VCS Program (e.g., VT0008 Additionality Assessment, VT0009 Combined Baseline and Additionality Assessment), or combine their own procedures and guidance with elements of an additionality tool. Where an additionality tool is referenced, it must be stated that the most recent version of the tool must be used. Instructions for describing different methods of determining additionality are included in the sections below. Delete from the methodology any of the following section headings that are not applicable to the method used to determine additionality.

Example

This methodology uses a [project method / performance method / activity method] to demonstrate additionality.

## Regulatory Surplus

All methodologies must require the project proponent to demonstrate regulatory surplus in accordance with the requirements for methodologies set out in the most recent versions of the VCS Standard and VCS Methodology Requirements.

The regulatory surplus requirements themselves should not be copied and pasted out of the VCS Program requirements into methodologies (rather, the methodology should refer to the VCS Program requirements, as in the examples below).

Example

The project proponent must demonstrate regulatory surplus in accordance with the rules and requirements regarding regulatory surplus set out in the most recent versions of the *VCS Standard* and VCS Methodology Requirements.

Where the project proponent demonstrates regulatory surplus, proceed to the next step. Otherwise, the project activity is not additional.

## Performance Benchmark

For methodologies applying a performance method for demonstrating additionality, identify and describe the performance benchmark metric that is used for the demonstration of additionality. Specify the level of the performance benchmark metric that will serve as the threshold for additionality. Describe the data, analysis, and process used to establish the benchmark in the [Performance Method Appendix](#_APPENDIX_X:_Performance) provided.

Example

The project proponent must demonstrate that the project’s performance exceeds a benchmark representing typical performance in the relevant sector or activity type, as established in accordance with the data and procedures described in Appendix X.

….

Where the project exceeds the performance benchmark, the project is additional. Otherwise, the project activity is not additional.

## Positive List

For methodologies applying an activity method for demonstrating additionality, include a brief summary of the option (A, B, or C) used to establish the positive list, using the [appendix](#_APPENDIX_X:_Activity) provided to give a full description of the data, analysis, and process used. Also include a statement that the Applicability Conditions section (Section 4) of the methodology represents the positive list.

Example

The applicability conditions of this methodology (Section 4) represent the positive list. The project proponent must demonstrate that the project meets all of the applicability conditions, and in so doing, it is deemed to conform with the positive list.

The positive list was established using the [activity penetration / financial viability / revenue streams] option (Option [A/B/C] in theVCS Methodology Requirements) …

The justification for the activity method is provided in Appendix X.

## Investment Analysis

For methodologies applying a project method for demonstrating additionality, a barrier and/or investment analysis (Section 7.4) and a common practice analysis (Section 7.5) must be conducted in accordance with the VCS Methodology Requirements.

Example

The project proponent must follow the procedures and requirements of Step 3 of the most recent version of VT0008 Additionality Assessment to conduct an investment analysis.

Where the project proponent demonstrates that all conditions of the investment analysis of VT0008 are met, proceed to Section 7.5 (Common Practice Analysis). Otherwise, the project activity is not additional.

## Common Practice Analysis

The project proponent must assess whether the project activity is common practice, following the procedures and requirements of Step 4 of the most recent version of *VT0008*.

Where the project activity meets all previous steps and is not a common practice, it is deemed additional. Otherwise, it is not additional.

# Quantification of Reductions and Removals

## Baseline Emissions

Describe the criteria and procedures, including relevant equations, for the quantification of GHG emissions and/or carbon stock changes for the selected GHG sources and carbon pools in the baseline scenario.

*Explain how uncertainty estimated for baseline emissions is accounted for and addressed. Assess the variability in the input data and how it affects baseline emissions. Explain whether a conservative assumption was taken or needs to be taken. Where relevant, include procedures with equations for estimating the baseline emissions uncertainty at a project level. Refer to the* [*Uncertainty Assessment Appendix*](#_APPENDIX_X:_Uncertainty) *to include further details.*

Trivial calculations such as simple averages may be excluded from the equations for simplicity. In such cases, they must be added as a monitoring parameter with clear indications for calculation and to avoid ambiguity (e.g., clarify the type of average: arithmetic mean, mode, median). When a weighted average is used, include the equations with a clear description of the weighting factors and the relevant procedures to determine them, if needed.

Include summary information to describe the context of equations and ensure clarity of the calculation approach.

