Verified Carbon Standard
A VERRA STANDARD

Methodology Requirements

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1 INTRODUCTION

This document provides the requirements for methodologies, including tools and modules, developed under the VCS Program. The purpose of this document is to assist methodology developers and validation/verification bodies in developing and assessing methodologies.

Where external documents are referenced, such as the *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories* , and such documents are updated, the most recent version of the document shall be used.

This document will be updated from time-to-time and readers shall ensure that they are using the most current version of the document.

2 GENERAL REQUIREMENTS

This section sets out the general rules and requirements for all methodologies under the VCS Program. Specific requirements for agriculture, forestry and other land use (AFOLU) and ozone depleting substances (ODS) methodologies are set out throughout this Section 2 (and Section 3) below, as these methodology types may encounter unique circumstances related to project implementation, monitoring and other matters, which must be addressed.

In order to become an approved methodology under the VCS Program, methodologies shall demonstrate how they meet the rules and requirements set out below. Methodologies shall be assessed per the process set out in the VCS Program document *Methodology Development and Review Process*.

2.1 Methodology Development

Concept

Establishing consistent and standardized criteria for development and assessment of methodologies is critical to ensuring their integrity. Accordingly, certain high-level requirements shall be met by all methodologies, as set out below.

Requirements

2.1.1 Methodologies shall conform with the requirements set out in this document and any other applicable requirements set out in the VCS Program rules and be approved via the methodology development process (as set out in the *VCS Methodology Development and Review Process*).

2.1.2 New methodologies shall not be developed where an existing methodology is broadly similar and could reasonably be revised (i.e., developed as a methodology revision) to meet the objective of the proposed methodology.

2.1.3 Methodologies shall be guided by the principles set out in the VCS Program document *VCS Standard*. They shall clearly state the assumptions, parameters and procedures that have significant uncertainty, and describe how such uncertainty shall be addressed.

2.1.4 Methodologies shall be informed by a comparative assessment of the project and its alternatives in order to identify the baseline scenario. Such analysis shall include, at a minimum, a comparative assessment of the implementation barriers and net benefits faced by the project and its alternatives.

2.2 Methodology Structure

Concept

The VCS Program allows for different methodology structures, including modular approaches, and different approaches for demonstrating additionality and/or determining the crediting baseline.

Requirements

General

2.2.1 Methodologies may employ a modular approach in which a framework document provides the structure of the methodology and separate modules and/or tools are used to perform specific methodological tasks. Such methodologies shall use the *VCS Methodology Template* for the framework document and the *VCS Module Template* for the modules and tools. The framework document shall clearly state how the modules and/or tools are to be used within the context of the methodology.

Additionality and Crediting Baseline Approaches

2.2.2 Methodologies shall use a standardized method (i.e., performance method or activity method) or a project method to determine additionality and/or the crediting baseline and shall state which type of method is used for each.

1) A project method is a methodological approach that uses a project-specific approach for the determination of additionality and/or crediting baseline.
2) Standardized methods are further described in Section 2.3.1 and additional guidance is available in the VCS Program document *Guidance for Standardized Methods*. This guidance document provides additional information to aid the interpretation of the VCS Program rules on standardized methods and should be read before developing or assessing such methods. Although the guidance document does not form part of the VCS Program rules, interpretation of the rules shall be consistent with the guidance document.

2.2.3 Methodologies may use any combination of project, performance, or activity methods for

determining additionality and the crediting baseline. However, methodologies shall provide only one method (i.e., a project method or performance method) for determining the crediting baseline (i.e., methodologies shall not provide the option of using either a project method or a performance method for the crediting baseline).

2.2.4 A standardized method shall be used as the preferred option for determining additionality. Where a methodology does not employ a standardized method for additionality, the proponent shall provide a justification for why such an approach is not appropriate or possible.

2.3 Standardized Methods

Concept

Standardized methods are methodological approaches that standardize the determination of additionality and/or the crediting baseline for a given class of project activity, with the objective of streamlining the development and assessment process for individual projects. The VCS Program allows for the use of two types of standardized methods: performance methods, which establish performance benchmarks for the demonstration of additionality and/or the crediting baseline, and activity methods, which pre-determine additionality for given classes of project activities using a positive list.

Requirements

2.3.1 Additionality and/or the crediting baseline are determined for the class of project activity, and qualifying conditions and criteria are set out in the methodology. Individual projects need only meet the conditions and apply the pre-defined criteria set out in the standardized method, obviating the need for each project to determine additionality and/or the crediting baseline via project-specific approaches and analyses.

The VCS Program defines two types of standardized methods:

1) Performance methods: These methods establish performance benchmark metrics for determining additionality and/or the crediting baseline. Projects that meet or exceed a pre-determined level of the metric may be deemed as additional and a pre-determined level of the metric may serve as the crediting baseline. Methodologies may establish a performance method fully within the methodology (i.e., a static performance benchmark or an autonomous improvement performance benchmark) or they may establish procedures and requirements for projects to establish the performance method (i.e., a dynamic performance benchmark) as set out in Sections 2.3.3 – 2.3.5.

2) Activity methods: These methods pre-determine additionality for given classes of project activities using a positive list. Projects that implement activities on the positive list are automatically deemed as additional and do not otherwise need to demonstrate additionality. One of three options (namely activity penetration, financial feasibility, or revenue streams) is used to qualify the project activity for the positive list, as set out in Section 3.5.9.

Note – There is some overlap between performance and activity methods with respect to concepts, objectives and outcomes, and methodologies may use any combination of methods (performance, activity and project) for determining additionality and the crediting baseline as set out in Section 2.2.2. However, both performance and activity methods are sufficiently distinct, and this document sets out the rules and requirements for each method separately.

2.3.2 Methodologies shall include sufficient information and evidence to allow the reader to reach the same assessment conclusion on the appropriateness and rigor of the standardized method reached as reached under the methodology development and review process, noting that the confidentiality of proprietary data may be protected as set out in Section 3.4.6(5). To aid the readability and clarity of methodologies, such information and evidence may be included in appendices to methodology documents rather than in the body of the documents themselves. Following their initial approval, methodologies are subject to periodic re-assessment, as set out in the VCS Program document *Methodology Development and Review Process*.

Performance Methods

2.3.3 Methodologies shall either fully establish the performance method (i.e., for static performance benchmarks and autonomous improvement factor performance benchmarks, defined in Section 2.3.4, below) or shall establish the procedures and requirements for projects to set out a performance method (i.e., for dynamic performance benchmarks, defined in Section 2.3.5, below). Table 1 includes a comparison between methodology-established performance methods and project-established performance methods.

2.3.4 Methodology-established performance methods include:

1) Static performance benchmarks: Static performance benchmarks are based on an analysis of the current distribution of performance within an activity class. The methodology uses this analysis to establish the level (in tCO_2e) of the performance benchmark metric (as defined per Section 2.3.9) for projects to use as the crediting and/or additionality benchmark for the duration of the project crediting period or AFOLU baseline period, as appropriate.

2) Autonomous improvement factor performance benchmarks: Autonomous improvement factor performance benchmarks follow the same requirements as static performance benchmarks, above, except they take trends in performance into account through the use of an autonomous improvement, which tightens the level of the performance benchmark metric annually, as set out in Section 3.4.8.

2.3.5 Project-established performance methods include:

1) Dynamic performance benchmarks: Dynamic performance benchmarks are based on a comparison between paired control data (representing the baseline scenario and used to determine baseline emissions and baseline carbon stocks) and monitored data (representing the project scenario). The methodology establishes the performance benchmark metric (as defined per Section 2.3.9), the level of the performance benchmark

metric (as a proportional improvement in comparison to the control data) and the procedure for projects to determine the greenhouse gas level of the performance benchmark metric (in tCO_2e). Dynamic performance benchmarks require projects to update the control data, and therefore the crediting baseline, within the project crediting period or AFOLU baseline period, as appropriate. The methodology shall include a procedure for projects to determine the performance benchmark, including requirements for:

a) The data source(s) for the control data, in line with the requirements for data set out in Section 3.4.6.

b) The approach for projects to match control data with project data (e.g., nearest neighbor or optimal matching), including an acceptable range for matched data.

c) The required frequency for projects to update the control data, which shall be at least every five years.

Table 1: Comparison of Performance Method Approaches

	Methodology-established Performance Method		Project-established Performance Method
	Static Performance Benchmark	Autonomous Improvement Factor Performance Benchmark	Dynamic Performance Benchmark
Basis of the performance method	Analysis of the current distribution of performance within an activity-class		Comparison of performance within an activity-class between control data (representing the baseline scenario) and monitored data (representing the project scenario)
Benchmark metric	Methodology establishes benchmark metric (e.g., an input, output or sequestration metric)		Methodology establishes benchmark metric (e.g., an input, output or sequestration metric)
Benchmark level	As an absolute level of the benchmark metric (e.g., 2 tCO_2e per unit of input)	As an absolute level of the benchmark metric with an autonomous improvement factor tightening the level annually (e.g., 1.0 tCO_2e per unit output in year 1, 0.95 tCO_2e per unit output in year 2, ...)	As a proportional change in comparison to the control data (e.g., 10% above average carbon stock per hectare in control data)

Project use	All projects using the performance benchmark use the same metric, level and greenhouse gas benchmark		All projects using the performance benchmark use the same metric and level, though the greenhouse gas benchmark (in tCO_2e) may differ among projects depending on the control data used
Information included in the methodology	Methodology establishes the performance benchmark for projects to use		Methodology establishes the procedure for projects to set the level (in tCO2e) of the baseline, including: 1) Source of the control data 2) Required matching method between control and project data 3) Required frequency of control data updates (at least every five years)
Frequency and type of update	Updates are made to the analysis of performance distribution in line with the requirements for re-assessment of standardized methods set out in the VCS Program document *Methodology Development and Review Process.* Projects may use the level of the performance benchmark set out in the methodology at the time of validation for their entire crediting period or AFOLU baseline period.	Updates are made to the analysis of performance distribution in line with the requirements for re-assessment of standardized methods set out in the VCS Program document *Methodology Development and Review Process.* Projects update the level of the performance benchmark annually using the autonomous improvement factor set out in the methodology.	The methodology sets out the frequency with which projects are required to update control data (which will be at least every five years). Projects using the methodology update the control data and resulting baseline emissions and/or baseline carbon stocks within the project crediting period or AFOLU baseline period.

2.3.6 All new performance methods shall be prepared using the *VCS Methodology Template*. A performance method is an integral part of a methodology and therefore it cannot be developed and approved as a separate module that is then applied by projects in conjunction with other methodologies.

2.3.7 Methodologies may use a performance method for determining additionality only, for

determining additionality and the crediting baseline, or for determining the crediting baseline only. The level of the performance benchmark metric for determining additionality and for the crediting baseline may be the same, or each may be different. Where they are different, the level for determining additionality shall be more stringent than the level of the crediting baseline.

2.3.8 Where a methodology uses a performance method for determining both additionality and the crediting baseline, the methodology shall list all methodologies that use a project method for determining the crediting baseline that are applicable to similar project activities and are approved under the VCS Program or an approved GHG program. The purpose of this requirement is to facilitate the transition to standardized methods, as further set out in the VCS Program document *VCS Standard*.

2.3.9 The performance benchmark metric shall be specified in terms of one of the following, as appropriate to the project activity applicable under the methodology:

1) Tonnes of CO_2e per unit of output (i.e., GHG emissions per unit of product or service);
2) Tonnes of CO_2e per unit of input (e.g., GHG emissions per unit of input per unit of land area);
3) As a sequestration metric (e.g., carbon stock per unit of land area), or;
4) As a carbon stock change metric (e.g., change in carbon stock per unit of land area).

The performance benchmark metric may represent tonnes of CO_2e reduced or tonnes of CO_2e sequestered. An input metric shall only be used where an output metric is not practicable (e.g., the corresponding output metric is subject to influences outside the control of the project proponent) and leakage shall be addressed. A carbon stock change metric shall only be used where a dynamic performance benchmark is established following the requirements set out in Section 2.3.5. The unit shall be unambiguously defined to allow a consistent comparison of project performance with the performance benchmark. The *GHG Protocol for Project Accounting*, Chapter 7 (WRI-WBCSD) provides some examples of products and services that may serve as candidates for performance benchmark metrics. Note that proxies for the performance benchmark metric may be used for determining additionality, as set out in Section 3.5.7.

2.3.10 An overly stringent level for the performance benchmark metric used for additionality may exclude additional projects (false negatives) while an overly lenient level may allow in non-additional projects (false positives). Similarly, an overly stringent level of the performance benchmark metric used for the crediting baseline may result in too little incentive for project proponents while an overly lenient level may allow the crediting of non-additional GHG emission reductions and removals. In order to address these considerations, the following shall apply with respect to setting the level(s) of the performance benchmark metric:

1) Methodologies that establish static performance benchmarks or autonomous improvement factor performance benchmarks shall:

a) Provide a description and analysis of the current distribution of performance within the sector as such performance relates to the applicability of the methodology or each performance benchmark (see Section 3.2.7 for further information on applicability of methodologies and performance benchmarks). Methodologies shall also provide an overview of the technologies and/or measures available for improving performance within the sector, though an exhaustive list is not required recognizing that performance methods may be somewhat agnostic with respect to the technologies and/or measures implemented by projects.

b) Discuss and evaluate the trade-off between false negatives and false positives and shall describe objectively and transparently the evidence used (including reference to primary and secondary data sources), experts consulted, assumptions made, and analysis (including numerical analysis) and process undertaken in determining the selected level(s) of the performance benchmark metric (noting that expert consultation is a key part of this process, as set out below). The selected level(s) shall not systematically overestimate GHG emission reductions or removals.

2) Methodologies that establish procedures and requirements for dynamic performance benchmarks shall justify the level of the performance benchmark metric in comparison with control data and demonstrate how the selected level does not systematically overestimate GHG emission reductions or removals.

3) The process of determining the level(s) of the performance benchmark metric for all types of performance benchmarks shall include and be informed by an expert consultation process, undertaken by the methodology developer as follows:

a) The objective of the expert consultation shall be to engage and solicit input from technical experts on the appropriateness of the proposed level(s) of the performance benchmark metric to ensuring environmental integrity and provision of sufficient financial incentive to potential projects. Technical experts are persons who have specific knowledge or expertise relevant to the methodology and performance benchmark metric.

b) The methodology developer shall ensure that a representative group of experts participates in the consultation, including, but not limited to, representation from industry, environmental non-governmental organizations, and government or other regulatory bodies. Where a diverse range of views can be expected with regard to the appropriate level of the performance benchmark metric, experts representing the range of views shall participate in the consultation. Participation by experts shall be pro-actively sought and facilitated. Consultation that does not involve a representative group of experts shall be deemed insufficient.

c) Experts shall be provided, under appropriate confidentiality agreements (as necessary), with sufficient background and technical information about the methodology and its context to allow meaningful participation in the consultation. The consultation process shall use meetings, conference calls and other appropriate methods to allow all experts to provide comments and exchange views in an open, fair and transparent manner.

d) A report on the expert consultation process and outcome shall be prepared and submitted to Verra when a methodology is submitted under the methodology development and review process. This may be included as an annex to the methodology, to be removed from any final approved version of the methodology. The report shall provide a summary of expert views and shall demonstrate how the above requirements have been met and how expert views were taken due account of (i.e., how expert views have affected the final level(s) of the performance benchmark metric in the draft methodology).

Note that expert consultation only needs to be undertaken by the methodology developer with respect to the level of the performance benchmark metric, since the methodology is also subject to public stakeholder consultation as part of the methodology development and review process.

2.3.11 Where there is heterogeneity of performance (measured in terms of the performance benchmark metric) that may be practicably achieved by individual projects, multiple benchmarks or correction factors may be required. Multiple benchmarks or correction factors shall be established under the following circumstances:

1) The project activity includes technologies and/or measures which may be implemented at both greenfield and brownfield sites and the performance (measured in terms of the performance benchmark metric) that may be practicably achieved at each is substantially different.

2) The methodology encompasses both larger and smaller scale project activities and the performance (measured in terms of the performance benchmark metric) that may be practicably achieved in each case is substantially different.

3) Any other circumstances related to the baseline scenario or project activity, such as plant age, raw material quality and climatic circumstances, that lead to heterogeneity of performance (measured in terms of the performance benchmark metric) that may be practicably achieved by individual projects.

Activity Methods

2.3.12 Activity methods shall be prepared using the *VCS Module Template*, or, where a new methodology is being developed, may be written directly into the methodology (i.e., a positive list may be prepared and approved as a standalone additionality test that may be used in conjunction with applicable methodologies, or may be prepared as a direct part of a new methodology, in which case it may not be used in conjunction with other methodologies). To aid the readability of this document, it is assumed that the activity method is being written directly into the methodology, so readers should take references to methodology to mean methodology or module, as appropriate.

2.3.13 Activity methods shall set out, using the specification of the project activity under the applicability conditions, a positive list of project activities that are deemed as additional under

the activity method (see Section 3.2 for further information on providing specification of project activities). All such project activities are deemed as additional under the activity method.

2.4 Uncertainty

Concept

Uncertainty is defined by the IPCC as the lack of knowledge of the true value of a variable that can be described as a probability density function characterizing the range and likelihood of possible values. The *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories*[1] provides further guidance on key concepts and terminology including applicable definitions of random error, systematic error, and related terms.

Methodologies must be designed to reduce systematic and random error as far as practical. Where relevant, methodologies must set out procedures for projects to estimate residual random error according to recognized statistical approaches, and to apply conservativeness deductions to reduce the risk of overestimating emission reductions due to random error.