Include concise procedures and requirements. Do not include background information, lengthy explanations, or justifications that are not relevant for the application of the methodology. Such additional information may be included in the [appendices](#_APPENDIX_X:_BACKGROUND). Footnotes may be used for brief additional information but must not be used to introduce a requirement or a procedure.

Use the example format below (copy and paste) for specifying equations and defining the associated parameters and variables, in conjunction with the following guidance:

* Ensure all equations are numbered using captions (under the reference tab click “Insert caption”) to specify the equation number and enable cross-referencing.
* Introduce only one equation at a time, followed by the relevant parameter descriptions.
* *Typically, introduce the main equation (higher level) at the beginning of the section and then introduce other equations (lower level) to facilitate understanding. For example:*
1. *Provide the main equation for* BEy *with the parameters, criteria, and procedures.*
2. *Introduce the equation for* BEFC,y *with the parameters, criteria, and procedures.*
3. *Introduce the equation for* BEEC,y *with the parameters, criteria, and procedures.*
* *Ensure that parameters and variables are consistently applied throughout the equations in the methodology. Use short and logical abbreviations for parameters and use subindexes to specify periods (*x*,* y*,* z*), cases and subcases (*i*,* j*,* k*), and to differentiate baseline (*B*) from Project (*P*) if not in the abbreviation. Avoid assigning the same subindex letter to different concepts. Use subindexes* t *and* y *for time and year only; do not assign* t *or* y *to other concepts.*
* *Use the following main parameters:*
	+ *GHG emission reductions in year* y*:* ERy
	+ *Carbon dioxide removals in year* y*:* CRy
	+ *Baseline emissions in year* y*:*BEy
	+ *Project emissions in year* y*:* PEy
	+ *Carbon stock changes in year* y*: Δ*BCSy*(baseline) and Δ*PCSy *(project)*
	+ *Leakage emissions in year* y*:* LEy
* Use the “Equation” function of MS Word for equations.
* *Include the parameters and descriptions in a hidden table (table with a white border) as in the examples below. This is to ensure that the structure, formatting, and indents are maintained. Copy and paste the table in the example below and delete rows that are not used or add additional rows as needed.*
* *Use normal font to write the parameters in the description below the equations. Do not use the “Equation” function for the parameter in the description section, unless it is absolutely necessary (e.g., when writing more complicated mathematical expressions that cannot be written in normal text).*
* *List each parameter and its description under each equation in which it appears. Make sure that the parameter description is consistent every time it appears.*
* *Include the unit of measure for each parameter in parentheses, using the International System of Units (SI).*
* *Describe the parameters clearly and concisely. Include in the description if they are totals, averages over* x *years, or any other relevant information.*
* *Where default values are proposed, indicate whether they are optional and include the default values after the equation.*

Examples

Baseline emissions are calculated as follows:

|  |  |
| --- | --- |
| $$BE\_{y}= \sum\_{i}^{}BE\_{FC,i,y}$$ | (1) |

Where:

|  |  |  |
| --- | --- | --- |
| *BEy* | = | Baseline emissions in year *y* (t CO2e) |
| *BEFC,i,y* | = | Baseline emissions from fossil fuel *i* consumed in year *y* (t CO2e) |
|  |  |  |

The baseline carbon stock change is calculated as follows:

|  |  |
| --- | --- |
| $$ΔBCS\_{y}= ΔAGB\_{BL,y}+ΔBGB\_{BL,y}+ΔDW\_{BL,y}$$ | (2) |

Where:

|  |  |  |
| --- | --- | --- |
| Δ*BCSy* | = | Baseline carbon stock change in the project area in year *y* (t CO2e/yr) |
| Δ*AGBBL,y* | = | Change in aboveground biomass stocks in the project area in the baseline scenario in year *y* (t CO2e/yr) |
| Δ*BGBBL,y* | = | Change in belowground biomass stocks in the project area in the baseline scenario in year *y* (t CO2e/yr) |
| Δ*DWBL,y* | = | Change in dead wood stocks in the project area in the baseline scenario in year *y* (t CO2e/yr) |

## Project Emissions

*Describe the criteria and procedures, including relevant equations, for the quantification of GHG emissions, carbon stocks, and/or carbon stock changes for the selected GHG sources, sinks, and/or reservoirs for the project. Follow the instructions for equations provided in Section 8.1 (Baseline Emissions) above.*

*Explain how uncertainty estimated for project emissions is accounted for and addressed. Assess the variability in the input data and how it affects project emissions. Explain whether a conservative assumption was taken or needs to be taken. Where relevant, include procedures with equations for estimating project emissions uncertainty at a project level. Refer to the* [*Uncertainty Assessment Appendix*](#_APPENDIX_X:_Uncertainty) *to include further details.*

*Where a methodology includes both GHG emission reductions and carbon dioxide removals, it must be specified whether project emissions relate to reductions, removals, or both as per the allocation principles in the most recent version of the* VCS Methodology Requirements*.*

Examples

The project carbon stock change is calculated as follows:

|  |  |
| --- | --- |
| $$ΔPCS\_{y}= ΔAGB\_{PR,y}+ΔBGB\_{PR,y}+ΔDW\_{PR,y}$$ | (3) |

Where:

|  |  |  |
| --- | --- | --- |
| Δ*PCSy* | = | Project carbon stock change in the project area in year *y* (t CO2e/yr) |
| Δ*AGBPR,y* | = | Change in aboveground biomass stocks in the project area in the project scenario in year *y* (t CO2e/yr) |
| Δ*BGBPR,y* | = | Change in belowground biomass stocks in the project area in the project scenario in year *y* (t CO2e/yr) |
| Δ*DWPR,y* | = | Change in dead wood stocks in the project area in the project scenario in year *y* (t CO2e/yr) |

Project emissions related to reductions only are calculated as follows:

|  |  |
| --- | --- |
| $$PE\_{ER,y}= \sum\_{i}^{}PE\_{FC,i,y}$$ | (4) |

Where:

|  |  |  |
| --- | --- | --- |
| *PEER,y* | = | Project emissions related to reductions in year *y* (t CO2e) |
| *PEFC,i,y* | = | Project emissions from fossil fuel *i* consumed in year *y* (t CO2e) |
|  |  |  |

Project emissions related to both reductions and removals in year *y* are calculated as follows:

|  |  |
| --- | --- |
| $$PE\_{y }= PE\_{trans\_{y}}+ PE\_{EC\_{y}}$$ | (5) |

Where:

|  |  |  |
| --- | --- | --- |
| *PEy* | = | Project emissions related to both reductions and removals in year *y* (t CO2e) |
| *PEtrans\_y* | = | Project emissions from transport in year *y* (t CO2e) |
| *PEEC\_y* | = | Project emissions from electricity consumption in year *y* (t CO2e) |

## Leakage Emissions

*Describe the criteria and procedures, including relevant equations, for the quantification of GHG emissions for the selected GHG sources, sinks, and/or reservoirs for leakage. Follow the instructions for equations provided in Section 8.1 (Baseline Emissions) above.*

*Explain how uncertainty estimated for leakage emissions is accounted for and addressed. Assess the variability in the input data and how it affects leakage emissions. Explain whether a conservative assumption was taken or needs to be taken. Where relevant, include procedures with equations for estimating leakage emissions uncertainty at a project level. Refer to the* [*Uncertainty Assessment Appendix*](#_APPENDIX_X:_Uncertainty) *to include further details.*

*Where a methodology includes both GHG emission reductions and carbon dioxide removals, the methodology must specify whether each leakage emissions parameter relates to the reductions, removals, or both as per the allocation principles in the most recent version of the* VCS Methodology Requirements*.*

Example

Leakage emissions related to both reductions and removals in year *y* are calculated as follows:

|  |  |
| --- | --- |
| $$LE\_{y }= LE\_{trans,y}$$ | (6) |

Where:

|  |  |  |
| --- | --- | --- |
| *LEy* | = | Leakage emissions related to both reductions and removals in year *y* (t CO2e) |
| *LEtrans,y* | = | Project emissions from transport in year *y* (t CO2e) |

## Net Reductions and Removals

Describe the procedure for quantifying net GHG emission reductions, *carbon stocks, and/or carbon stock changes*, as a function of baseline emissions, project emissions, and leakage. *Follow the instructions for equations in Section 8.1 (Baseline Emissions) above.*

*Explain how uncertainty estimated for baseline, project, and leakage emissions is accounted for and addressed. Where relevant, include the discount factors to be applied based on the resulting uncertainty estimated at the methodology level (i.e., the methodology provides the numerical value), or include equations for estimating and deducting uncertainty at the project level.*

*Include separate equations for total net GHG emission reductions and total carbon dioxide removals, considering the allocation principles in the most recent version of the* VCS Methodology Requirements*.*

Example
 *Example for a project that has both reductions and removals and all project emission sources are applicable to both the reduction and removal activities. The baseline condition also has an increase in carbon stocks but to a lesser degree.*