Requirements

2.4.1 Methods used for estimating random error shall be based on recognized statistical approaches such as those described in the latest IPCC guidance.[2]

2.4.2 Methodology developers shall include within the methodology an assessment of uncertainties that may result from application of the methodology. Methodology developers shall make reasonable assumptions (based on available data, literature and precision standards included in the methodology) of the uncertainty ranges of the parameters in the methodology. They must estimate the resulting emission reduction uncertainty, using standard error propagation equations or simulation techniques. The assessment shall conclude whether there is a significant risk that the uncertainty for estimating emission reductions (i.e., the half-width of the two-sided 90 percent confidence interval) could exceed 10 percent of the estimated value. The risk shall be deemed significant where uncertainties are expected to exceed 10 percent in at least 10 percent of the cases (i.e., the worst case scenario). See box below for an example emission reduction uncertainty calculation.

[1] See Volume 1, Chapter 3, Section 3.1.3 available at https://www.ipcc-nggip.iges.or.jp/public/2019rf/vol1.html.
[2] At the time of writing, guidance on uncertainties is included in Volume 1, Chapter 3 of the *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories* (https://www.ipcc-nggip.iges.or.jp/public/2019rf/vol1.html).

Example Emission Reduction Uncertainty Calculation

A proposed new methodology lays out a simple calculation to estimate emission reductions:

$$ER = AD \times EF$$

Where:
ER = Emission reductions (tCO_2e/yr)
AD = Activity data (ha)
EF = Emission factor ($tCO_2e/ha/yr$)

For the AD parameter, the methodology developer provides data that show how uncertainties vary across projects, but in 90% of the cases, AD uncertainties do not exceed 2% of the AD estimate (i.e., the lower bound of the 90% confidence interval). For EF parameter, the methodology requires a minimum precision level of 5% of the EF estimate, which must be achieved when measuring the EF.

Using the above set of numbers and error propagation equation, the methodology developer concludes that ER uncertainties are expected to be smaller than 5.4% of the ER estimate in 90% of the cases:

$$Uncertainty\ ER = \sqrt{Uncertainty\ AD^2 + Uncertainty\ EF^2} = \sqrt{0.02^2 + 0.05^2} = 5.4\%$$

Therefore, since it is unlikely that the emission reduction estimate could be more uncertain than 10%, the methodology does not need to lay out a procedure for estimating uncertainties and applying uncertainty discounts

2.4.3 Where it is unlikely that the half-width of the two-sided 90 percent confidence interval for estimating emission reductions could exceed 10 percent of the estimated value, methodologies may exclude random uncertainty.

2.4.4 Where it is likely that the half-width of the two-sided 90 percent confidence interval for estimating emission reductions could exceed 10 percent of the estimated value, methodologies shall:

1) Set out a procedure to estimate a two-sided 90 percent confidence interval for the emission reduction estimates, considering the random error of baseline emissions and project emissions and the underlying data and parameters. Where analyzing random errors of emission reduction estimates is not practical, the uncertainty analysis may focus on estimates of emissions, activity data, and emission factors; and

2) Set out a procedure to calculate an appropriate conservativeness deduction. The deductions shall usually be applied to estimates of emission reductions but may alternatively be applied to estimates of emissions, activity data, and emission factors in cases where this is not practical.

3) The methodology shall include procedures for calculation and application of a conservativeness deduction as follows:[3]

First, a discount factor shall be established:

$$Discount\ factor = \frac{Uncertainty}{t_{\alpha=10\%}} \times t_{\alpha=66.6\%}$$

Where:

Discount factor	= Discount factor to be applied for calculating the conservativeness deduction; %
Uncertainty	= Half-width of the 90% confidence interval as a percentage of the mean estimate; %
$t_{\alpha=10\%}$	= t-value for the two-sided 90% confidence interval, approximately 1.6449; dimensionless
$t_{\alpha=66.6\%}$	= t-value for a one-sided 66.67% confidence interval, approximately 0.4307; dimensionless

Second, the estimate shall be corrected downwards by the discount factor to arrive at a conservatively discounted estimate:

$$Conservatively\ discounted\ estimate\ = Estimated\ emission\ reduction\ \times\ (1 - Discount\ factor)$$

See box below for an example calculation and application of a conservativeness deduction.

Example Calculation and Application of a Conservativeness Deduction

A hypothetical project generates emission reductions of 100,000 tCO_2e. Following guidance in its methodology, the project estimates the standard error of the emission reduction estimate at 20,000 tCO_2e and the uncertainty at the 90 percent confidence level at 32,898 tCO_2e, i.e., as a percentage: Uncertainty = 32,898 tCO_2e / 100,000 tCO_2e = 32.9%.

The project estimates the discount factor as follows: Discount factor = 32.9% / 1.6449 * 0.4307 = 8.6%. Accordingly, the project corrects downward its emission reduction estimate as follows: Conservatively discounted ER estimate = 100,000 tCO_2e * (1 – 8.6%) = 91,400 tCO_2e.

[3] This conservativeness deduction is based on Climatic Change 166, 26 (2021) available at https://doi.org/10.1007/s10584-021-03079-z.

2.4.5 Where the half-width of the two-sided 90 percent confidence interval exceeds 100 percent of the emission reduction estimate, the project is not eligible for crediting.

2.5 Models, Default Factors and Proxies

Concept

Methodologies may use models, default factors and/or proxies to streamline monitoring or measurement processes. Where methodologies use models, default factors and/or proxies, they shall follow the requirements set out below in order to ensure the integrity of the model, default factor(s) and proxy(s) used.

Requirements

2.5.1 Where methodologies mandate the use of specific models to simulate processes that generate GHG emissions (i.e., the project proponent is not permitted to use other models), the following applies, given the note below:

1) Models shall be publicly available, though not necessarily free of charge, from a reputable and recognized source (e.g., the model developer's website, IPCC, or government agency).

2) Model parameters shall be determined based upon studies by appropriately qualified experts that identify the parameters as important drivers of the model output variable(s).

3) Models shall have been appropriately reviewed and tested (e.g., ground-truthed using empirical data or results compared against results of similar models) by a recognized, competent organization, or an appropriate peer review group.

4) All plausible sources of model uncertainty, such as structural uncertainty or parameter uncertainty, shall be assessed using recognized statistical approaches such as those described in *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories, Volume 1, Chapter 3*.

5) Models shall have comprehensive and appropriate requirements for estimating uncertainty in keeping with IPCC or other appropriate guidance, and the model shall be calibrated by parameters such as geographic location and local climate data.

6) Models shall apply conservative factors to discount for model uncertainty (in accordance with the requirements set out in Section 2.1.3) and shall use conservative assumptions and parameters that are likely to underestimate, rather than overestimate, the GHG emission reductions or removals.

Note – The criteria set out in (2)-(6) above are targeted at more complex models. For simple models, certain of these criteria may not be appropriate, or necessary to the integrity of the methodology. Such criteria may be disregarded, though the onus is upon the methodology developer to demonstrate that they are not appropriate or necessary.

2.5.2 Where methodologies use default factors and standards to ascertain GHG emission data and

any supporting data for establishing baseline scenarios and demonstrating additionality, the following applies:

1) Where the methodology uses third-party default factors and/or standards, such default factors and standards shall meet with the requirements for data set out in Section 3.4.6, *mutatis mutandis*. Where the methodology requires peer-reviewed scientific literature to establish such default factor(s) the following shall apply:

   a) The literature shall be in a journal indexed in the Web of Science: Science Citation Index (SCI; available at https://mjl.clarivate.com).

   b) Where there is no relevant literature indexed in the SCI, the project proponent may propose alternative source(s) of information (e.g., government databases, industry publications) to establish the default factor(s) and shall provide evidence that the alternative source(s) of information is robust and credible (e.g., independent expert attestation).

   c) Where the default factor(s) is not derived from primary data in the SCI-indexed literature or in the alternative source of information (e.g., it is established by referencing other publications, or it is a meta-analysis), the primary source(s) from which it was drawn shall be cited.

2) Where the methodology itself establishes a default factor, the following applies:

   a) The data used to establish the default factor shall conform with the requirements for data set out in Section 3.4.6, *mutatis mutandis*.

   b) The methodology shall describe in detail the study or other method used to establish the default factor.

   c) The methodology developer shall identify default factors which may become out of date (i.e., those default factors that do not represent physical constants or otherwise would not be expected to change significantly over time). Such default factors are subject to periodic re-assessment, as set out in the VCS Program document *Methodology Development and Review Process*.

3) Where methodologies allow project proponents to establish a project-specific factor, the methodology shall provide a procedure for establishing such factors.

Note – Methodologies may use deemed savings factors which, as set out in the definition of deemed savings factor, are a specific type of default factor.

2.5.3 Where proxies are used, it shall be demonstrated that they are strongly correlated with the value of interest and that they can serve as an equivalent or better method (e.g., in terms of reliability, consistency or practicality) to determine the value of interest than direct measurement of the value itself.

2.6 AFOLU Methodologies

Concept

AFOLU projects may encounter unique circumstances related to project implementation, monitoring and other matters. Methodologies applicable to AFOLU projects shall meet additional requirements in order to address these circumstances. This section sets out high-level methodological requirements related to such AFOLU-specific matters. Note that additional AFOLU-specific requirements are also set out throughout this document.

Requirements

2.6.1 There are currently six AFOLU project categories under the VCS Program, as further described in Appendix 1 Eligible AFOLU Project Categories. Proposed AFOLU methodologies shall fall within one or more of these AFOLU project categories.

2.6.2 Where a methodology combines AFOLU project categories, the methodology shall adhere to all sets of requirements pertaining to each and every project category covered, either separating activities, or where activities cannot be separated, taking a conservative approach to each requirement.

2.6.3 Biofuel crop production activities are eligible as a project activity only to the extent that they generate measurable long-term increases in aboveground, belowground, and/or soil carbon stocks or substantially reduce soil carbon losses. Biofuel crop production on undrained or rewetted wetlands shall follow the wetlands restoration and conservation (WRC) requirements. Although a number of biofuel crops require drainage, some forms of biomass production on wetlands (e.g., paludicultures on peatland) are compatible with rewetting and may even lead to organic matter accumulation. This activity is feasible, for example, with crops that grow on wet peatlands and that do not consume the peat body, such as alder, papyrus and willow. Biofuel crop production activities on drained wetlands or on wetlands cleared of, or converted from, native ecosystems are not eligible.

2.7 ODS Methodologies

Concept

ODS projects may encounter unique circumstances related to project implementation, avoidance of perverse incentives, and other matters. Methodologies applicable to ODS projects shall meet additional requirements in order to address these circumstances. This section sets out high-level methodological requirements related to such ODS-specific matters. Note that additional ODS-specific requirements are also set out throughout this document.

Requirements

2.7.1 Methodologies for ODS destruction projects are categorized under sectoral scope 11, fugitive

emissions from production and consumption of halocarbons and sulphur hexafluoride.

2.7.2 ODS projects are eligible for immediate crediting of future avoided emissions and methodologies may use such a crediting model.

Note – Crediting shall still be in relation to the baseline scenario. In many cases, methodologies will credit projects for all of the ODS destroyed by the project (minus any project emissions and leakage). However, it is possible that projects could destroy ODS from existing stockpiles and only a portion of the ODS would have been emitted under the baseline scenario. For example, if the baseline scenario includes use of the ODS to service existing equipment and a certain proportion of such ODS would be recovered and destroyed at the end of that equipment's life (whether voluntarily or due to regulation), then the volume of credits granted to the project shall reflect this.

2.8 Methodology Revisions

Concept

VCS methodologies and approved GHG program methodologies may be revised under the VCS Program. Additionally, standardized methods must be re-evaluated periodically to ensure that they are still valid, and necessary updates to a standardized method may require revision to the underlying methodology.

Requirements

General

2.8.1 Methodology revisions are appropriate where a project activity is broadly similar to the project activities eligible under an existing methodology and such project activity can be included through reasonable changes to that methodology. Methodology revisions are also appropriate where an existing methodology can be materially improved. Materially improving a methodology involves comparing the existing and proposed methodologies so as to show that the changes will deliver material improvements that will result in greater accuracy of measurement of GHG emissions reductions or removals, improved conservatism and/or reduced transaction costs.

2.8.2 Methodology revisions shall be prepared using the *VCS Methodology Template* and shall be managed via the methodology development process. They may be prepared and submitted to the methodology development and review process by the developer of the original methodology or any other entity.

2.8.3 The VCS Program distinguishes between revisions to VCS methodologies and revisions to approved GHG program methodologies. The requirements for the development and assessment of each are set out in the VCS Program document *Methodology Development and Review Process*.

Standardized Methods

2.8.4 Standardized methods approved under the VCS Program shall be periodically reviewed and

may require revision, as set out in the VCS Program document *Methodology Development and Review Process*.

2.8.5 Where an activity method uses the activity penetration option and the level of activity penetration has risen (since initial approval) to exceed the five-percent threshold level, the activity method may not be revised to use the financial feasibility or revenue streams options.

3 METHODOLOGY COMPONENTS

This section sets out the rules and requirements for each component of VCS methodologies.

In order to be approved under the VCS Program, methodologies shall be assessed per the process set out in the VCS Program document *Methodology Development and Review Process*.

3.1 Definitions

Concept

Methodologies may set out defined terms in addition to those already included in the VCS *Program Definitions* to help users understand the context of the methodology and improve its readability.

Requirements

3.1.1 Definitions shall be written in a clear and concise manner.

3.1.2 Defined terms shall be used within the methodology and methodologies shall not define terms that are already included in the VCS *Program Definitions*.

3.2 Applicability Conditions

Concept

Applicability conditions define the project activities which are eligible to apply a given methodology. These may include conditions such as geographic applicability, technology type, historical land use and any other conditions under which the methodology is or is not applicable.

Requirements

General

3.2.1 Methodologies shall use applicability conditions to specify the project activities to which it applies and shall establish criteria that describe the conditions under which the methodology can (and cannot, if appropriate) be applied. Any applicability conditions set out in tools or modules used by the methodology shall also apply.

3.2.2 Applicability conditions must be specified clearly, and in a manner that allows easy determination of whether an activity being undertaken by a potential project proponent is eligible.

3.2.3 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.

Standardized Methods

3.2.4 Methodologies shall specify the class of activities that they are applicable to in order to provide a carefully targeted standardized method with an appropriate level of aggregation with respect to the project activity. The methodology shall specify the applicability conditions accordingly and shall cause to be excluded from the methodology, to the extent practicable, those classes of project activities that it can be reasonably assumed will be implemented without the intervention created by the carbon market. For example, a methodology may exclude facilities larger than a specific size or capacity, constructed before a given date or that have regular access to lower cost fuels than most facilities. Methodologies shall demonstrate how the applicability conditions achieve such objective with respect to free-riders.

Performance Methods

3.2.5 The methodology's applicability conditions shall limit its applicability to project activities whose performance can be described in terms of the performance benchmark metric set out in the methodology.

3.2.6 Where a methodology uses a performance method for determining additionality, the applicability conditions shall ensure that the project implements technologies and/or measures that cause substantial performance improvement relative to the crediting baseline and what is achievable within the sector, and the methodology shall explicitly specify such technologies and/or measures (or examples thereof). Note that the implementation date of such technologies and/or measures is the project start date and the VCS Program rules with respect to project start date apply (i.e., implementation will need to have occurred within timeframes permitted under the VCS Program rules on project start date). Activities that have not implemented any such technologies and/or measures, or that have implemented them on a date that is earlier than that permitted under the VCS rules on project start date, shall be excluded from the methodology.

3.2.7 The applicability conditions shall establish the scope of validity of the methodology, and where multiple benchmarks are established, each performance benchmark, including the geographic scope. In establishing the scope of validity of the methodology or each performance benchmark, the methodology shall clearly demonstrate that there is similarity across the sub-areas of the geographic scope 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, noting that variation is permitted where correction factors address such variation as set out in Section 2.3.11.

It may be necessary to stratify and establish multiple performance benchmarks, or to limit the applicability of the methodology, to conform with this requirement.

3.2.8 The applicability of a methodology or a performance benchmark shall be limited to the geographic area for which data are available, or it shall be demonstrated that data from one geographic area are representative of another or that it is conservative to apply data from one geographic area to another. Representativeness shall be determined in terms of the similarity of the geographic areas considering such factors as those set out in Section 3.2.7 above. Likewise, it shall be determined that it is conservative to apply data from one geographic area by considering the same factors. In determining whether two areas are sufficiently similar, or that it is conservative, to allow data to apply from one area to another, only factors related to the baseline scenario and additionality need to be considered.

Activity Methods

3.2.9 The applicability conditions specify the project activity and they shall therefore serve as the specification of the positive list (i.e., all project activities that satisfy the applicability conditions are deemed as additional).

3.2.10 Methodologies shall clearly specify the project activity in terms of a technology or measure and its context of application. A technology or measure encompasses the plant, equipment, process, management and conservation measure or other practice that directly or indirectly generates GHG emission reductions and/or removals. The context of application refers to the conditions or circumstances under which such technology or measure may be implemented.

3.2.11 The applicability conditions shall establish the scope of validity of the methodology, including the geographic scope. In establishing the scope of validity of the methodology, the methodology shall clearly demonstrate that there is similarity across the sub-areas of the geographic scope 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, it may be necessary to limit the applicability of the methodology to conform with this requirement.

3.2.12 Where the activity method is set out as a separate module (i.e., is not an integrated part of a methodology), the activity method may be applied to any methodology eligible under the VCS Program that permits the project activity specified in the module (see the VCS Program document *VCS Standard* for further details).