The net carbon stock increase in the project area in year y is calculated as follows:

|  |  |
| --- | --- |
| $$ΔCS\_{y}= ΔPCS\_{y}-ΔBCS\_{y}$$ | (7) |

Where:

|  |  |  |
| --- | --- | --- |
| Δ*CSy* | = | Net carbon stock change in the project area in year *y* (t CO2e/yr) |
| Δ*PCSy* | = | Project carbon stock change in the project area in year *y* (t CO2e/yr) |
| Δ*BCSy* | = | Baseline carbon stock change in the project area in year *y* (t CO2e/yr) |

The project emissions related to both reductions and removals are allocated proportionally to the removals as follows:

|  |  |
| --- | --- |
| $$PE\_{CR,y}= PE\_{y}×\frac{ΔCS\_{y}}{ΔCS\_{y}+BE\_{y}-PE\_{ER,y}}$$ | (8) |

Where:

|  |  |  |
| --- | --- | --- |
| *PECR,y* | = | Project emissions that are allocated to removals in year *y* (t CO2e/yr) |
| *PEy* | = | Project emissions related to both reductions and removals in year *y* (t CO2e) |
| Δ*CSy*  | = | Net carbon stock change in the project area in year *y* (t CO2e/yr) |
| *BEy* | = | Baseline emissions in year *y* (t CO2e) |
| *PEER,y* | = | Project emissions related to reductions in year *y* (t CO2e) |
|  |  |  |

The leakage emissions related to both reductions and removals are allocated proportionally to the removals as follows:

|  |  |
| --- | --- |
| $$LE\_{CR,y}= LE\_{y}×\frac{ΔCS\_{y}}{ΔCS\_{y}+BE\_{y}-PE\_{ER,y}}$$ | (9) |

Where:

|  |  |  |
| --- | --- | --- |
| *LECR,y* | = | Leakage emissions that are allocated to removals in year *y* (t CO2e/yr) |
| *LEy* | = | Leakage emissions related to both reductions and removals in year *y* (t CO2e) |
| Δ*CSy*  | = | Net carbon stock change in the project area in year *y* (t CO2e/yr) |
| *BEy* | = | Baseline emissions in year *y* (t CO2e) |
| *PEER,y* | = | Project emissions related to reductions in year *y* (t CO2e) |
|  |  |  |

Carbon dioxide removals are calculated as follows:

|  |  |
| --- | --- |
| $$CR\_{y}= ΔCS\_{y}-PE\_{CR,y}-LE\_{CR,y}$$ | (10) |

Where:

|  |  |  |
| --- | --- | --- |
| *CRy* | = | Carbon dioxide removals in year *y* (t CO2e/yr) |
| Δ*CSy*  | = | Net carbon stock change in the project area in year *y* (t CO2e/yr) |
| *PECR,y* | = | Project emissions that are allocated to removals in year *y* (t CO2e/yr) |
| *LECR,y* | = | Leakage emissions that are allocated to removals in year *y* (t CO2e/yr) |

GHG emission reductions are calculated as follows:

|  |  |
| --- | --- |
| $$ER\_{y}= BE\_{y}-PE\_{ER,y}-(PE\_{y}-PE\_{CR,y})-(LE\_{y}-LE\_{CR,y})$$ | (11) |

Where:

|  |  |  |
| --- | --- | --- |
| *ERy* | = | GHG emission reductions in year *y* (t CO2e/yr) |
| *BEy* | = | Baseline emissions in year *y* (t CO2e) |
| *PEER,y* | = | Project emissions related to reductions in year *y* (t CO2e) |
| *PEy* | = | Project emissions related to both reductions and removals in year *y* (t CO2e) |
| *PECR,y* | = | Project emissions that are allocated to removals in year *y* (t CO2e/yr) |
| *LEy* | = | Leakage emissions related to both reductions and removals in year *y* (t CO2e) |
| *LECR,y* | = | Leakage emissions that are allocated to removals in year *y* (t CO2e/yr) |

The net reductions and removals are calculated as follows:

|  |  |
| --- | --- |
| $$ERR\_{y}= ER\_{y}+CR\_{y}$$ | (12) |

Where:

|  |  |  |
| --- | --- | --- |
| *ERRy* | = | Net reductions and removals in year *y* (t CO2e/yr) |
| *ERy* | = | GHG emission reductions in year *y* (t CO2e/yr) |
| *CRy* | = | Carbon dioxide removals in year *y* (t CO2e/yr) |

# Monitoring

Use this space if you have any monitoring-related requirements that do not fit under other headings in the methodology (including the sub-headings in this section). For example, if you wanted to list monitoring requirements related to applicability, those can be listed here rather than in Section 4 (Applicability Conditions).

## Data and Parameters Available at Validation

Complete the table below for all data and parameters that will be determined or available at validation and will remain fixed throughout the project crediting period (copy the table for each data/parameter). Data and parameters monitored during the operation of the project are included in Section 9.2 (Data and Parameters Monitored) below. Data and parameters that are determined at validation but are expected to change during the crediting period and/or are monitored during operation of the project should be included in Section 9.2.

The parameters must be introduced in order of appearance in Section 8 (Quantification of Reductions and Removals).

Ensure that data sources are appropriate and conform with VCS Program rules and requirements. Likewise, ensure that rules and requirements for models and default factors are adhered to. Indicate any conservative assumptions already included.

Ensure that all original data and parameters used in the equations for quantification of GHG emission reductions and carbon dioxide removals in the methodology are included in this section (Data and Parameters Available at Validation) or the following section (9.2 Data and Parameters Monitored).

|  |  |
| --- | --- |
| Data/Parameter | *Use italic font; do not use “Equation” function.* |
| Data unit | *Indicate the unit of measure using SI units.* |
| Description | *Provide a brief description of the data/parameter.* |
| Equations | *List the equation(s) that use this data/parameter, using cross-references.* |
| Source of data | Indicate the source(s) of data. |
| Value applied | Provide the default value applied where applicable. |
| Justification of choice of data or description of measurement methods and procedures applied | Justify the choice of data source, including adopted conservative assumptions, and provide references where applicable. Where values are based on measurement, include a description of the measurement methods and procedures applied (e.g., which standards or protocols have been followed).  |
| Purpose of data | Indicate one or more of the following: * Determination of baseline scenario (AFOLU projects only)
* Calculation of baseline emissions
* Calculation of project emissions
* Calculation of leakage
 |
| Comments | Provide any additional comments. |

Example

|  |  |
| --- | --- |
| Data/Parameter | *NCVFF,i* |
| Data unit | GJ/t |
| Description | Net calorific value of fossil fuel i used in the baseline scenario |
| Equations | (1) |
| Source of data | Use values from 2006 IPCC Guidelines for National Greenhouse Gas Inventories. The upper and lower limits of the confidence intervals are used for uncertainty assessment. |
| Value applied | N/A |
| Justification of choice of data or description of measurement methods and procedures applied | The IPCC Guidelines for National Greenhouse Gas Inventories is internationally recognized and the data provided in the guidelines are peer-reviewed. |
| Purpose of data | Calculation of baseline emissions |
| Comments | None |

## Data and Parameters Monitored

Complete the table below for all data and parameters that will be monitored during the project crediting period (copy the table as necessary for each data/parameter).

Data and parameters determined or available at validation are included in Section 9.1 (Data and Parameters Available at Validation) above. Data and parameters that are determined at validation but are expected to change during the crediting period and/or are monitored during operation of the project should be included in this section (9.2). Where the methodology establishes default factors which may become out of date (i.e., default factors that do not represent physical constants or otherwise would be expected to change significantly over time), make note of this in the Comments field and include instructions for updating the default factors.

Ensure that data sources are appropriate and conform with VCS Program rules and requirements. Likewise, ensure that rules and requirements for models and default factors are adhered to.

Indicate any conservative assumptions to be taken or uncertainty thresholds to be achieved (e.g., metering accuracy class, sampling precision, 66th percentile point of estimate).

Do not include tables for parameters that are not directly monitored themselves (i.e., do not include parameters that are calculated using monitored data/parameters and the equations provided in the methodology).

|  |  |
| --- | --- |
| Data/Parameter | *Use italic font; do not use “Equation” function.* |
| Data unit | *Indicate the unit of measure using SI units.* |
| Description | *Provide a brief description of the data/parameter.* |
| Equations | *List the equation(s) that use this data/parameter, using cross-references.* |
| Source of data | *Indicate the source(s) of data.* |
| Description of measurement methods and procedures to be applied | *Specify the appropriate measurement methods and procedures and any standards or protocols that must be followed. Include any relevant information regarding the accuracy of measurements (e.g., accuracy associated with meter equipment or laboratory tests).* |
| Frequency of monitoring/recording | *Specify measurement and recording frequency.* |
| QA/QC procedures to be applied | *Describe the quality assurance and quality control (QA/QC) procedures to be applied, including calibration procedures where applicable.* |
| Purpose of data | *Indicate one or more of the following:* * Determination of baseline scenario (AFOLU projects only)
* Calculation of baseline emissions
* Calculation of project emissions
* Calculation of leakage
 |
| Calculation method | *Describe any method to derive the value (e.g., average, value at standard conditions).* |
| Comments | Provide any additional comments |