3.3 Project Boundary

Concept

The project boundary includes the GHG sources, sinks and reservoirs that are controlled by the project proponent, are related to the project or are affected by project activities. Methodologies shall describe the project boundary and the GHG sources, sinks and reservoirs included in or excluded from the project boundary.

Requirements

General

3.3.1 Methodologies shall establish criteria and procedures for describing the project boundary and identifying and assessing GHG sources, sinks and reservoirs relevant to the project and baseline scenarios. Justification for GHG sources, sinks and reservoirs included or excluded shall be provided.

3.3.2 In identifying GHG sources, sinks and reservoirs relevant to the project, methodologies shall set out criteria and procedures for identifying and assessing GHG sources, sinks and reservoirs that are controlled by the project proponent, related to the project or affected by the project (i.e., leakage).

3.3.3 In identifying GHG sources, sinks and reservoirs relevant to the baseline scenario, methodologies shall:

1) Set out criteria and procedures used for identifying the GHG sources, sinks and reservoirs relevant for the project.

2) Where necessary, explain and apply additional criteria for identifying relevant baseline GHG sources, sinks and reservoirs.

3) Compare the GHG sources, sinks and reservoirs identified for the project with those identified in the baseline scenario, to ensure equivalency and consistency.

AFOLU Methodologies

3.3.4 The relevant carbon pools for AFOLU project categories are aboveground tree biomass (or aboveground woody biomass, including shrubs, in ARR, ALM and ACoGS projects), aboveground non-tree biomass (aboveground non-woody biomass in ARR and ALM projects), belowground biomass, litter, dead wood, soil (including peat) and wood products. Methodologies shall include the relevant carbon pools set out in Table 2 below.

Table 2: Carbon Pools to be considered in Methodologies

	Above-ground tree* biomass	Above-ground non-tree* biomass	Below-ground biomass	Litter	Dead wood	Soil	Wood products
ARR	Y	S	S	S	S	S	O

		Above-ground tree* biomass	Above-ground non-tree* biomass	Below-ground biomass	Litter	Dead wood	Soil	Wood products
ALM	Exclusive focus on reducing N_2O, CH_4 and/or fossil-derived CO_2 emissions	S	N	O	N	N	S	O
	All other ALM projects	S	N	O	N	N	Y	O
IFM	Reduced Impact Logging (RIL) with no or minimal (<25%) effect on total timber extracted	Y	N	O	N	Y	N	N
	Reduced Impact Logging (RIL) with at least 25% reduction in timber extracted	Y	N	O	N	Y	N	Y
	Logged to Protected Forest (LtPF)	Y	N	O	N	Y	N	Y
	Extended Rotation Age (ERA)	Y	N	O	N	O	N	O
	Low-productive to High-productive Forests (LtHP)	Y	N	O	N	O	O	O
REDD	Planned or unplanned deforestation/degradation (APD or AUDD) with annual crop as the land cover in the baseline scenario	Y	O	O	N	O	O	S
	Planned or unplanned deforestation/degradation (APD or AUDD) with pasture grass as the land cover in the baseline scenario	Y	O	O	N	O	N	S
	Planned or unplanned deforestation/degradation (APD or AUDD) with	Y	Y	O	N	O	N	S

		Above-ground tree* biomass	Above-ground non-tree* biomass	Below-ground biomass	Litter	Dead wood	Soil	Wood products
	perennial tree crop[4] as the land cover in the baseline scenario							
ACoGS	Planned or unplanned conversion	O	O	O	O	O	O	N
WRC		Y	O	O	N	O	Y	O

Y: Carbon pool shall be included in the project boundary.

S: Carbon pool shall be included where project activities may significantly reduce the pool, and may be included where baseline activities may significantly reduce the pool, as set out in Sections 3.3.10 to 3.3.28. The methodology shall justify the exclusion or inclusion of the pool in the project boundary.

N: Carbon pool does not have to be included, because it is not subject to significant changes or potential changes are transient in nature. The pool may be included in the project boundary because of positive impacts to reducing or removing emissions. Where the carbon pool is included in the project boundary, methodologies shall establish criteria and procedures to set out when a project proponent may include the pool.

O: Carbon pool is optional and may be excluded from the project boundary. Where the pool is included in the methodology, the methodology shall establish criteria and procedures to set out when a project proponent shall or may include the pool.

***** For ARR, ALM and ACoGS projects, in place of "Aboveground tree" and "Aboveground non-tree", these two carbon pool categories should be read as "Aboveground woody" and "Aboveground non-woody" respectively.

3.3.5 Additional guidance and further requirements with respect to specific carbon pools and GHG sources are set out below in Sections 3.3.10 to 3.3.28.

3.3.6 Specific carbon pools and GHG sources, including carbon pools and GHG sources that cause project and leakage emissions, may be deemed *de minimis* and do not have to be accounted

[4] Common perennial crops include oil palm, bananas, other fruit trees, spice trees, tea shrubs, and the like, which may or may not meet the definition of a tree used within a host country.

for if together the omitted decrease in carbon stocks (in carbon pools) or increase in GHG emissions (from GHG sources) amounts to less than five percent of the total GHG benefit generated by the project. The methodology shall establish the criteria and procedures by which a pool or GHG source may be determined to be *de minimis*.

For example, peer reviewed literature or the CDM A/R methodological tool *Tool for testing significance of GHG emissions in A/R CDM project activities* may be used to determine whether decreases in carbon pools and increases in GHG emissions are *de minimis*.

Further, the following GHG sources may be deemed *de minimis* and need not be accounted for:

1) ARR, IFM and REDD: N_2O emissions from project activities that apply nitrogen containing soil amendments and N_2O emissions caused by microbial decomposition of plant materials that fix nitrogen. ALM projects that apply nitrogen fertilizer and/or manure or plant nitrogen fixing species shall account for N_2O emissions.

2) ARR, IFM, REDD, ACoGS and WRC: GHG emissions from the removal or burning of herbaceous vegetation and collection of non-renewable wood sources for fencing of the project area.

3) ARR, IFM, REDD, ACoGS and WRC: Fossil fuel combustion from transport and machinery use in project activities. Where machinery use for selective harvesting activities may be significant in IFM project activities as compared to the baseline or where machinery use for earth moving activities may be significant in WRC project activities as compared to the baseline, emissions shall be accounted for if above *de minimis*, in accordance with this Section 3.3.6. Fossil fuel combustion from transport and machinery use in rewetting of drained peatland and conservation of peatland project activities need not be accounted for.

3.3.7 Specific carbon pools and GHG sources do not have to be accounted for if their exclusion leads to conservative estimates of the total GHG emission reductions or removals generated. The methodology shall establish criteria and procedures by which a project proponent may determine a carbon pool or GHG source to be conservatively excluded. Such conservative exclusion may be determined by using tools from an approved GHG program, such as the CDM A/R methodological tool *Procedure to determine when accounting of the soil organic carbon pool may be conservatively neglected in CDM A/R project activities*, or by using peer-reviewed literature.

3.3.8 Reductions of N_2O and/or CH_4 emissions are eligible for crediting if in the baseline scenario the project area would have been subject to livestock grazing, rice cultivation, burning and/or nitrogen fertilization.

3.3.9 Reductions of CH_4 emissions are eligible for crediting if fire would have been used to clear the land in the baseline scenario.

Afforestation, Reforestation and Revegetation (ARR)

3.3.10 Where a methodology is applicable to projects that may reduce the aboveground non-woody

biomass, belowground biomass, litter, dead wood or soil pools above *de minimis* (as set out in Section 3.3.6), the relevant carbon pool shall be included in the project boundary.

Agricultural Land Management (ALM)

3.3.11 Where a methodology is applicable to projects with livestock grazing in the project or baseline scenario, CH_4 emissions from enteric fermentation and CH_4 and N_2O emissions from manure shall be included in the project boundary.

3.3.12 Where land-use conversion requires intensive energy inputs or infrastructure development, such as the establishment of irrigation or drainage systems, the methodology shall include the GHG emissions associated with the conversion process in the project boundary.

3.3.13 Where energy-conserving practices reduce emissions of CO_2, such as adopting no-till practices to reduce fuel use, the methodology may include these GHG emissions reductions in the project boundary.

3.3.14 Where activities convert drained, farmed organic soils to perennial non-woody vegetation and reduce or eliminate drainage to reduce CO_2 and N_2O emissions from organic soils, such activities may increase CH_4 emissions. Methodologies applicable to such activities shall include CH_4 emissions in the project boundary.

Improved Forest Management (IFM)

3.3.15 IFM methodologies applicable to activities that reduce harvested timber shall account for the GHG emissions associated with changes in the wood products pool to avoid overestimating project net GHG benefits. The quantity of live biomass going into wood products shall be quantified where above *de minimis* (as set out in Section 3.3.6).

3.3.16 For IFM activities, changes in soil carbon are likely to be *de minimis* for forests on mineral upland soils, though they could be considerably above *de minimis* for forests growing in wetland areas such as peatland forests or mangroves. Although it may be conservative to omit the soil carbon pool for such projects, additional GHG credits may be available if the soil carbon pool is included. Therefore, the pool may be included in the project boundary.

3.3.17 RIL and LtPF methodologies shall include the dead wood carbon pool in the project and baseline scenario. Both of these activities reduce the amount of timber extracted per unit area, which, in turn, may reduce the dead wood pool in the project scenario.

3.3.18 Accounting for the dead wood carbon pool in ERA methodologies is complex because GHG emissions will depend on how post-harvest slash is treated. Slash may either be piled and burned on site, as typically happens in fire prone areas, or left on site to decompose. Extending a harvest rotation or cutting cycle would result in larger trees at harvest, which would increase the amount of dead wood produced at each harvest, but not necessarily the total amount of dead wood produced over time. Because the dead wood pool may increase above the *de minimis* in the baseline or project scenario, this carbon pool is deemed optional.

Reduced Emissions from Deforestation and Degradation (REDD)

3.3.19 Where timber removal is associated with deforestation and/or degradation in the baseline scenario, the wood product pool shall be included in the project boundary because significant quantities of carbon can be stored in wood products instead of entering the atmosphere during deforestation. The quantity of live biomass going into wood products shall be quantified if above *de minimis* (as set out in Section 3.3.6) or may be conservatively excluded (as set out in Section 3.3.7).

3.3.20 Where the baseline scenario is the conversion of forest to annual crops, additional GHG credits may be available if the soil carbon pool is included because decreases in soil carbon stocks in the baseline scenario can be significant.

Avoided Conversion of Grasslands and Shrublands (ACoGS)

3.3.21 Grasslands and shrublands are highly variable in their above- and belowground biomass, so the relevant carbon pools will vary. Non-forest land commonly generates negligible amounts of wood products, hence the pool is not required for ACoGS. All other pools are optional for ACoGS activities, because none of the carbon pools are expected to decrease with the project activity. Soil carbon is likely to be the carbon pool that generates the most GHG emission reductions in ACoGS projects. In addition, in non-forested ecosystems, the belowground biomass pool is often several times larger than the aboveground biomass pools[5]. Methodologies shall set out the carbon pools that shall or may be included in the project boundary.

3.3.22 Grazing is a common practice in many grassland and some shrubland ecosystems. As such, livestock grazing does not preclude ACoGS project eligibility, and grazing may continue on project areas. Projects that incorporate improved grazing practices shall follow the Improved Grassland Management requirements for such activities in the ALM category. Such activities may provide GHG benefits in addition to those achieved by avoiding conversion under this ACoGS category. Where livestock grazing may be present in the project scenario, methodologies shall set out criteria and procedures to account for CH_4 emissions from enteric fermentation and CH_4 and N_2O emissions from manure. Where grazing occurs in both the baseline and project scenarios, net changes in CH_4 and N_2O associated with grazing may be deemed *de minimis* and excluded in accordance with Sections 3.3.6 and 3.3.7.

3.3.23 Where the baseline scenario may include conversion to cropland, methodologies may include CH_4 and N_2O emissions from fertilizer application (manure or synthetic) in the baseline and project scenarios.

3.3.24 Where the baseline scenario may include the conversion of vegetation to perennial crops, such as where oil palm or short-rotation woody crops would be planted, the aboveground woody and non-woody biomass pools shall be included.

[5] Mokany, K., R. J. Raison, and A. S. Prokushkin. 2006. Critical analysis of root: shoot ratios in terrestrial biomes. Global Change Biology 12:84-96.

Wetlands Restoration and Conservation (WRC)

3.3.25 Methodologies that allow for combined category projects shall apply the relevant WRC requirements for the soil carbon pool and the respective non-WRC AFOLU project category requirements for the other pools, unless the former may be deemed *de minimis* (as set out in Section 3.3.6) or conservatively excluded (as set out in Section 3.3.7)

3.3.26 Methodologies shall include CH_4 emissions in the project boundary (for example, transient peaks of CH_4 that may arise after rewetting peatland). The methodology shall establish the criteria and procedures by which the CH_4 source may be deemed *de minimis* (as set out in Section 3.3.6) or conservatively excluded (as set out in Section 3.3.7)

3.3.27 N_2O emissions shall be included in the project boundary for RWE activities. The methodology shall establish the criteria and procedures by which the N_2O source may be deemed *de minimis* (as set out in Section 3.3.6) or conservatively excluded (as set out in Section 3.3.7).

3.3.28 For project activities implemented on coastal wetlands, methodologies shall establish criteria and procedures for establishing the geographic boundary that considers projections of expected relative sea level rise. The procedures shall account for the potential effect of sea level rise on the lateral movement of wetlands during the project crediting period and the potential that the wetlands will migrate beyond the project boundary.

3.4 Baseline Scenario

Concept

The baseline scenario represents the activities and GHG emissions that would occur in the absence of the project activity. The baseline scenario must be accurately determined so that an accurate comparison can be made between the GHG emissions that would have occurred under the baseline scenario and the GHG emission reductions and/or removals that were achieved by project activities.

Requirements

General

3.4.1 Methodologies using a project method shall establish criteria and procedures for identifying alternative baseline scenarios and determining the most plausible scenario, taking into account the following:

1) The identified GHG sources, sinks and reservoirs.

2) Existing and alternative project types, activities and technologies providing equivalent type and level of activity of products or services to the project.

3) Data availability, reliability and limitations.

4) Other relevant information concerning present or future conditions, such as legislative, technical, economic, socio-cultural, environmental, geographic, site-specific and temporal assumptions or projections.

3.4.2 Methodologies using a standardized method for determining the crediting baseline shall describe (taking into account the factors set out Section 3.4.1 above), as far as is possible, the technologies or measures that represent the most plausible baseline scenario or the aggregated baseline scenario (see Section 3.4.4 for further information on aggregate baseline scenarios), though it is recognized that it may not be possible to specify precisely all technologies or measures given that the baseline may represent a variety of different technologies and measures.

Standardized Methods

3.4.3 Standardized methods shall be developed with the objective of predicting, as accurately as is practicable, the most plausible baseline scenario or aggregated baseline scenario. Notwithstanding this principle, it is recognized that standardized methods cannot perfectly capture the precise baseline behavior for all proposed projects eligible under a standardized method.

Performance Methods

3.4.4 Methodologies shall identify alternative baseline scenarios and determine either the most plausible baseline scenario or an aggregate baseline scenario for the project activity. Aggregate baseline scenarios shall be determined by combining likely scenarios on a probabilistic (i.e., likelihood) basis.

Note – The most plausible baseline scenario or aggregate baseline scenario for many AFOLU project activities is represented by the control data (i.e., for methodologies using a dynamic performance benchmark) or reference region.

3.4.5 Performance benchmarks shall be established based upon available technologies and/or current practices, and trends, within a class of activities. Where the analysis of current distribution of performance within a class of activities for a methodology-established performance method shows a clear trend of improvement in the baseline scenario over time, the performance benchmark shall take account of the trend through the use of an autonomous improvement factor, as set out in Section 3.4.8.

3.4.6 Appropriate data sources for developing performance methods include economic and engineering analyses and models, peer-reviewed scientific literature, case studies, empirical data, and common practice data. The data and dataset derived from such data sources shall meet the requirements below. The CDM *Guidelines for quality assurance and quality control of data used in the establishment of standardized baselines* also provides useful related guidance.

1) Data collected directly from primary sources shall comply with relevant and appropriate standards, where available, for data collection and analysis, and be audited at an appropriate frequency by an appropriately qualified, independent organization.

2) Data collected from secondary sources shall be available from a recognized, credible source and must be reviewed for publication by an appropriately qualified, independent organization or appropriate peer review group, or be published by a government agency.

3) Data shall be from a time period that accurately reflects available technologies and/or current practice, and trends, within the sector. Selection of the appropriate temporal range shall be determined based on the guidance provided in the *GHG Protocol for Project Accounting*, Chapter 7 (WRI-WBCSD).

4) Where sampling is applied in data collection, the requirements set out in Section 2.1.3 shall be adhered to. The methodology developer shall demonstrate that sampling results provide an unbiased and reliable estimate of the true mean value (i.e., the sampling does not systematically underestimate or overestimate the true mean value).

5) Data shall be publicly available or made publicly available. Proprietary data (e.g., data pertaining to individual facilities) may be aggregated, and therefore not made publicly available, where there are demonstrable confidentiality considerations. However, sufficient data shall be publicly available to provide transparency and credibility to the dataset.

6) All data shall be made available, under appropriate confidentiality agreements as necessary, to Verra and each of the validation/verification bodies assessing the proposed performance benchmark methodology, to allow them to reproduce the determination of the performance benchmark. Data shall be presented in a manner that enables them to independently assess the presented data.

7) Data shall be appropriate to the methodology's geographic scope and the project activities applicable under it.

8) All reasonable efforts shall be undertaken to collect sufficient data and the use of expert judgment as a substitute for data shall only be permitted where it can be demonstrated that there is a paucity of data. Expert judgment may be applied in interpreting data. Where expert judgment is used, good practice methods for eliciting expert judgment shall be used (e.g., *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories*).

9) Where data must be maintained in a central repository on an on-going basis (e.g., in a database that holds sector data for use by project proponents in establishing specific performance benchmarks for their projects), there shall be clear and robust custody arrangements for the data and defined roles and responsibilities with respect to the central repository.

Where such data requirements set out above cannot be met, a performance method shall not be applied except as set out in Section 3.2.7.

3.4.7 The dataset may be documented and contained within the methodology or may be maintained

in a separate repository that is referenced by the methodology. Datasets documented and contained within methodologies are static datasets, where all projects use the level of the performance benchmark metric specified in the methodology (noting that autonomous improvement factors may be used, as set out in Section 3.4.8 below). The following applies with respect to datasets maintained in a separate repository:

1) The dataset may or may not be periodically updated.

2) The methodology shall establish criteria and procedures for use of the dataset and for establishing specific performance benchmarks for individual projects.

3) The methodology may specify that projects use the level of the performance benchmark metric available at project validation for the duration of their project crediting periods, or may specify that projects use an updated level of the performance benchmark metric at each verification event. The frequency that data is updated within the dataset shall be determined by the methodology developer.

4) It shall be demonstrated that procedures are in place to maintain the dataset in accordance with the applicable requirements set out for data and datasets in Section 3.4.6 above.

3.4.8 Where the analysis of trends in performance of a class of activities shows a clear trend of improvement in the baseline scenario over time, the performance benchmark shall take account of the trend. This means that where the performance benchmark does not use a dataset that is updated at least annually, an autonomous improvement factor shall be used that provides a performance benchmark that tightens annually (i.e., the methodology shall establish an autonomous improvement factor performance benchmark). Notwithstanding this requirement, methodologies may allow projects to use the level of the static performance benchmark metric available at project validation for the duration of their project crediting periods (see also Section 3.4.7 below). Where the analysis of trends shows a trend of increasing GHG emissions or decreasing GHG removals in the baseline scenario over time, the performance benchmark shall not consider such trend.

Activity Methods

3.4.9 There are no specific requirements for activity methods, noting that methodologies using an activity method may use a project or performance method for determining the crediting baseline, as set out in Section 2.2.2.

AFOLU Methodologies

3.4.10 The determination and establishment of a baseline scenario shall follow an internationally accepted GHG inventory protocol, such as the *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories*.

Agricultural Land Management (ALM)

3.4.11 The criteria and procedures for establishing the baseline scenario shall require the project

proponent to take into account current and previous management activities. The quantification of the baseline scenario may be determined from measured inventory estimates and/or activity-based estimation methods, such as those found in the *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories*.

Improved Forest Management (IFM)

3.4.12 Methodologies that establish criteria and procedures for establishing the baseline scenario using a project method, rather than a performance method shall require the following:

1) Documented evidence of the project proponent's operating history, such as five or more years of management records, to provide evidence of normal historical practices. Management records may include, *inter alia*, data on timber cruise volumes, length of roads and skid trails, inventory levels, and harvest levels within the project area. Where the project proponent or implementing partner is a new owner or management entity and does not have a history of management practices within the project area, procedures shall be established to identify the most plausible baseline scenario based upon the most likely owner or operator, noting the following:

   a) For RIL and LtPF projects, where the project proponent takes over ownership or management of a property specifically to implement the project, the baseline scenario shall represent the most likely management plan of the most likely owner or operator (i.e., be based on the projected management plans of the previous property owners and/or operators or the management plans of the most likely operator).

   b) In all other cases, the baseline scenario shall reflect the local common practices and legal requirements. However, if the common practice is unsustainable and unsustainable practices are inconsistent with the mission or the historical management practices of the new owner or management entity, then a sustainable baseline is the minimum that can be adopted.

2) Adherence to the legal requirements for forest management and land use in the area unless verifiable evidence is provided demonstrating that common practice in the area does not adhere to such requirements.

3) Baseline environmental management practices shall not be set below (i.e., be less environmentally robust than) those commonly considered a minimum standard among similar landowners in the area. For example, where common practice exceeds minimum legal practice, the baseline cannot be the minimum legal requirement and the baseline scenario shall, at a minimum, be based on common practice.

Reduced Emissions from Deforestation and Degradation (REDD)

3.4.13 The baseline for REDD projects is comprised of a land-use and land-cover (LU/LC) change component and a carbon stock change component. These components may be addressed separately in a methodology as their scale of analysis may differ.

3.4.14 For inclusion of the non-CO_2 gases, methodologies shall require projects to provide evidence to demonstrate that the practice for which the project plans to claim credit is not common practice in the area. The guidance in the *IPCC 2003 Good Practice Guidelines for LULUCF* and the *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories* may be used to estimate such GHG emissions.

3.4.15 Determination and establishment of the LU/LC change component of the baseline is handled differently for the two eligible REDD activity types, as follows:

1) APDD: The criteria and procedures for establishing the baseline scenario shall require the project proponent to provide verifiable evidence to demonstrate, based on government plans (for publicly owned and managed land), community plans (for publicly owned and community-managed land), concessionary plans (for publicly owned and concession-holder managed) or landowner plans (for privately owned land), that the project area was intended to be cleared. The baseline scenario shall take into account the following:

   a) Where it is common practice in the area for timber to be removed before clearing, wood products shall be included in the baseline scenario.

   b) Where the agent of deforestation is not the landowner (e.g., in situations where the project proponent successfully outcompeted other agents to acquire a government concession or privately-owned lands) and the project can identify the most-likely agent of deforestation, the baseline scenario shall be determined based on the activities of the most-likely agent who would have acquired control of and cleared the project area.

   c) Where the agent of deforestation is not the landowner and cannot be specifically identified, the criteria and procedures for establishing the baseline scenario may be determined based on the most-likely-class of deforestation agents and the intent to deforest. This may be demonstrated through a historical analysis of similar deforestation within the region by the identified most-likely class of deforestation agents. The most-likely-class of deforestation agents are the entities (e.g., individuals, companies or associations) classified based on common characteristics and rates of deforestation that would have been likely to undertake deforestation activities and post-deforestation land-use practices in the project area. The annual rate of forest conversion shall be based on the recent historical practice of the most-likely class (i.e., how much forest is typically cleared each year by similar baseline activities) and projection of the rate of their deforestation activities in the area.

2) AUDD: The criteria and procedures for establishing the baseline scenario shall require the project proponent to take into account deforestation/degradation that would have occurred in the project area during the project crediting period. The baseline scenario shall take into account the following:

   a) Methodologies shall set out criteria and procedures to identify where deforestation would likely occur using spatial analysis and projections (except for certain mosaic configurations as set out in Section 3.4.15(2)(c)). Such analysis shall be based on

historical factors over at least the previous 10 years that explain past patterns and can be used to make future projections of deforestation.

b) In the frontier configuration, most of the forest area to be protected will have low rates of historical deforestation and/or degradation because most of the project area was not accessible in the past to the agents of deforestation/degradation expected to encroach during the project crediting period. Where the expansion of the deforestation frontier into the project area is linked to the development of infrastructure (e.g., roads) that does not yet exist, clear evidence shall be provided to demonstrate that such infrastructure would have been developed in the baseline scenario. Evidence may include permits, maps showing construction plans, construction contracts or open tenders, an approved budget and/or evidence that construction has started.

c) The criteria and procedures for establishing the baseline scenario in the frontier and mosaic configurations shall take into account such factors as historical deforestation and/or degradation rates and require the project proponent to develop a baseline by determining and analyzing a reference area (which need not be contiguous to the project area), that shall be similar to the project area in terms of drivers and agents of deforestation and/or degradation, landscape configuration, and socio-economic and cultural conditions, noting the following.

i) Where, in the mosaic configuration, no patch of forest in project areas exceeds 1,000 ha and the forest patches are surrounded by anthropogenically cleared land, or where it can be demonstrated that 25 percent or more of the perimeter of the project area is within 120 meters of land that has been anthropogenically deforested within the 10 years prior to the project start date, spatial projections to determine where in the project area deforestation is likely to occur are not required. Though not required, such spatial projections may be applied, in accordance with the methodology. Analysis of historical deforestation rates that explain past deforestation in the reference area is required and shall be applied conservatively to the project area.

Avoided Conversion of Grasslands and Shrublands (ACoGS)

3.4.16 The baseline for ACoGS projects is comprised of a land-use and land-cover (LU/LC) change component, a carbon stock change component and a non-CO_2 GHG component where applicable. These components may be addressed with separate analyses in a methodology because the appropriate scale of analysis may differ for each component.

3.4.17 Determination and establishment of the LU/LC change component of the baseline is handled differently for the two eligible ACoGS activity types, as follows:

1) APC: The criteria and procedures for establishing the baseline scenario shall require the project proponent to provide verifiable evidence to demonstrate, based on government plans (for publicly owned and managed land), community plans (for publicly owned and community-managed land), concessionaire plans (for publicly owned and concession holder

managed) or landowner plans (for privately owned land), that the project area was intended to be converted. Documentation of the ability to increase net present value of land through conversion is required, including government subsidies or funding that promotes conversion. Further documentation of landowner plans for conversion may include government approval of conversion or a purchase offer from an entity dedicated to conversion. The baseline scenario shall account for spatial heterogeneity in the project area. Where certain areas are unlikely to be converted, these areas shall be excluded from the baseline scenario. The baseline scenario shall take into account the following:

a) Where the agent of conversion is not the landowner (e.g., in situations where the project proponent successfully outcompeted other agents to acquire a government concession or privately-owned lands) and the project can identify the most-likely agent of conversion, the baseline scenario shall be determined based on historical and current conversion activities of the most-likely agent who would have acquired control of and converted the project area.

b) Where the agent of conversion is not the landowner and cannot be specifically identified, the criteria and procedures for establishing the baseline scenario shall be determined based on the most-likely-class of conversion agents and their intent to convert, which shall be demonstrated through a history of similar conversion within the region by the identified most-likely class. The most-likely-class of conversion agents are the entities (e.g., individuals, companies or associations) classified based on common characteristics and rates of conversion that would have been likely to undertake conversion activities and post-conversion land-use practices in the project area. The annual rate of land conversion shall be based on the recent historical practice of the most-likely class (i.e., how much land is typically converted each year by similar baseline activities) and projection of the rate of their conversion activities in the area. The timeframe used to quantify recent historical practice shall be justified by the project proponent as being of long enough duration to average over typical market fluctuations, commonly between 5-15 years. This rate of conversion shall only be extrapolated to lands that were identified as susceptible to conversion in the baseline scenario.

2) AUC: The criteria and procedures for establishing the baseline scenario shall require the project proponent to take into account conversion that would have occurred in the project area during the project crediting period. The baseline scenario shall account for spatial heterogeneity within the project area. Where certain areas are unlikely to be converted, these areas shall be excluded from the baseline scenario. This analysis shall take into account the patch size at which land conversion typically occurs (e.g., areas unsuitable for crops may still be plowed if they are a small part of a larger suitable parcel. Alternatively, even suitable areas may be unlikely to be plowed if they are a small part of a larger unsuitable area). The baseline scenario shall take into account the following:

a) Methodologies shall set out criteria and procedures to identify where land conversion would likely occur using spatial analysis and projections. Such analysis shall be based on historical factors over the previous 10 years that explain past patterns and can be used to make future projections of land conversion.

b) In cases where future land conversion rates are predicted to exceed historical rates in the project area, evidence documenting the factors contributing to increased conversion must be presented. Where the expansion of the conversion frontier into the project area is linked to the development of infrastructure (e.g., roads) that does not yet exist, clear evidence shall be provided to demonstrate that such infrastructure would have been developed in the baseline scenario. Evidence may include permits, an approved budget or executed construction contracts.

c) The criteria and procedures for establishing the baseline scenario shall take into account such factors as historical conversion rates and require the project proponent to develop a baseline by determining and analyzing a reference area (which need not be contiguous to the project area), that shall be similar to the project area in terms of drivers and agents of land conversion, landscape configuration, and socio-economic and cultural conditions.

Wetland Restoration and Conservation (WRC)

3.4.18 The criteria and procedures for establishing the RWE baseline scenario shall take into account the following:

1) The current and historic hydrological characteristics of the watershed or coastal plain, and the drainage system in which the project occurs.

2) The long-term average climate variables influencing water table depths and the timing and quantity of water flow. The long-term average climate variables shall be determined using data from climate stations that are representative of the project area and shall include at least 20 years of data.

3) Planned water management activities (such as dam construction).

3.4.19 The criteria and procedures for establishing the RWE baseline scenario shall also consider the relevant non-human induced rewetting brought about by any of the following:

1) Collapsing dikes or ditches that would have naturally failed over time without their continued maintenance.

2) Progressive subsidence of deltas or peatlands leading to a rise in relative water table depths, thus reducing CO_2 emissions but possibly increasing CH_4 emissions in freshwater systems.

3) Non-human induced elevation of non-vegetated wetlands to build vegetated wetlands. Deltaic systems with high sediment load from rivers often do this naturally, and this should be counted as part of the baseline.

3.4.20 The criteria and procedures for establishing the CIW baseline scenario are handled differently for each of the eligible CIW activities, as follows:

1) AUWD: The criteria and procedures for establishing the baseline scenario shall require the project proponent to reference a period of at least 10 years for modeling a spatial trend in conversion, taking into account the long-term average climate variables, and the observed conversion practices (e.g., drainage including canal width, depth, length and maintenance). The long-term average climate variable shall be determined using data from climate stations that are representative of the project area and shall include at least 20 years of data.

2) APWD: The criteria and procedures for establishing the baseline scenario shall require the project proponent to provide verifiable evidence to demonstrate that, based on government plans (for publicly owned and managed wetland), community plans (for publicly owned and community-managed wetland), concessionary plans (for publicly owned and concession holder managed) or landowner plans (for privately owned wetland), the project area was intended to be drained or otherwise converted. The annual rate and depth of drainage or rate of other conversion shall be based on the common practice in the area—that is, how much wetland is typically drained or converted each year by similar baseline activities.

3.4.21 The criteria and procedures for identifying fire in the baseline scenario shall demonstrate with fire maps and historical databases on fires that the project area is now and in the future would be under risk of anthropogenic fires. The procedure for identifying fire in the baseline scenario shall also consider any relevant current and planned land use conditions that may affect the occurrence of fire in order to establish the most plausible scenario for fire in the baseline.

3.4.22 Many land use activities on wetlands (e.g., aquaculture and agriculture) involve the exposure of wetland soils to aerobic decomposition through piling, dredging (expansion of existing channels) or channelization (cutting through wetland plains). Where relevant, the criteria and procedures for identifying WRC baseline scenarios shall account for such processes as they expose disturbed carbon stocks to aerobic decomposition thus increasing the rate of organic matter decomposition and GHG emissions that may continue for years from the stockpiles. Methodologies shall include credible methods for quantifying and forecasting GHG emissions from such degradation.

3.4.23 Where relevant, the criteria and procedures for identifying WRC baseline scenarios shall take account of hydrological processes that lead to increased carbon burial and GHG reductions within the project area. Such processes include changes in the landscape form (i.e., construction of levees to constrain flow and flooding patterns or dams to hold water) and changes in land surface (i.e., forest clearing, and ditching or paving leading to intensified run-off).

3.4.24 Where relevant, the criteria and procedures for identifying WRC baseline scenarios shall take account of processes within the project area that reduce sediment supply associated with changes in the landscape (e.g., construction of upstream dams or stabilization of eroding

feeder cliffs along the coast). The supply of sediment varies over time and the time-averaged delivery of sediment shall be considered.

3.4.25 Where relevant, methodologies shall establish criteria and procedures for identifying wetland erosion and/or migration resulting from sea level rise in the baseline scenario on the basis of wetland maps, historical trend data, future projection of sea level rise and how changes in management would impact carbon stocks.

3.4.26 Where relevant, the criteria and procedures for establishing the baseline scenario shall require the project proponent to take into account current and historic management activities outside the project area that have significantly impacted or may significantly impact the project area, including the following:

1) Disruption to or improvement of natural sediment delivery, as this will alter the rate and magnitude of coastal wetlands response to sea level rise.

2) Upstream dam construction, as this will alter water and sediment delivery, as well as salinity in coastal lowlands.

3) Construction of infrastructure inland of coastal wetlands, as this will impair wetland capacity to migrate landwards with sea level rise.

4) Construction of coastal infrastructure, as this can impair sediment movement along shorelines causing wetland loss and increasing risk of carbon emissions with sea level rise.

3.4.27 Methodologies that allow for combined category projects shall require the use of the relevant WRC requirements and the respective non-WRC AFOLU project category requirements for the determination and establishment of the baseline scenario.

ODS Methodologies

3.4.28 Where the destruction of the ODS by the project is mandated by law, statute or other regulatory framework applied in the host country, the baseline shall be the gradually increasing compliance with such law, statute or other regulatory framework, and the baseline emissions shall be calculated as follows:

$$BE_{y,a} = BE_y * (1 - CR_y)$$

Where:

$BE_{y,a}$	=	The baseline emissions to be used for the calculation of GHG emission reductions in year y.
BE_y	=	The baseline emissions in year y.
CR_y	=	The host country level compliance rate of the law, statute or other regulatory framework in the year y. Calculation of the compliance rate shall exclude other projects implemented under GHG programs. If the compliance rate exceeds 50%, the project shall receive no further credit.