Example (monitored parameter)

|  |  |
| --- | --- |
| Data/Parameter | *ECP,y* |
| Data unit | MWh/yr |
| Description | Quantity of electricity consumed by project facility from the grid in year *y*  |
| Equations | (2), (5) |
| Source of data | Measurements at project facility  |
| Description of measurement methods and procedures to be applied | Use calibrated electricity meters from the grid supplier.  |
| Frequency of monitoring/recording | Data must be monitored continuously and recorded on a monthly basis or with the frequency applicable according to the grid supplier. |
| QA/QC procedures to be applied | The consistency of metered electricity consumption should be cross-checked with receipts from electricity bills where applicable. |
| Purpose of data | Calculation of project emissions |
| Calculation method | Electricity meter is cumulative. The monthly electricity consumption is the difference between initial and final reading within one month. |
| Comments | None |

Example (parameter determined at validation but expected to change during crediting period)

|  |  |
| --- | --- |
| Data/Parameter | *EFCO2,j* |
| Data unit | t CO2e/liter |
| Description | Emission factor for fossil fuel *j* (gasoline or diesel) combusted  |
| Equations | (8) |
| Source of data | Table 3.3.1 Chapter 3 Volume 2 in IPCC (2019) |
| Description of measurement methods and procedures to be applied | For gasoline *EFCO2* = 0.002810 t CO2e per liter. For diesel *EFCO2* = 0.002886 t CO2e per liter.  |
| Frequency of monitoring/recording | Source of data for emission factor must be monitored every five years and must be updated when more accurate data applicable to the project conditions become available following the guidance in Section 8.3 under Quantification Approach 3. |
| QA/QC procedures to be applied | See “Source of data” |
| Purpose of data | Calculation of baseline and project emissions |
| Calculation method | Not applicable |
| Comments | Assumes four-stroke gasoline energy for gasoline combustion and default values for energy content of 47.1 GJ/t and 45.66 GJ/t for gasoline and diesel respectively (IEA 2004). |

## Description of the Monitoring Plan

Describe the criteria and procedures for obtaining, recording, compiling, and analyzing the monitored data and parameters set out in Section 9.2 above.

# References

Include any references relevant to the methodology, including the full reference information for any citations that have been included in the text or in footnotes. Follow the style of the following examples (if you are using a reference management system, choose Chicago style):

Aynekulu, Ermias, Tor-G. Vagen, Keith D. Shephard, and Leigh Winowiecki. 2011. *A Protocol for Modeling, Measurement and Monitoring Soil Carbon Stocks in Agricultural Landscapes*. Version 1.1. World Agroforestry Centre.

Beem-Miller, Jeffrey P., Angela Y. Y. Kong, Stephen Ogle, and David Wolfe. 2016. “Sampling for soil carbon stock assessment in rocky agricultural soils.” *Soil Science Society of America Journal* 80 (5): 1411–23. https://doi.org/10.2136/sssaj2015.11.0405.

IEA. 2005. *Energy Statistics Manual*. International Energy Agency. https://www.iea.org/reports/energy-statistics-manual-2.

# APPENDIX X: Performance Method

Where the methodology applies a performance method for determining additionality and/or the crediting baseline, complete the sections below. For all other methodologies, delete this appendix.

Number appendices consecutively starting with Appendix 1.

The purpose of this appendix is to provide background information on the performance method and to provide transparency with respect to the rigor and appropriateness of the performance method. The main body of the methodology should be kept clear of such background information. The sections below provide instructions on the information required, though the instructions are not exhaustive. Additional information must be added where required by the VCS Program rules and should be added where this would help to establish the rigor and appropriateness of the performance method.

AX.1 Applicability Conditions

Provide information with respect to how the applicability conditions ensure the following:

* The methodology, to the extent practicable, excludes those classes of project activities that it can be reasonably assumed will be implemented without the intervention created by the carbon market.
* Projects implement technologies and/or measures that cause performance improvement relative to the crediting baseline and what is achievable within the sector.
* The methodology or performance benchmark is only applicable to the geographic area for which data are available, or that data from one geographic area are representative of another, or that it is conservative to apply data from one geographic area to another.