3.5 Additionality

Concept

A project activity is additional if it can be demonstrated that the activity results in emission reductions or removals that are in excess of what would be achieved under a "business-as-usual" scenario and the activity would not have occurred in the absence of the incentive provided by the carbon markets. Additionality is an important characteristic of GHG credits, including VCUs, because it indicates that they represent a net environmental benefit and a real reduction of GHG emissions, and can thus be used to offset emissions. Methodologies shall set out a procedure for demonstrating additionality using a project method or a standardized method (i.e., performance method or activity method).

Requirements

General

3.5.1 Methodologies shall establish a procedure for the demonstration and assessment of additionality based upon the requirements set out below.

The steps which shall be included in methodologies for each method of demonstrating additionality (i.e., project methods, performance methods and activity methods) are set out below.

3.5.2 Methodologies shall use a project method, performance method and/or activity method to determine additionality. The high level specifications and procedural steps for each approach are set out in Sections 3.5.3 to 3.5.9 below. New methodologies developed under the VCS Program shall meet this requirement by doing one of the following:

1) Referencing and requiring the use of an appropriate additionality tool that has been approved under the VCS Program or an approved GHG program;

2) Developing a full and detailed procedure for demonstrating and assessing additionality directly within the methodology; or

3) Developing a full and detailed procedure for demonstrating and assessing additionality in a separate tool, which shall be approved via the methodology development process, and referencing and requiring the use of such new tool in the methodology.

Note – Reference in a methodology to the VCS Program requirements on additionality is insufficient. The VCS Program requirements are high level requirements and do not represent a full and detailed procedure for the demonstration of additionality. The only exception to this is with respect to regulatory surplus (i.e., methodologies may directly reference the VCS Program requirements on regulatory surplus and do not need to further develop a procedure for demonstrating and assessing regulatory surplus).

Project Method

3.5.3 Step 1: Regulatory Surplus

The project shall not be mandated by any law, statute or other regulatory framework, or for UNFCCC non-Annex I countries, any systematically enforced law, statute or other regulatory framework. For UNFCCC non-Annex I countries, laws, statutes, regulatory frameworks or policies implemented[6] since 11 November 2001 that give comparative advantage to less emissions-intensive technologies or activities relative to more emissions-intensive technologies or activities need not be taken into account. For all countries, laws, statutes, regulatory frameworks or policies implemented since 11 December 1997 that give comparative advantage to more emissions-intensive technologies or activities relative to less emissions-intensive technologies or activities shall not be taken into account.

3.5.4 Step 2: Implementation Barriers

The project shall face one or more distinct barrier(s) compared with barriers faced by alternatives to the project:

1) Investment barrier: Project faces capital or investment return constraints that can be overcome by the additional revenues associated with the sale of GHG credits.
2) Technological barriers: Project faces technology-related barriers to its implementation.
3) Institutional barriers: Project faces financial (other than identified in investment barrier above), organizational, cultural or social barriers that the VCU revenue stream can help overcome.

3.5.5 Step 3: Common Practice

The project shall not be common practice, determined as follows:

1) Project type shall not be common practice in sector/region, compared with projects that have received no carbon finance.
2) Where it is common practice, the project proponent shall identify barriers faced compared with existing projects.
3) Demonstration that the project is not common practice shall be based on guidance provided in *The GHG Protocol for Project Accounting*, Chapter 7 (WRI-WBCSD).

Standardized Methods

Performance Methods

3.5.6 Step 1: Regulatory Surplus

[6] Implemented in the context of this paragraph means enacted or introduced, consistent with use of the term under the CDM rules on so-called Type E+ and Type E- policies.

The project activity shall meet with the requirements on regulatory surplus set out under the project method in Section 3.5.3.

3.5.7 Step 2: Performance Benchmark

The GHG emissions generated (or carbon sequestered) per unit of output, unit of input or sequestration metric by the project shall be below (or above, for sequestration) the prescribed performance benchmark metric or proxy for such metric (see Section 2.3.9 for specification of the metric). Proxy metrics or conditions may be specified where it can be demonstrated 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.

GHG emissions generated (or carbon sequestered) may be above (or below, for sequestration) the prescribed performance benchmark metric or proxy for such metric for a given verification period, though the project shall not be granted credit for such verification periods.

Activity Methods

3.5.8 Step 1: Regulatory Surplus

The project activity shall meet with the requirements on regulatory surplus set out under the project method in Section 3.5.3.

3.5.9 Step 2: Positive List

The methodology shall apply one or more of the following three options:

1) Option A: Activity Penetration

The methodology shall demonstrate that the project activity has achieved a low level of penetration relative to its maximum adoption potential, as follows:

a) The methodology shall demonstrate that the project activity has achieved a low level of penetration relative to its maximum adoption potential, determined using the following equation:

$$AP_y = OA_y / MAP_y$$

Where:

AP_y	=	Activity penetration of the project activity in year y (percentage)
OA_y	=	Observed adoption of the project activity in year y (e.g., total number of instances installed at a given date in year y, or amount of energy supplied in year y)
MAP_y	=	Maximum adoption potential of the project activity in year y (e.g., total number of instances that potentially could have been installed at a given

date in year y, or the amount of energy that potentially could have been supplied in year y)

The maximum adoption potential is the total adoption of a project activity that could currently be achieved given current resource availability, technological capability, level of service, implementation potential, total demand, market access and other relevant factors within the methodology's applicable geographically defined market. Maximum adoption potential does not consider market price, cost of adoption, consumer education, cultural or behavioral barriers, and laws, statutes, regulatory frameworks or policies.

Maximum adoption potential is constrained by numerous factors each imposing their own limitations on the total adoption of a project activity. The following list provides further specification with respect to factors that do, and do not, need to be considered in determining maximum adoption potential:

i) Resource availability is the limitation imposed by the supply of raw materials or energy resources to the activity.

ii) Technological capability is the limitation imposed by the technical efficiency of the project activity.

iii) Level of service is the limitation imposed by the technical reliability or quality of the service provided by the project activity relative to its alternatives.

iv) Implementation potential is the limitation imposed by the availability of appropriate locations for implementing the project activity.

v) Total demand is the limitation imposed by demand for the product or service provided by, or associated with, the project activity and all relevant alternative sources of the product or service.

vi) Market access is the limitation imposed by current infrastructure and the degree to which the outputs of project activity can be practically supplied to the market.

vii) Market price is the limitation imposed by the current price achievable for outputs from the project activity. Cost of adoption is the limitation imposed by the cost of switching to the project activity from an alternative activity. Consumer education is the public knowledge or awareness of the activity and its benefits. Behavioral or cultural barriers are limitations resulting from social or cultural inertia with respect to the adoption of the project activity.

Data used in determining the level of activity penetration shall meet the requirements for data set out for performance benchmarks in Section 3.4.6, *mutatis mutandis*.

b) The level of penetration of the project activity shall be no higher than five percent.

c) Where the project activity has been commercially available in any area of the applicable geographic scope for less than three years (i.e., it uses a new technology or measure), it shall be demonstrated that the project activity faces barriers to its uptake. Such barriers shall be demonstrated in accordance with Step 3 (barrier analysis) of the latest version of the CDM *Tool for the demonstration and assessment of additionality.*

2) Option B: Financial Feasibility

The methodology shall demonstrate that the project activity is less financially or economically attractive than the alternatives to the project activity using the procedures for investment analysis set out in the CDM *Tool for the demonstration and assessment of additionality*. This requires that Steps 1, 2 and 4 of such tool are followed. The analysis shall be conducted for the class of project activities to which the methodology is applicable, and the following also applies:

a) Sub-step 1a. *Other realistic and credible alternative scenarios* shall be taken to mean the full range of alternatives to the class of project activity that are found and are operational in the applicable geographic scope.

b) Sub-step 1b. Where the methodology is applicable to more than one country, the mandatory applicable legal and regulatory requirements of all countries shall be examined.

c) Sub-step 2b and Sub-step 2c. The following applies:

i) The full range of circumstances which can influence the project activity shall be considered, and either average circumstances or the circumstances that lead to the most cost effective outcome shall be assumed (e.g., if the observed wind resource in the geographic scope of the methodology leads to plant load factors for wind turbines of between 25 and 30 percent, an average of these figures can be used, or 30 percent may be assumed).

ii) Likewise, the full range of cost and/or revenue estimates for the project activity shall be considered, and either average estimates or the estimates that lead to the most cost effective outcome shall be assumed.

iii) The full range of circumstances related to the baseline alternatives shall be considered, and either average circumstances or the circumstances that lead to the most cost effective outcome shall be assumed. Only observed or realistic circumstances shall be included (e.g., in a country where cement plants are all located close to harbors or large rivers with a view to easy access to transport, it would not be realistic to assume cement plants would be located in remote areas without easy access to transport).

iv) Likewise, the full range of cost and/or revenue estimates for the baseline alternatives shall be considered, and either average estimates or estimates pertaining to the most likely baseline alternative shall be assumed. Where

estimates pertaining to the most likely baseline alternative are used, it shall be substantiated that such baseline alternative is the most likely among the alternatives.

d) Sub-step 2b, Option III. Company internal benchmarks may not be used.

e) Sub-step 2d. Where average circumstances or estimates have been used in Sub-step 2b and/or Sub-step 2c (i.e., calculations have been based upon a range of circumstances or estimates, see above), a sensitivity analysis shall be undertaken. The objective of the sensitivity analysis is to test whether the conclusion regarding the financial/economic attractiveness of the class of project activity is robust to reasonable variations in the critical assumptions, and where it does not demonstrate conclusively that the (entire class of) project activity is additional, the project activity shall not qualify for the positive list under this Option B. Where the most cost effective, and therefore most conservative, circumstances or estimates have been used, a sensitivity analysis is not required.

f) Step 2 (General). Where there are multiple circumstances and estimates that must be aggregated in order to calculate output figures, the method of aggregation shall account for the correlations between each circumstance and estimate.

g) Step 4 (Common practice analysis). It shall be demonstrated that the project activity is not common practice using the full procedures for common practice analysis set out in the CDM *Tool for the demonstration and assessment of additionality*.

3) Option C: Revenue Streams

The methodology shall demonstrate that the project activity does not have any significant sources of revenue other than revenue from the sale of GHG credits, as follows:

a) The project activity's gross annual revenue (including cost savings) excluding from the sale of GHG credits shall not exceed five percent of capital expenditure (see the VCS Program document *Program Definitions* for definition of capital expenditure). All capital expenditures incurred during the project crediting period shall be accounted for and where the project activity involves capital expenditure subsequent to year zero, an appropriate discount rate shall be applied.

b) It shall be demonstrated that the project activity is not common practice using the full procedures for common practice analysis set out in the CDM *Tool for the demonstration and assessment of additionality*.

3.6 Baseline and Project Emissions/Removals

Concept

Baseline emissions, and project emissions and/or removals, must be accurately quantified in order to determine net emission reductions and removals achieved by projects. Methodologies shall therefore set out procedures to quantify these emissions and/or removals.

Requirements

General

3.6.1 Methodologies shall establish criteria and procedures for quantifying GHG emissions and/or removals, and/or carbon stocks, for all selected GHG sources, sinks and/or reservoirs identified in the project boundary.

AFOLU Methodologies

3.6.2 *The 2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories* or the *IPCC 2003 Good Practice Guidance for Land Use, Land-Use Change and Forestry* shall be used as guidance for quantifying increases or decreases in carbon stocks and GHG emissions. The IPCC Guidelines shall also be followed in terms of quality assurance/quality control (QA/QC) and uncertainty analysis.

3.6.3 The *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories* may be referenced to establish procedures for quantifying GHG emissions/removals associated with the following carbon pools including:

1) Litter;
2) Dead wood;
3) Soil (methodologies may follow the IPCC guidelines for the inclusion of soil carbon, including the guidelines that are in sections not related to forest lands); and
4) Belowground biomass (estimated using species-dependent root-to-shoot ratios, the Mokany et al.[7] ratios and equations, or the Cairns equations).

3.6.4 Where carbon would have been lost in the baseline scenario due to land use conversion or disturbance, GHG emissions from soil carbon, belowground biomass, wood products and dead wood carbon pools generally occur over a period of time following the event. It shall not be assumed that all GHG emissions from these carbon pools in the project categories specified below occur instantaneously or within a short period of time.

Methodologies shall set out criteria and procedures to reliably establish the pattern of carbon loss over time using empirical evidence, such as studies that use primary data or locally calibrated models, or methodologies shall apply an appropriate decay model (such as a linear

[7] Mokany, K., Raison, R. J., and Prokushkin, A. S. 2006. *Critical analysis of root:shoot ratios in terrestrial biomes*. Global Change Biology 12: 84-96

or exponential decay function) that is scientifically sound, based on empirical evidence and not likely to overestimate early carbon losses.

Where appropriate, belowground biomass, soil carbon and dead wood decay models shall be calibrated. Where models are calibrated using measurement plots or data from research plots, sound and reliable measurement methods shall be applied as set out in Section 3.9.5.

Where the following carbon pools are included in the project boundary, methodologies may opt to conform with the requirement to establish a pattern of carbon loss over time by incorporating the respective procedures below:

1) Belowground biomass pool for IFM LtPF and REDD. The pattern of carbon loss shall be modeled based upon a 10-year linear decay function.

2) Dead wood pool in IFM and REDD. The pattern of carbon loss shall be modeled using a 10-year linear decay function.

3) Soil carbon pool in all AFOLU project categories. The pattern of carbon loss shall be modeled based upon a 20-year linear decay function, taking into account the depth of affected soil layers and the total portion of the pool that would have been lost.

4) Wood products pool in IFM and REDD. The pattern of carbon loss shall be modeled as follows:

   a) For short-term wood products and wood waste that would decay within 3 years, all carbon shall be assumed to be lost immediately.

   b) For medium-term wood products that are retired between 3 and 100 years, a 20-year linear decay function shall be applied.

   c) For long-term wood products that are considered permanent (i.e., carbon is stored for 100 years or more), it may be assumed no carbon is released.

Note – Where applying the wood products procedure set out above, it is not required to separately account for the portion of wood products in landfills and the decay rate for such products, due to the current lack of established, reliable data and methods. Such products shall apply the rates for short-, medium-, or long-term wood products, as appropriate.

3.6.5 Where activity-based methods are used for determining baseline soil carbon stocks, estimates shall be conservatively determined relative to the computed maximum carbon stocks that occurred in the designated project area within the previous 10 years. For example, if carbon stocks in the project area were 100 tonnes C/ha in 2002 and declined to 90 tonnes C/ha by 2007 after intensive tillage, the minimum baseline carbon stock for a project established in 2008 would be 100 tonnes C/ha.

Afforestation, Reforestation and Revegetation (ARR)

3.6.6 Where ARR or IFM projects include harvesting, the loss of carbon due to harvesting shall be included in the quantification of project emissions. The maximum number of GHG credits

available to projects shall not exceed the long-term average GHG benefit. The GHG benefit of a project is the difference between the project scenario and the baseline scenario of carbon stocks stored in the selected carbon pools and adjusted for any project emissions of N_2O, CH_4 and fossil-derived CO_2, and leakage emissions. The long-term average GHG benefit shall be calculated using the following procedure:

1) Establish the period over which the long-term average GHG benefit shall be calculated, noting the following:

   a) For ARR or IFM projects undertaking even-aged management, the time period over which the long-term GHG benefit is calculated shall include at minimum one full harvest/cutting cycle, including the last harvest/cut in the cycle. For example, where a project crediting period is 40 years and has a harvest cycle of 12 years, the long-term average GHG benefit will be determined for a period of 48 years.

   b) For ARR projects under conservation easements with no intention to harvest after the project crediting period, or for selectively-cut IFM projects, the time period over which the long-term average is calculated shall be the length of the project crediting period.

2) Determine the expected total GHG benefit of the project for each year of the established time period. For each year, the total GHG benefit is the to-date GHG emission reductions or removals from the project scenario minus baseline scenario.

3) Sum the total GHG benefit of each year over the established time period.

4) Calculate the average GHG benefit of the project over the established time period.

5) Use the following equation to calculate the long-term average GHG benefit:

$$LA = \frac{\sum_{t=0}^{n} PE_t - BE_t}{n}$$

Where:

LA = The long-term average GHG benefit

PE_t = The total to-date GHG emission reductions and removals generated in the project scenario (tCO_2e). Project scenario emission reductions and removals shall also consider project emissions of CO_2, N_2O, CH_4 and leakage.

BE_t = The total to-date GHG emission reductions and removals projected for the baseline scenario (tCO_2e)

t = Year

n = Total number of years in the established time period

6) A project may claim GHG credits during each verification event until the long-term average GHG benefit is reached. Once the total number of GHG credits issued has reached this

average, the project can no longer issue further GHG credits. The long-term average GHG benefit shall be calculated at each verification event, meaning the long-term average GHG benefit may change over time based on monitored data. For an example of determining the long-term average GHG benefit, see the Verra website.