AX.2 Baseline Scenario

Provide the following information with respect to the baseline scenario:

* For static performance benchmarks and autonomous improvement factor performance benchmarks, provide the following information:
	+ A description and analysis of the current distribution of performance within the group of emitters to which the methodology and performance benchmark is applicable, including current trends in performance
	+ A description of the alternative baseline scenarios that were identified and the process followed to determine the most plausible baseline scenario or an aggregate baseline scenario for the project activity
* For dynamic performance benchmarks, provide the following information:
	+ *Procedure that projects must follow to set out the baseline scenario based on control data including the required source(s) for control data, the approach for projects to match control data with monitored data (including an acceptable range for matched data), and the frequency with which projects must update the control data*
	+ *Justification for how and why the identified source(s) of control data represent the most plausible baseline scenario*

AX.3 Performance Benchmark

Provide the following information with respect to the performance benchmark:

* For static performance benchmarks and autonomous improvement factor performance benchmarks:
	+ Provide a discussion and evaluation of the tradeoff between false negatives and false positives in selecting the level of the performance benchmark metric. Describe objectively and transparently the evidence used, experts consulted, assumptions made, and analysis (including numerical analysis) and process undertaken in determining the selected level of the performance benchmark metric. Include a summary of the expert consultation process and attach the full expert consultation report as a separate document or an appendix.
	+ Explain and justify the appropriateness of data sources used to establish the performance benchmark metric.
* *For dynamic performance benchmarks, explain and justify:*
	+ *The level of the performance benchmark metric in comparison to the control data (e.g., X% above average unit of input, output, sequestration, or carbon stock change).*
* Where proxy metrics or conditions for the performance benchmark metric are used, demonstrate that they are strongly correlated with the performance benchmark metric and that they can serve as an equivalent or better method (e.g., in terms of reliability, consistency, or practicality) to determine whether performance is achieved to a level at least equivalent to that of the performance benchmark metric.

#

# APPENDIX X: Activity Method

Where the methodology applies an activity method for determining additionality, complete the sections below. For all other methodologies, delete this appendix.

Number appendices consecutively starting with Appendix 1.

The purpose of this appendix is to provide background information on the activity method and to provide transparency with respect to the rigor and appropriateness of the activity method. The main body of the methodology should be kept clear of such background information. The sections below provide instructions on the information required, though the instructions are not exhaustive. Additional information must be added where required by the VCS Program rules and should be added where this would help to establish the rigor and appropriateness of the activity method.

AX.1 Applicability Conditions

Provide information with respect to how the applicability conditions ensure the following:

* The methodology, to the extent practicable, excludes those classes of project activities that it can be reasonably assumed will be implemented without the intervention created by the carbon market.
* There is similarity across the sub-areas of the geographic scope (to which the methodology is applicable) in factors such as socio-economic conditions, climatic conditions, energy prices, raw material availability, and electricity grid emission factors, as such factors relate to the baseline scenario and additionality.

AX.2 Baseline Scenario

Provide the following information with respect to the baseline scenario:

* A description and analysis of the current distribution of performance within the group of emitters to which the methodology is applicable, including current trends in performance
* A description of the alternative baseline scenarios that were identified and the process followed to determine the most plausible baseline scenario or an aggregate baseline scenario for the project activity

AX.3 Positive List

Provide the following information with respect to the positive list:

* Identification of the option selected for establishing the positive list (Option A, B, or C) and a detailed description to demonstrate how each of the steps and associated requirements for the selected option have been addressed
* Explanation and justification of the appropriateness of data sources used to establish the positive list

#

# APPENDIX X: Justification for Upstream Displacement Discount Factor

Where the methodology credits upstream displacement activities and uses a discount factor other than the default value provided in the most recent version of the VCS Methodology Requirements, include the justification as an appendix. For all other methodologies, delete this appendix.

Number appendices consecutively starting with Appendix 1.

The justification of the discount factor must use one of the following options:

1. An analysis of at least three peer-reviewed publications in reputable journals that are listed in the Web of Science: Science Citation Index (SCI; available at <https://mjl.clarivate.com>); or
2. A market analysis of supply and demand elasticities associated with, or analogous to, the considered activity, product, or service.

#

# APPENDIX X: Justification of Compatibility with Transition to Net Zero

The purpose of this appendix is to provide an analysis of the risk of carbon lock-in as per Section 2.6 of the VCS Methodology Requirements, v4.4. It must consider alternative technologies or practices with lower GHG emissions and consider typical project lifetimes against the risk of entrenching consumer behavior, business practices, or physical infrastructure that increase or prolong unabated fossil fuel consumption. This appendix must be included in all methodologies.

Number appendices consecutively starting with Appendix 1.

# APPENDIX X: Uncertainty Assessment

Include an assessment of the expected uncertainty associated with the input parameters for baseline, project, and leakage emissions (expected range of values or variability considering a 90% confidence interval). It may be helpful to include a sensitivity analysis to understand how the variability in the input parameter is transferred to the result (a large uncertainty in an input dataset does not necessarily imply a large uncertainty in the result).

Provide the information used and the procedures followed to arrive at the conclusions of the uncertainty assessment for baseline, project, and leakage emissions. Explain the procedures applied to propagate the individual uncertainty of the input data into the resulting emissions (e.g., linear error propagation/variance method, Monte Carlo simulation) and relevant assumptions. Provide information on the sensitivity analysis, if applied, to identify the key variables that contribute the most to the overall uncertainty. Variables that do not have a significant impact on the overall uncertainty may be excluded from the assessment. Where conservative assumptions have been made, the uncertainty associated with those variables may be neglected when estimating the overall uncertainty.

*For measured parameters, the uncertainty may be associated with the measurement device (e.g., accuracy class 0.5 may be used to determine 0.5% uncertainty).*

*For parameters that are determined by literature reviews or publications, identify the possible range of values. Where the variability can be reasonably attributed to specific factors, such as temperature, technology, or fuel type, and data are available, it is better to provide differentiated values with their respective ranges (e.g., the variability of CO2 emission factors associated with fossil fuels can be high, but once a specific fuel is selected, the variability reduces significantly).*

*For parameters that are obtained through sampling, it may be helpful to specify the sampling approach and the required precision to be achieved so the uncertainty is already determined.*

*Identify the key parameters that contribute the most to the emissions uncertainty and describe how this uncertainty is addressed.*

*In some cases, it may not be practical to assess all data inputs. For those cases, the focus of the assessment should be on those variables that have a significant impact on the overall uncertainty.*

*Uncertainty may be addressed by different means (e.g., by selecting a conservative default value, requiring a specified precision, providing a conservative approach, or including a deduction to account for the uncertainty).*

*Where possible, uncertainty should be assessed at the methodology level, providing the necessary information for project proponents to account for it. Where the uncertainty highly depends on the project situation, clear procedures should be added so that project proponents can assess the uncertainty consistently.*

*Use this appendix to include further details, sources of information, procedures, and data used. Number appendices consecutively starting with Appendix 1.*

# APPENDIX X: Background Information

Include detailed background information, explanations, and justifications of key methodological components in this appendix to keep the main sections of the methodology concise and focused on the relevant procedures and requirements.

Include different appendices to separate information as needed. Adapt the title of each appendix based on the content. Number appendices consecutively starting with Appendix 1.

# Document History

Include the document history of the methodology using the table below. Delete any rows that are not required. For new methodologies, only the indication of the initial version and date is required (see example below, first line v1.0). For methodology revisions, include the new version number, date, and a brief description of the revisions introduced to the methodology.

|  |  |  |
| --- | --- | --- |
| **Version** | **Date** | **Comment** |
| v1.0 |  | Initial version |
|  |  |  |

Example

|  |  |  |
| --- | --- | --- |
| **Version** | **Date** | **Comment** |
| v1.0 | 19 Oct 2020 | Initial version  |
| v1.1 | 07 Feb 2021 | Minor revision, including the following changes:* Clarifications to applicability conditions in Section 4
* Correction of Equation 7, including indices *i* and *j* in parameter *P0,i,j*
 |
| v2.0 | 30 May 2023 | Major revisions, including the following changes:* Introduction of a baseline control sites option to allow for direct SOC measurement under Quantification Approach 2
* Update of Section 8.6 on uncertainty assessment to clarify statistical procedures and align with the *VCS* *Methodology Requirements*
* Introduction of guidance on the use of proximal sensing technologies to estimate SOC content in Appendix 4
* Introduction of an applicability condition allowing for one-time land conversion from grassland to cropland or vice versa to restore degraded lands in Section 4 and Appendix 2
* Introduction of a requirement and procedures to account for emissions associated with use of agricultural limestone in Section 8.2.4
* Introduction of a requirement to account for leakage from diversion of biomass residues used for energy applications in the baseline scenario
* General improvements, errata, and clarifications
 |