Buffer credits are withheld only when GHG credits are issued. As set out in Section 3.8.5, the number of buffer credits to withhold is based on the change in carbon stocks only (not the net GHG benefit), as such the buffer credits will be based on the long-term average change in carbon stock. Use the following equation to calculate the long-term average change in carbon stock.

$$LC = \frac{\sum_{t=0}^{n} PC_t - BC_t}{n}$$

Where:

LC = The long-term average change in carbon stock

PC_t = The total to-date carbon stock in the project scenario (tCO_2e)

BC_t = The total to-date carbon stock projected for the baseline scenario (tCO_2e)

t = Year

n = Total number of years in the established time period

Note – VCS guidance document AFOLU Guidance: Example for Calculating the Long-Term Average Carbon Stock for ARR Projects with Harvesting, *available on the Verra website, provides examples for calculating the long-term average carbon stock for a variety of ARR project scenarios with harvesting. The same examples can be applied to IFM projects with harvesting.*

Agricultural Land Management (ALM)

3.6.7 Methodologies that target soil carbon stock increases shall quantify, where significant, concomitant increases in N_2O, CH_4 and fossil-derived CO_2. Similarly, methodologies targeting N_2O emission reductions shall establish the criteria and procedures by which the changes in soil carbon stocks may be deemed *de minimis* (as set out in Section 3.3.6) or conservatively excluded (as set out in Section 3.3.7).

3.6.8 Procedures to quantify GHG emissions/removals from cropland and grassland soil management projects may include activity-based model estimates, direct measurement approaches, or a combination of both.

3.6.9 Procedures to measure soil carbon stocks shall be based on established and reliable sampling methods, with sufficient sampling density to determine statistically significant changes at a 95 percent confidence level. Uncertainty related to sampling shall be addressed as set out in Section 2.4, above.

3.6.10 Soil organic carbon stock changes shall be calculated based on equivalent soil mass (ESM) to a

minimum depth of 30 cm, utilizing site-specific measurements of soil organic carbon concentrations. Bulk density measurements are not required to determine SOC stock changes on an ESM basis. Procedures to calculate SOC stock changes on an ESM basis should be based on the references Ellert & Bettany[8] (1995), von Haden, Yang & DeLucia[9] (2020) and Wendt & Hauser[10] (2013).

3.6.11 Procedures to quantify N_2O and CH_4 emissions factors shall be based on scientifically defensible measurements of sufficient frequency and duration to determine emissions for a full annual cycle. Minimum baseline estimates for N_2O and CH_4 emissions shall be based on documented management records averaged over the five-year period prior to the project start date. Documented management records may include fertilizer purchase records, manure production estimates and/or livestock data. For new management entities or where such records are unavailable, minimum baseline estimates may be based on a conservative estimate of common practice in the region.

Improved Forest Management (IFM)

3.6.12 Procedures for quantifying GHG emissions/removals in selected carbon pools may reference the *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories* section on forests remaining as forests.

3.6.13 Procedures for quantifying GHG emissions/removals in wood products may reference Skog et al. 2004[11] or other sources published in scientific peer-reviewed literature.

3.6.14 Where biomass is burned as part of the slash removal after harvesting, or nitrogen fertilizer is used, methodologies may reference *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories* for the quantification of such GHG emissions.

3.6.15 Where IFM projects include harvesting, the loss of carbon due to harvesting shall be included in the quantification of project emissions. The maximum number of GHG credits available to projects shall not exceed the long-term average GHG benefit, as set out in Section 3.6.6.

Reduced Emissions from Deforestation and Degradation (REDD)

[8] Ellert, B.H. and Bettany, J.R. (1995) 'Calculation of organic matter and nutrients stored in soils under contrasting management regimes', Canadian Journal of Soil Science, 75(4), pp. 529–538. doi:10.4141/cjss95-075

[9] von Haden, A.C., Yang, W.H. and DeLucia, E.H. (2020) 'Soils' dirty little secret: Depth-based comparisons can be inadequate for quantifying changes in soil organic carbon and other mineral soil properties', Global Change Biology, 26(7), pp. 3759–3770. doi:10.1111/gcb.15124

[10] Wendt, J.W. and Hauser, S. (2013) 'An equivalent soil mass procedure for monitoring soil organic carbon in multiple soil layers', European Journal of Soil Science, 64(1), pp. 58–65. doi:10.1111/ejss.12002.

[11] Skog, K.E., K. Pingoud, J. E. Smith. 2004. A method countries can use to estimate changes in carbon stored in harvested wood products and the uncertainty of such estimates. Environmental Management 33 (suppl 1): S65-S73

3.6.16 Procedures for quantifying GHG emissions/removals in all selected carbon pools may reference *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories* sections on conversion of forest to non-forest (for deforestation) and forests remaining as forest (for degradation).

3.6.17 Procedures for quantifying GHG emissions/removals in long-lived wood products (e.g., wood products lasting longer than five years) may reference published scientific peer-reviewed literature (such as Skog et al. 2004).

3.6.18 Where harvesting is allowed in the project scenario (e.g., the project activity reduces deforestation but selective harvesting is allowed), the methodology shall include criteria and procedures to quantify GHG emissions/removals from such harvesting. The methodology shall also include criteria and procedures by which the change in carbon stocks from such harvesting may be deemed *de minimis* (as set out in Section 3.3.6) or conservatively excluded (as set out in Section 3.3.7).

Avoided Conversion of Grasslands and Shrublands (ACoGS)

3.6.19 Procedures for quantifying N_2O emissions from the use of synthetic fertilizers may reference the CDM A/R methodological tool for the *Estimation of direct and indirect (e.g., leaching and runoff) nitrous oxide emission from nitrogen fertilization*.

3.6.20 Procedures for quantifying GHG emissions/removals in all selected carbon pools may reference *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories*. Baseline scenarios may include annual estimates of changes in each carbon pool over the entire project period. Differences in shorter and longer term effects may be accounted for by distinguishing phases of effects. For example, effects of conversion on biomass may occur entirely in year one, whereas effects on soil carbon shall take into account the timing of such effects that may occur over many years, as set out in Section 3.6.4.

3.6.21 Under the default assumption that management does not change in the project scenario and carbon pools are at steady state, the project scenario shall ensure the maintenance (or increase) of existing carbon pools. Where methodologies include criteria and procedures to account for increases in carbon pools on lands where conversion is avoided, evidence shall be provided that such increases may occur. Where changes in management are the basis for increases in carbon pools, ALM accounting rules shall be followed. Where revegetation or restoration is the basis for increases in carbon pools under the project scenario, projects shall follow ARR or ALM requirements for quantifying GHG emissions/removals, depending on whether the project activities involve woody biomass.

3.6.22 GHG emissions associated with conversion and post-conversion land management practices that are avoided shall be estimated based on expected land management practices. Baseline estimates for N_2O and CH_4 emissions shall be based on documented management practices used on lands similar to the project area, or that represent average local or regional land management practices. Preference shall be given to data that are more specific to the project

area (e.g., site specific data, where available, are preferable to state or province level data). Documentation of land management practices may include, for example, fertilizer purchase or application records, manure production estimates and/or livestock data.

3.6.23 Quantifying GHG emissions and/or removals from avoided conversion requires estimates of changes in carbon pools that would have occurred if the land protected by the project had been converted. Although the direct measurement of carbon pools on protected lands can provide an estimate of initial carbon stocks for the baseline scenario, subsequent years under the baseline scenario require estimates of the effects of conversion that are extrapolated from lands similar to the project area but which have already undergone conversion. Estimates of expected changes in carbon stocks following conversion may be based on activity-based model estimates, direct measurement (including direct measurements reported in the scientific literature), or a combination of both.

3.6.24 Direct measurements needed for estimating the baseline shall be taken on lands similar to the project area that have already undergone conversion to the same land use as the one(s) being avoided in the project area, rather than direct measurements on the project area itself. Similar lands refers to lands with similar vegetation, climate, topography and soils, and therefore with similar expected responses to conversion. Such extrapolation from similar lands necessarily introduces uncertainty, which shall be accounted for by using methods that allow for calculating a confidence interval as set out in Section 2.4.1 above. Uncertainty from baseline modeling shall be combined with other sources of uncertainty using valid statistical approaches (e.g., as set out in Chapter 5.2 of the *IPCC Good Practice Guidance for LULUCF*).

3.6.25 Estimation of carbon stock change and/or soil emission factors shall be based on data from replicated field experiments whose management treatments have a duration of at least five years (preferably longer), for climate and soil conditions and management activities representative of the project conditions, using established, reliable measurement methods. Stock change factors for soil carbon or woody biomass carbon that are based on experiments shall not be projected over a longer period than the length of the study. Complex, dynamic models that have been validated for conditions representative of the project area are also acceptable. Models shall be parameterized to reflect the range of soil, climate, land use and management conditions in the project area.

Wetland Restoration and Conservation (WRC)

3.6.26 The following applies with respect to the criteria and procedures for quantifying GHG emissions/removals in the baseline scenario:

1) For WRC activities on peatland the peat depletion time (PDT) shall be included in the quantification of GHG emissions and removals in the baseline scenario, and for non-peat wetlands, the soil organic carbon depletion time (SDT) shall be included in the quantification of GHG emissions and removals in the baseline scenario, noting the following:

a) PDT is the time it would have taken for the peat to be completely lost due to oxidation or other losses, or for the peat depth to reach a level where no further oxidation or other losses occur. No GHG emission reductions may be claimed for a given area of peatland for longer than the PDT. The procedure for determining the PDT shall conservatively consider peat depth and oxidation rate within the project boundary and may be estimated based on the relationship between water table depth, subsidence (e.g., using peat loss and water table depth relationships established in scientific literature), and peat depth in the project area. The PDT is considered part of the baseline and thus shall be reassessed with the baseline in accordance with the requirements set out in the VCS Program document *VCS Standard.*

b) SDT is the time it would have taken for the soil organic carbon to be lost due to oxidation or to reach a steady stock where no further losses occur. No GHG emissions reductions may be claimed for a given area of wetland for longer than the SDT. The procedure for determining the SDT shall conservatively consider soil organic carbon content and oxidation rate within the project boundary and may be estimated based on the relationship between water table depth and soil organic carbon content in the project area. Where wetland soils are subject to sedimentation or erosion, the procedure for determining the SDT shall conservatively account for the associated gain or loss of soil organic carbon. This assessment is not mandatory in cases where soil organic carbon content on average may be deemed *de minimis* as set out in Section 3.3.6.

2) Any applicable and justifiable proxies, as established in scientific literature, for GHG emissions projected throughout the project crediting period shall be estimated.

3) Net baseline GHG emissions during the project crediting period, including emissions associated with the estimated water table depths, salinity or another justifiable proxy for GHG emissions, plus emissions from other activities such as biomass loss or fires, as well as carbon sequestration, where applicable, shall be estimated.

3.6.27 Baseline emissions shall be estimated conservatively and consider that the water table depth in the project area may rise during the project crediting period due to any or all of the causes identified in alternative baseline scenarios as set out in Section 3.4.19.

3.6.28 The procedure for quantifying CO_2 emissions for the baseline and project emissions may be estimated through hydrological modeling or the modeling of proxies for GHG emissions in place of direct on-site gas flux measurements. The procedure may include estimation through well-documented relationships between CO_2 emissions and other variables such as vegetation types, water table depth, salinity or subsidence, or remote sensing techniques that adequately assess and monitor soil moisture. Because of the dominant relationship between water table depth and CO_2 emissions, drainage depth can be used as a proxy for CO_2 emissions in the

absence of emissions data.[12] Where relevant, the micro-topography of the project area (e.g., the proportion of hummocks and hollows and vegetation patterns in peatlands) shall be considered. Net GHG emissions reductions shall be calculated using the same methods that are used for the baseline estimates, but using monitored data.

3.6.29 Where relevant, the fate of transported organic matter as a result of sedimentation, erosion and oxidation shall be assessed conservatively based on peer-reviewed literature and considering the following:

1) It is conservative to not account for the loss of sediment from the project area in the baseline scenario.

2) It is conservative to not account for further sedimentation in the project area in the project scenario. Where soil carbon is included in the project boundary, sedimentation shall be accounted for so that carbon sequestration resulting from the growth of vegetation can be estimated separately from carbon accumulated in sedimentation. In the absence of the project activity, such high carbon silt would be washed out to sea and would not have been oxidized and emitted in the baseline, and in such cases carbon accumulated in sedimentation is not eligible for crediting.

3.6.30 With respect to the soil carbon pool, the maximum quantity of GHG emission reductions that may be claimed by the project shall not exceed the net GHG benefit generated by the project 100 years after its start date. This limit is established because in wetlands remaining partially drained or not fully rewetted, or where drainage continues, the soil carbon will continue to erode and/or oxidize leading to GHG emissions and eventually depletion of the soil carbon. To determine this long-term net GHG benefit, methodologies shall establish criteria and procedures to estimate the remaining soil carbon stock adjusted for any project emissions and leakage emissions from wetlands remaining partially drained or not fully rewetted, or where drainage continues, in both the baseline and project scenarios for 100 years, taking into account uncertainties in modeling and using verifiable assumptions. Projects unable to establish and demonstrate a significant difference in the net GHG benefit between the baseline and project for at least 100 years are not eligible.

Note – the criteria and procedures established to estimated remaining soil carbon stock are not required to include projected impacts from sea level rise.

3.6.31 Emissions of CH_4 from drained or saline wetlands may be excluded in the baseline scenario where it may be deemed *de minimis* (as set out in Section 3.3.6) or conservatively excluded (as set out in Section 3.3.7).

3.6.32 As WRC activities are likely to influence CH_4 emissions, methodologies shall establish

[12] Couwenberg, J, Dommain, R, Joosten, H. 2010. Greenhouse gas fluxes from tropical peatlands in south-east Asia. Global Change Biology 16: 1715-1732.

procedures to estimate such emissions, and shall establish the criteria and procedures by which the source may be deemed *de minimis* (as set out in Section 3.3.6) or conservatively excluded (as set out in Section 3.3.7). Where relevant, the micro-topography of the project area (i.e., the proportion of hummocks and hollows and vegetation patterns) shall be considered.

3.6.33 Methodologies that combine project categories shall use the relevant WRC requirements and the respective AFOLU project category requirements for quantifying GHG emissions/removals, unless the former may be deemed *de minimis* (as set out in Section 3.3.6) or conservatively excluded (as set out in Section 3.3.7).

3.6.34 RWE projects on peatland that include an activity designed specifically to reduce incidence and severity of fires shall deduct the amount of peat assumed to burn when estimating peat depletion times. Where peat depletion times are estimated based only on oxidation rates due to drainage, the outcome would be a longer period than when first subtracting the amount of peat that is considered to burn in the baseline.

3.6.35 Methodologies for RWE projects on peatland explicitly addressing anthropogenic peatland fires occurring in drained peatlands shall establish procedures for determining or conservatively estimating the baseline emissions from peatland fire occurring in the project area using defensible data (such as fire maps, historical databases on fires, and where appropriate, combined with temperature and precipitation data). Methods for estimating GHG emissions from fire may be based on the *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories*, or other methods based on scientific, peer-reviewed literature.

3.6.36 Where relevant, methodologies shall establish procedures to account for any changes in carbon sequestration or GHG emission reductions resulting from lateral movement of wetlands due to sea level rise, or coastal squeeze associated with any structures that prevent wetland landward migration and cause soil erosion.

3.7 Leakage

Concept

Leakage is the net change of anthropogenic GHG emissions that occurs outside the project boundary and is attributable to project activities. Methodologies shall establish procedures to quantify leakage, where the potential for leakage is identified, as projects may otherwise overestimate their net emission reductions and/or removals.

Requirements

General

3.7.1 The methodology shall establish criteria and procedures for quantifying leakage.

AFOLU Methodologies

3.7.2 The methodology shall establish procedures to quantify all significant sources of leakage. Leakage is defined as any increase in GHG emissions that occurs outside the project boundary (but within the same country), and is measurable and attributable to the project activities. All leakage shall be accounted for, in accordance with this Section 3.7. The three types of leakage are:

1) Market leakage occurs when projects significantly reduce the production of a commodity causing a change in the supply and market demand equilibrium that results in a shift of production elsewhere to make up for the lost supply.

2) Activity-shifting leakage occurs when the actual agent of deforestation and/or forest or wetland degradation moves to an area outside of the project boundary and continues its deforestation or degradation activities elsewhere.

3) Ecological leakage occurs in WRC projects where a project activity causes changes in GHG emissions or fluxes of GHG emissions from ecosystems that are hydrologically connected to the project area.

3.7.3 Leakage that is determined, in accordance with Section 3.3.6, to be below *de minimis* (i.e., insignificant) does not need to be included in the GHG emissions accounting. The significance of leakage may also be determined using the CDM A/R methodological tool *Tool for testing significance of GHG Emissions in A/R CDM Project Activities*.

3.7.4 GHG emissions from leakage may be determined either directly from monitoring, or indirectly when leakage is difficult to monitor directly but where scientific knowledge provides credible estimates of likely impacts. The GHG credit calculation table provided below in Section 3.8 includes an example of indirect leakage accounting.

3.7.5 The methodology shall require projects to account for market leakage where the production of a commodity (e.g., timber, aquacultural products or agricultural products) is significantly affected by the project. The significance of timber production is determined as set out in Section 3.3.6 above or as set out in Section 3.7.15 below.

3.7.6 Leakage occurring outside the host country (international leakage) does not need to be quantified.

3.7.7 Where leakage mitigation measures include tree planting, aquacultural intensification, agricultural intensification, fertilization, fodder production, other measures to enhance cropland and/or grazing land areas, leakage management zones or a combination of these, then any significant increase in GHG emissions associated with these activities shall be accounted for, unless deemed *de minimis* (as set out in Section 3.3.6) or can be conservatively excluded (as set out in Section 3.3.7).

3.7.8 Methodologies shall not allow for projects to account for positive leakage (i.e., where GHG emissions decrease or removals increase outside the project area due to project activities).

Afforestation/Reforestation/Revegetation (ARR)

3.7.9 Activity-shifting leakage in ARR projects can result from, inter alia, the shifting of grazing animals, shifting of households or communities, shifting of aquacultural or agricultural activities or shifting of fuelwood collection (from non-tree sources). Leakage emissions may also result from transportation and machinery use. The requirements for assessing and managing leakage in ARR projects are similar to those for CDM afforestation/reforestation project activities, and methodologies may require or allow projects to apply CDM tools for estimating leakage, such as the *Tool for calculation of GHG emissions due to leakage from increased use of non-renewable woody biomass attributable to an A/R CDM project activity*.

3.7.10 Where deforestation increases outside the project area due to leakage from project activities, methodologies shall set out criteria and procedures for projects to assess and quantify the effects of this deforestation on all carbon pools, unless determined to be *de minimis* (as set out in Section 3.3.6) or conservatively excluded (as set out in Section 3.3.7).

Agricultural Land Management (ALM)

3.7.11 ALM projects setting aside land for conservation shall quantify activity-shifting leakage emissions associated with the displacement of pre-project activities, unless deemed *de minimis* (as set out in Section 3.3.6) or conservatively excluded (as set out in Section 3.3.7). Guidance on accounting for leakage associated with shifting of pre-project activities due to land conversions from agriculture to grassland is functionally similar to conversion of land to forest vegetation under ARR (see Section 3.3.6 and 3.3.7).

3.7.12 Market leakage in ALM projects involving cropland or grassland management activities is likely to be negligible because the land in the project scenario remains maintained for commodity production, and therefore does not need to be included in the GHG emissions accounting, unless determined to be above *de minimis* in accordance with Section 3.3.6.

3.7.13 Where livestock are displaced to outside the project area, methodologies shall set out criteria and procedures for projects to quantify such activity-shifting leakage to capture potential reductions in carbon stocks and potential increases in livestock-derived CH_4 and N_2O emissions from outside the project area.

Improved Forest Management (IFM)

3.7.14 Leakage in IFM projects can result from activities shifting within the project proponent's operations. Methodologies shall set out criteria and procedures to quantify activity-shifting leakage or demonstrate that there is no leakage to areas that are outside of the project area by either of the following, as appropriate:

1) Applying the appropriate leakage discount factor identified in Table 3 to the net change in carbon stock associated with the activity that reduces timber harvest.

2) Methodologies shall set out criteria and procedures for projects to demonstrate that there is no leakage to areas that are outside the project area but within the project proponent's operations, such as areas where the project proponent has ownership of, management of, or legally sanctioned rights to use forest land within the country.

Methodologies shall set out criteria and procedures for projects to demonstrate that the management plans and/or land-use designations of all other lands operated by the project proponent (which shall be identified by location) have not materially changed as a result of the project activity (e.g., harvest rates have not been increased or land has not been cleared that would otherwise have been set aside). Where the project proponent is an entity with a conservation mission, it may be demonstrated that there have been no material changes to other lands managed or owned by the project proponent by providing documented evidence that it is against the policy of the organization to change the land use of other owned and/or managed lands including evidence that such policy has historically been followed.

3.7.15 Leakage in IFM projects is predominantly attributable to market leakage (market effects). Methodologies shall set out criteria and procedures to quantify market leakage by either of the following:

1) Applying the appropriate leakage discount factor identified in Table 3 to the net change in carbon stock associated with the activity that reduces timber harvest.

2) Directly accounting for market leakage associated with the project activity. Where directly accounting for leakage, market leakage shall be accounted for at the country-scale applied to the same general forest type as the project (i.e., forests containing the same or substitutable commercial species as the forest in the project area) and shall be based on methods for quantifying leakage from scientific peer-reviewed journal sources.[13]

Table 3: Leakage Discount Factors for IFM Projects

Project Action	Leakage Risk	Leakage Discount Factor
IFM activity with no effect or minimal effect on total timber harvest volumes (e.g., RIL with less than 25% reduction)	None	0%

[13] The following three papers may be helpful in assessing leakage:
- Murray, B.C., B.A. McCarl, and H. Lee. 2004. Estimating Leakage from Forest Carbon Sequestration Programs. Land Economics 80(1):109-124. (http://ideas.repec.org/p/uwo/uwowop/20043.html)
- Murray, B.C., B.L. Sohngen, et al. 2005. EPA-R-05-006. Greenhouse Gas Mitigation Potential in U.S. Forestry and Agriculture. Washington, D.C: U.S. Environmental Protection Agency, Office of Atmospheric Programs. (www.epa.gov/sequestration/pdf/greenhousegas2005.pdf)
- Sohngen, B. and S. Brown. 2004. Measuring Leakage from Carbon Projects in Open Economies: A Stop Timber Harvesting Project as a Case Study, Canadian Journal of Forest Research. 34: 829-839 (http://www.winrock.org/ecosystems/files/Sohngen_Brown_2004.pdf)

IFM activity that leads to a shift in harvests across time periods but minimal change in total timber harvest over time (e.g., ERA with rotation extension of 5-10 years)	Low	10%
IFM activity that substantially reduces harvest levels permanently (e.g., RIL activity that reduces timber harvest across the project area, or project that halts logging by at least 25%)	Moderate to High	Conditional upon where timber harvest is likely to be shifted, as follows: • Where the ratio of merchantable biomass to total biomass is higher within the area to which harvesting is displaced compared to the project area, 20% • Where the ratio of merchantable biomass to total biomass is similar within the area to which harvesting is displaced compared to the project area, 40% • Where the ratio of merchantable biomass to total biomass is lower within the area to which harvesting is displaced compared to the project area, 70% • Where the leakage is out of country, 0%

Reduced Emissions from Deforestation and Degradation (REDD)

3.7.16 Methodologies shall set out criteria and procedures to assess and manage leakage for the two eligible REDD project types as follows:

1) APD: Leakage shall be quantified by directly monitoring the activities of the deforestation agent identified in the baseline scenario. The deforestation agent can be an entity that has ownership of, management of, or legally sanctioned rights to use, multiple parcels of forest land within the country or can be the most-likely-class of deforestation agent. Such forest land could be used to make up for the generation of goods and/or services lost through implementation of the REDD project, therefore leading to reductions in carbon stocks or increases in GHG emissions outside the project boundary. Leakage shall be accounted for as follows:

a) Where the specific deforestation agent can be identified, leakage need not be considered where it can be demonstrated that the management plans and/or land-use designations of the deforestation agent's other lands (which shall be identified by location) have not materially changed as a result of the project (e.g., the deforestation agent has not designated new lands as timber concessions, increased harvest rates in lands already managed for timber, cleared intact forests for agricultural production or increased fertilizer use to enhance agricultural yields). Where management plans and/or land-use designations of the deforestation agent's other lands have materially

changed, leakage shall be quantified by directly monitoring the activities of the deforestation agent.

b) Where the specific deforestation agent cannot be identified, leakage shall be quantified based upon the difference between historic and with-project rates of deforestation by the identified most-likely-class of deforestation agent within the region. Alternatively, where such agents are driven by the demand for market commodities, the project may directly account for market leakage associated with the specific project activity. Where directly accounting for leakage, market leakage shall be accounted for at the country-scale, taking into account the supply and demand elasticities for the commodity affected, and shall be based on methods for quantifying leakage from scientific peer-reviewed journal sources, as described above in Section 3.7.15.

2) AUDD: The potential for leakage shall be identified and the project shall address (and describe in the project description) the socio-economic factors that drive deforestation and/or degradation. Leakage shall be calculated by monitoring forested areas surrounding the project and other forested areas within the country susceptible to leakage from project activities.

3.7.17 Where the project baseline includes illegal logging activities that supply regional, national and/or global timber markets, domestic market leakage shall be quantified using the market leakage discount factors for IFM projects set out in Sections 3.7.14 and 3.7.15. The market leakage effects associated with stopping illegal logging need not be considered where GHG emissions are not included in the baseline and GHG credits from stopping such activities are not claimed.

Avoided Conversion of Grasslands and Shrublands (ACoGS)

3.7.18 Leakage in ACoGS projects can result from activities shifting within the project proponent's operations. It shall be demonstrated that there is no leakage to areas that are outside the project area but within the project proponent's operations, such as areas where the project proponent has ownership of, management of, or legally sanctioned rights to use land within the country. It shall be demonstrated that the management plans and/or land-use designations of all other lands operated by the project proponent (which shall be identified by location) have not materially changed as a result of the project activity (e.g., land has not been cleared that would otherwise have been set aside).

Where the project proponent is an entity with a conservation mission, it may be demonstrated that there have been no material changes to other lands managed or owned by the project proponent by providing documented evidence that it is against the policy of the organization to change the land use of other owned and/or managed lands including evidence that such policy has historically been followed.

3.7.19 Methodologies shall set out criteria and procedures to assess and manage leakage for the two eligible ACoGS project types as follows:

1) APC: Leakage shall be quantified by directly monitoring the activities of the conversion agent identified in the baseline scenario. The conversion agent can be an entity that has ownership of, management of, or legally sanctioned rights to use, multiple parcels of land within the country or can be the most-likely-class of conversion agent. Such land could be used to make up for the generation of goods and/or services lost through implementation of the ACoGS project, therefore leading to reductions in carbon stocks or increases in GHG emissions outside the project boundary. Leakage shall be accounted for as follows:

   a) Where the specific conversion agent can be identified, leakage need not be considered where it can be demonstrated that the management plans and/or land-use designations of the conversion agent's other lands (which shall be identified by location) have not materially changed as a result of the project (e.g., land has not been cleared that would otherwise have been set aside). Where management plans and/or land-use designations of the conversion agent's other lands have materially changed, leakage shall be quantified by directly monitoring the activities of the conversion agent.

   b) Where the specific conversion agent cannot be identified, leakage shall be quantified based upon the difference between historic and with-project rates of conversion by the identified most-likely-class of conversion agent within the region. Alternatively, where such agents are driven by the demand for market commodities, the project may directly account for market leakage associated with the specific project activity. Where directly accounting for leakage, market leakage shall be accounted for at the country-scale, taking into account the supply and demand elasticities for the commodity affected, and shall be based on methods for quantifying leakage from scientific peer-reviewed journal sources, as described above in Section 3.7.15.

2) AUC: The potential for leakage shall be identified and the project shall address (and describe in the project description) the socio-economic factors that drive conversion. Leakage shall be calculated by monitoring areas surrounding the project and areas within the country susceptible to leakage from project activities.

Wetland Restoration and Conservation (WRC)

3.7.20 RWE projects involving rewetting of forested wetlands are likely to reduce the productivity of the forest or make harvesting more difficult, which could lead to fewer forest products and thus result in leakage (i.e., GHG emissions from logging and drainage elsewhere). Where the project results in activity shifting of forest products, the applicable requirements for leakage in IFM or REDD project activities shall be followed, accounting for both activity-shifting and/or market leakage. Where the project results in the shifting of drainage activities or other activities that would lower the water table, the expected GHG emissions from a lower water table shall also be accounted for. RWE projects on peatland shall assume that the PDT of leakage activities occurs over the length of the project crediting period if the PDT is longer than the project crediting period.

3.7.21 Rewetting in the project area may lead to higher water table depths in some areas beyond the

project boundary, and consequently leading to lower water table depths in downstream areas further beyond the project boundary (e.g., in the case of project activities that reverse subsidence), or cause transportation of organic matter to areas beyond the project boundary. In such cases, the project proponent shall be required to demonstrate that such changes in water table depths or export caused by the project do not lead to increases in GHG emissions outside the project area, or the affected areas shall be identified and the resulting leakage shall be quantified and accounted for.

3.7.22 Methodologies shall set out criteria and procedures to assess and manage leakage for CIW, REDD+CIW and IFM+CIW projects as follows, noting that for combined category projects, the IFM or REDD leakage requirements also apply:

1) APWD: Activity-shifting leakage shall be quantified by directly monitoring the activities of the land conversion agent (e.g., deforestation agent or agent causing other forms of wetland degradation) identified in the baseline scenario. The land conversion agent can be an entity that has ownership of, management of, or legally sanctioned rights to use multiple parcels of wetland within the country, or can be the most-likely-class of land conversion agent. These other wetlands could be used to make up for the generation of goods and/or services lost through implementation of the WRC project, therefore leading to reductions in carbon stocks or increases in GHG emissions outside the project boundary. Leakage shall be accounted for as follows:

   a) Where the specific land conversion agent can be identified, leakage need not be considered where it can be demonstrated that the management plans and/or land-use designations of the land conversion agent's other lands (which shall be identified by location) have not materially changed as a result of the project (e.g., a deforestation agent has not designated new lands as timber concessions, increased harvest rates in lands already managed for timber, cleared intact forests for agricultural production or increased fertilizer use to enhance agricultural yields). Where management plans and/or land-use designations of the land conversion agent's other lands have materially changed, leakage shall be quantified by directly monitoring the activities of the land conversion agent.

   b) Where the specific land conversion agent cannot be identified, leakage shall be quantified based upon the difference between historic and with-project rates of wetland degradation by the identified most-likely-class of land conversion agent within the region.

2) AUWD: The potential for leakage shall be identified and the project shall address the socio-economic factors that drive wetland degradation. Leakage shall be calculated by monitoring wetland areas surrounding the project and other wetland areas within the country susceptible to leakage from project activities.

3.7.23 Wetland restoration methodologies including fire reduction activities shall follow the requirements for accounting for fire under REDD, where land use changes are identified as the

cause (or one of the causes) of anthropogenic fires in the project region.

ODS Methodologies

3.7.24 Methodologies shall establish criteria and procedures to quantify and account for GHG emissions associated with any substitute substances that can be assumed to be used to provide the service previously provided by the ODS destroyed by the project.

For example, where a project destroys ODS that under the baseline would have been recovered and reused, the project shall account for the GHG emissions associated with substitute substances, since the market demand that was being serviced by the ODS can be assumed to be supplied from alternative sources. Conversely, where a project destroys ODS that under the baseline would have leaked or been released to the atmosphere, the ODS was not meeting any market demand and accounting for GHG emissions associated with substitute substances is not applicable. Such quantification and accounting shall be done using one of the following options:

1) Identify the actual type and quantity of substitute substances used to provide the service previously provided by the ODS destroyed by the project, calculate or monitor the GHG emissions associated with such substances that arise during the project crediting period, and deduct such GHG emissions from the GHG emission reductions;

2) Identify the actual type and quantity of substitute substances used to provide the service previously provided by the ODS destroyed by the project, assume 100 percent of such substances leak or are released to the atmosphere during the project crediting period, and deduct such GHG emissions from the GHG emission reductions;

3) Identify, based on conservative assumptions using appropriate data, the type and quantity of substitute substances used to provide the service previously provided by the ODS destroyed by the project, assume 100 percent of such substances leak or are released to the atmosphere during the project crediting period, and deduct such GHG emissions from the GHG emission reductions claimed by the project; or

4) The project shall not claim GHG emission reductions for the ODS destroyed by the project that under the baseline would have been recovered and reused.

3.8 Quantification of GHG Emission Reductions and Removals

Concept

Net GHG emission reductions and removals achieved by projects are the basis for the volume of VCUs that can be issued. Methodologies shall establish criteria and procedures for quantifying net GHG emission reductions and removals.

Requirements

General

3.8.1 Methodologies shall establish criteria and procedures for quantifying GHG emissions and/or removals, and/or carbon stocks, for the selected GHG sources, sinks and/or reservoirs, separately for the project (including leakage) and baseline scenarios.

3.8.2 Methodologies shall establish criteria and procedures for quantifying net GHG emission reductions and removals generated by the project, which shall be quantified as the difference between the GHG emissions and/or removals, and/or as the difference between carbon stocks, from GHG sources, sinks and reservoirs relevant for the project and those relevant for the baseline scenario. The GHG emissions and/or removals in the project scenario shall be adjusted for emissions resulting from project activities and leakage. Where appropriate, net GHG emission reductions and removals, and net change in carbon stocks, shall be quantified separately for the project and the baseline scenarios for each relevant GHG and its corresponding GHG sources, sinks and/or reservoirs.

Standardized Methods

Performance Methods

3.8.3 In any given verification period, a methodology may result in the project's GHG emission reductions or removals being quantified as negative. This is permitted and the project shall be granted no credit in such periods.

AFOLU Methodologies

3.8.4 AFOLU methodologies shall establish procedures for quantifying the net change in carbon stocks, so that the number of buffer credits withheld in the AFOLU pooled buffer account and market leakage emissions may be quantified for the project.

3.8.5 AFOLU methodologies shall include procedures to determine the number of GHG credits issued to projects, which is determined by subtracting out the buffer credits from the net GHG emission reductions or removals (including leakage) associated with the project. The buffer credits are calculated by multiplying the non-permanence risk rating (as determined by the *AFOLU Non-Permanence Risk Tool*) times the change in carbon stocks only. The full rules and procedures with respect to assignment of buffer credits are set out in the VCS Program document *Registration and Issuance Process*. This calculation process is illustrated in the example below.

3.8.6 To illustrate the calculation of buffer credits, the following example is provided:

At the first verification event, the example project in Table 4 below has generated a change in carbon stocks in the project scenario compared to the baseline scenario of 1000 tonnes. It also reduced GHG emissions by 60 tonnes by avoiding machinery use as compared to the baseline, resulting in a total change in GHG emissions from baseline to project scenario of 1060 tonnes. The project displaced some pre-project activities and resulted in leakage totalling 280 tonnes, including a reduction in carbon stocks outside the project boundary and associated emissions (note that carbon stock losses caused by leakage are considered permanent). Such leakage is subtracted from the change in GHG emissions of the project,

resulting in 780 GHG emission reductions or removals (net GHG benefit). The project is assessed to have a 20 percent non-permanence risk rating, which is multiplied by the change in carbon stocks only (not the net GHG benefit). This results in a buffer withholding of 200 credits, with 580 GHG credits issued as VCUs.

Table 4: Example GHG credit calculation

Project Compared to Baseline	tCO_2e	Comment
Change in carbon stocks	1000	Reversal risk
Change in non-stock related GHG emissions (e.g., from decrease in machinery use)	60	No reversal risk
Total change in GHG emissions for project vs. baseline	1060	= 1000 + 60
Leakage		
Change in carbon stocks outside the project area (e.g., 20% market leakage, as determined in Table 3)	-200	= 1000 × 0.2 (considered permanent)
Change in GHG emissions	-80	No reversal risk
Total leakage	-280	= -200 - 80
Total GHG Credits Generated		
GHG emission reductions and removals generated (net GHG benefit)	780	= 1060 − 280
Buffer credits (determined as a percentage of net change carbon stocks*)	200	= 1000 × 20%
GHG credits issued (VCUs)	580	= 780 - 200

* Where the net change in carbon stocks is not a whole number, round the calculated VCU and buffer credit volumes down to the nearest whole number. Where the net change in carbon stocks is a whole number, round the calculated buffer volume up, and the VCU volume down, to the nearest whole number.

3.9 Monitoring

Concept

Methodologies shall describe the data and parameters available at validation (i.e., those that are fixed for the duration of the project crediting period) and data and parameters monitored (i.e., those that must be monitored during the project crediting period for each verification). Additionally, methodologies shall describe the criteria and procedures for obtaining, recording, compiling, and analyzing monitored data and parameters.

Requirements

General

3.9.1 The methodology shall describe the data and parameters to be reported, including sources of data and units of measurement.

3.9.2 When highly uncertain data and information are relied upon, conservative values shall be selected that ensure that the quantification does not lead to an overestimation of net GHG emission reductions or removals.

3.9.3 Metric tonnes shall be used as the unit of measure and the quantity of each type of GHG shall be converted to tonnes of CO_2e consistent with the requirements set out in the VCS Program document *VCS Standard*.

3.9.4 The methodology shall establish criteria and procedures for monitoring, which shall cover the following:

1) Purpose of monitoring.
2) Monitoring procedures, including estimation, modeling, measurement or calculation approaches.
3) Procedures for managing data quality.
4) Monitoring frequency and measurement procedures.

AFOLU Methodologies

3.9.5 Where measurement plots or data from research plots are used to calibrate belowground biomass, soil carbon and dead wood decay models (as described above in Section 3.6.4), sound and reliable methods for monitoring changes in carbon stocks, including representative location of samplings sites and sufficient frequency and duration of sampling shall be applied. In addition, plots used to calibrate soil carbon models shall be measured considering appropriate sampling depths, bulk density and the estimated impact of any significant erosion (or plots with significant erosion shall be avoided). Data used to calibrate belowground biomass and dead wood models shall consider an estimation of oven-dry wood density and the state of decomposition.

ODS Methodologies

3.9.6 The methodology shall establish procedures for monitoring the chemical composition and quantity of the ODS destroyed by the project.

3.9.7 Where projects destroying ODS contained in products or mixed with other substances are eligible under the methodology, the methodology shall establish procedures for monitoring the mass of ODS contained in such products or other substances. This shall be achieved using a mass balance analysis and/or other approach (based on conservative assumptions), as appropriate to the nature and scale of the project.

APPENDIX 1 ELIGIBLE AFOLU PROJECT CATEGORIES

As set out in Section 2.6 above, there are currently six AFOLU project categories under the VCS Program, as further described below. Proposed AFOLU methodologies shall fall within one or more of these AFOLU project categories and shall meet with the criteria and requirements set out below.

Afforestation, Reforestation and Revegetation (ARR)

A1.1 Eligible ARR activities are those that increase carbon sequestration and/or reduce GHG emissions by establishing, increasing, or restoring vegetative cover (forest or non-forest) through the planting, sowing or human-assisted natural regeneration of woody vegetation. Eligible ARR projects may include timber harvesting in their management plan. The project area shall not be cleared of native ecosystems within the 10-year period prior to the project start date, as set out in the VCS Program document *VCS Standard*.

Note – Activities that improve forest management practices, such as enrichment planting and liberation thinning, are categorized as IFM project activities.

Agricultural Land Management (ALM)

A1.2 Eligible ALM activities are those that reduce net GHG emissions on croplands and grasslands by increasing carbon stocks in soils and woody biomass and/or decreasing CO_2, N_2O and/or CH_4 emissions from soils. The project area shall not be cleared of native ecosystems within the 10-year period prior to the project start date. Eligible ALM activities include:

1) Improved Cropland Management (ICM): This category includes practices that demonstrably reduce net GHG emissions of cropland systems by increasing soil carbon stocks, reducing soil N_2O emissions, and/or reducing CH_4 emissions, noting the following:

   a) Soil carbon stocks can be increased by practices that increase residue inputs to soils and/or reduce soil carbon mineralization rates. Such practices include, but are not limited to, the adoption of no-till, elimination of bare fallows, use of cover crops, creation of field buffers (e.g., windbreaks or riparian buffers), use of improved vegetated fallows, conversion from annual to perennial crops and introduction of agroforestry practices on cropland. Where perennial woody species are introduced as part of cropland management (e.g., field buffers and agroforestry), carbon sequestration in perennial woody biomass may be included as part of the ALM project.

   b) Soil N_2O emissions can be reduced by improving nitrogen fertilizer management practices to reduce the amount of nitrogen added as fertilizer or manure to targeted

crops. Examples of practices that improve efficiency while reducing total nitrogen additions include improved application timing (e.g., split application), improved formulations (e.g., slow release fertilizers or nitrification inhibitors) and improved placement of nitrogen.

c) Soil CH_4 emissions can be reduced through practices such as improved water management in flooded croplands (in particular flooded rice cultivation), through improved management of crop residues and organic amendments and through the use of rice cultivars with lower potential for CH_4 production and transport.

2) Improved Grassland Management (IGM): This category includes practices that demonstrably reduce net GHG emissions of grassland ecosystems by increasing soil carbon stocks, reducing N_2O emissions and/or reducing CH_4 emissions, noting the following:

a) Soil carbon stocks can be increased by practices that increase belowground inputs or decrease the rate of decomposition. Such practices include increasing forage productivity (e.g., through improved fertility and water management), introducing species with deeper roots and/or more root growth and reducing degradation from overgrazing.

b) Soil N_2O emissions can be reduced by improving nitrogen fertilizer management practices on grasslands as set out in Section A1.2(1)(b), above.

c) N_2O and CH_4 emissions associated with burning can be reduced by reducing the frequency and/or intensity of fire.

d) N_2O and CH_4 emissions associated with grazing animals can be reduced through practices such as improving livestock genetics, improving the feed quality (e.g., by introducing new forage species or by feed supplementation) and/or by reducing stocking rates.

3) Cropland and Grassland Land-use Conversions (CGLC): This category includes practices that convert cropland to grassland or grassland to cropland and reduce net GHG emissions by increasing carbon stocks, reducing N_2O emissions, and/or reducing CH_4 emissions, noting the following:

a) The conversion of cropland to perennial grasses can increase soil carbon by increasing belowground carbon inputs and eliminating and/or reducing soil disturbance. Decreases in nitrogen fertilizer and manure applications resulting from a conversion to grassland may also reduce N_2O emissions.

b) Conversion of drained, farmed organic or wetland soils to perennial non-woody vegetation, where there is substantial reduction or elimination of drainage, is an eligible practice but shall follow both the WRC and ALM requirements.

c) Grassland conversions to cropland production (e.g., introducing orchard crops or agroforestry practices on degraded pastures) may increase soil and biomass carbon stocks. Only conversions where the crop in the project activity does not qualify as forest

are included under ALM. Land conversions of cropland or grassland to forest vegetation are considered ARR activities. Projects that convert grasslands shall demonstrate that they do not have a negative impact on local ecosystems as set out in the VCS Program document *VCS Standard*.

Note – Project activities relating to manure management are eligible under sectoral scope 15 (livestock, enteric fermentation, and manure management), not sectoral scope 14 (AFOLU).

Improved Forest Management (IFM)

A1.3 Eligible IFM activities are those that increase carbon sequestration and/or reduce GHG emissions on forest lands managed for wood products such as sawtimber, pulpwood and fuelwood by increasing biomass carbon stocks through improving forest management practices. The baseline and project scenarios for the project area shall qualify as *forests remaining as forests*, such as set out in the *2019 Refinement to the 2006 IPCC Guidelines for National GHG Inventories*, and the project area shall be designated, sanctioned or approved for wood product management by a national or local regulatory body (e.g., as logging concessions or plantations).

A1.4 Various sanctioned forest management activities may be changed to increase carbon stocks and/or reduce emissions, but only a subset of these activities make a measurable difference to the long-term increase in net GHG emissions compared to the baseline scenario. Eligible IFM activities include:

1) Reduced Impact Logging (RIL): This category includes practices that reduce net GHG emissions by switching from conventional logging to RIL during timber harvesting. Carbon stocks can be increased by:

   a) Reducing damage to other trees (e.g., by implementing directional felling or vine cutting);

   b) Improving the selection of trees for harvesting based on inventoried knowledge concerning tree location, size and quality;

   c) Improving planning of log landing decks, skid trails and roads (e.g., in peatland forests this could include avoiding the use of canals, which drain the peat and increase GHG emissions, to extract the logs); and/or

   d) Reducing the size of logging roads, skid trails and log landing decks.

2) Logged to Protected Forest (LtPF): This category includes practices that reduce net GHG emissions by converting logged forests to protected forests. By eliminating harvesting for timber, biomass carbon stocks are protected and can increase as the forest re-grows and/or continues to grow. Harvesting of trees to advance conservation purposes (e.g., the removal of diseased trees) may continue in the project scenario. LtPF activities include:
   a) Protecting currently logged or degraded forests from further logging.

b) Protecting unlogged forests that would otherwise be logged.

3) Extended Rotation Age/Cutting Cycle (ERA): This category includes practices that reduce net GHG emissions of evenly aged managed forests by extending the rotation age or cutting cycle and increasing carbon stocks. Because trees are typically harvested at an economically optimal rotation age before they are fully mature, extending the age at which the trees are cut increases the average carbon stock on the land. There is no fixed period of years over which the extension should occur, but generally the longer the period, on the order of 5 to 20 years, the more the average carbon stock increases. ERA activities may also include extending the cutting cycle or harvest schedule in uneven-aged forest management that may have similar effects as extending rotation age in even-aged forest management. Though such activities may have a limited carbon benefit, where methodologies are able to establish criteria and procedures for the credible monitoring of such activities, they are eligible. Examples of extending cutting cycles are:

   a) Increasing the minimum diameter limit of cutting thresholds.

   b) Extending the re-entry period for selective harvesting.

4) Low-Productive to High-Productive Forest (LtHP): This category includes practices that increase carbon sequestration by converting low-productivity forests to high-productivity forests. Carbon stocks can be increased by improving the stocking density of low-productivity forests, noting the following:

   a) Low-productivity forests usually satisfy one of the following conditions:

      i) They qualify as forest as defined by the host country for its UNFCCC national inventory accounting, but contain minimal to no timber of commercial value.

      ii) They are in a state of arrested succession, where regeneration is inhibited for extended periods of time, following either a catastrophic natural event to which the forest is maladapted thus causing massive mortality, or ongoing human-induced disturbance, for example uncharacteristically severe fire or widespread flooding, animal grazing, or burning.

      iii) They have a very slow growth rate or low crown cover.

   b) Improving the stocking density of low-productivity forests can be achieved through the following activities:

      i) Introducing other tree species with higher growth rates.

      ii) Adopting enrichment planting to increase the density of trees.

      iii) Adopting other forest management techniques to increase carbon stocks (e.g., fertilization or liming).

Note – Activities that reduce GHG emissions from unsanctioned forest degradation (e.g., illegal logging) are considered REDD activities. Activities that degrade wetlands to increase forest production are not eligible.

Reduced Emissions from Deforestation and Degradation (REDD)

A1.5 Eligible REDD activities are those that reduce net GHG emissions by reducing deforestation and/or degradation of forests. Deforestation is the direct, human-induced conversion of forest land to non-forest land. Degradation is the persistent reduction of canopy cover and/or carbon stocks in a forest due to human activities such as animal grazing, fuelwood extraction, timber removal or other such activities, but which does not result in the conversion of forest to non-forest land (which would be classified as deforestation), and qualifies as *forests remaining as forests*, such as set out under the *IPCC 2003 Good Practice Guidance*. The project area shall meet an internationally accepted definition of forest, such as those based on UNFCCC host-country thresholds or FAO definitions and shall qualify as forest for a minimum of 10 years before the project start date. The definition of forest may include mature forests, secondary forests, and degraded forests. Under the VCS Program, secondary forests are considered to be forests that have been cleared and have recovered naturally and that are at least 10 years old and meet the lower bound of the forest threshold parameters at the start of the project. Forested wetlands, such as floodplain forests, peatland forests and mangrove forests, are also eligible provided they meet the forest definition requirements mentioned above.

A1.6 Avoiding deforestation and/or degradation can affect GHG emissions and removals in a number of ways. The main effect is on carbon emissions that are reduced by preventing the conversion of forest lands with high carbon stocks to non-forest lands with lower carbon stocks. Where the forest is young or degraded, stopping its further degradation and deforestation also allows for additional sequestration of carbon on the land as the forest re-grows (with or without assisted regeneration). Avoiding conversion of forests to cropland or pasture can reduce emissions of N_2O and CH_4 that are associated with biomass burning used to clear the land, fertilizer use and other agricultural practices that would have occurred if the forests had been converted.

A1.7 Activities covered under the REDD project category are those that are designed to stop planned (designated and sanctioned) deforestation or unplanned (unsanctioned) deforestation and/or degradation. Avoided planned degradation is classified as IFM.

A1.8 Activities that stop unsanctioned deforestation and/or illegal degradation (such as removal of fuelwood or timber extracted by non-concessionaires) on lands that are legally sanctioned for timber production are eligible as REDD activities. However, activities that reduce or stop logging only, followed by protection, on forest lands legally designated or sanctioned for forestry activities are included within IFM. Projects that include both avoided unplanned deforestation and/or degradation as well as stopping sanctioned logging activities, shall follow the REDD guidelines for the unplanned deforestation and/or degradation and the IFM guidelines for the

sanctioned logging activities, and shall follow the requirements set out in the VCS Program document *VCS Standard*.

A1.9 Eligible REDD activities include:

1) Avoiding Planned Deforestation and/or Degradation (APDD): This category includes activities that reduce net GHG emissions by stopping or reducing deforestation or degradation on forest lands that are legally authorized and documented for conversion, noting the following:

   a) This practice can occur in degraded to mature forests.

   b) Planned deforestation can encompass a wide variety of activities where forest land is converted to non-forest land, including inter alia:

      i) National resettlement programs from non-forested to forested regions.

      ii) National land plans to reduce the forest estate and convert it to industrial-scale production of commodities such as soybeans, pulpwood and oil palm, where the converted land would not qualify as forest land.

      iii) Plans to convert community-owned forests to other non-forest uses.

      iv) Planned forest conversion for urban, rural and infrastructure development.

   c) Planned degradation includes activities where a forest system would have been cleared and replaced by a different forest system with a lower carbon stock and where the recovery of timber was not the primary objective of the initial forest clearance. For example, national land plans to reduce the forest estate and convert it to industrial-scale production of commodities such as pulpwood and oil palm, where the converted land would still meet the country definition of forest land, are considered planned degradation.

   d) Avoided planned deforestation and degradation can include decisions by individual land owners, governments, or community groups, whose land is legally zoned for agriculture, not to convert their forest(s) to crop production or biofuel plantations. For example, a community may determine that GHG credits from forest protection are more valuable than the potential revenue from crop or commodity production. Similarly, an owner of land zoned for conversion to agriculture or urban development may choose to protect forested lands by partnering with a conservation organization, either in a joint management agreement or an outright sale.

   e) Avoiding planned degradation in a managed forest (e.g., legally sanctioned timber extraction) is an eligible activity under IFM.

Note – Activities that only reduce or avoid logging, followed by protection, on forest lands legally designated or sanctioned for forest products are eligible as IFM activities.

2) Avoiding Unplanned Deforestation and/or Degradation (AUDD): This category includes activities that reduce net GHG emissions by stopping deforestation and/or degradation of degraded to mature forests that would have occurred in any forest configuration, noting the following:

   a) Unplanned deforestation and/or degradation can occur as a result of socio-economic forces that promote alternative uses of forest land and the inability of institutions to control these activities. Poor law enforcement and lack of property rights can result in piecemeal conversion of forest land. Unplanned deforestation and/or degradation activities can include, inter alia, subsistence farming or illegal logging occurring on both public lands legally designated for timber production and on public or communal lands that are poorly managed or otherwise degraded.

   b) Methodologies may be designed for frontier and/or mosaic configurations, which are described as follows:

      i) The frontier deforestation and/or degradation pattern can result from the expansion of roads and other infrastructure into forest lands. Roads and other infrastructure can improve forest access and lead to increased encroachment by human populations, such as subsistence farming and fuelwood gathering on previously inaccessible forest lands.

      ii) The mosaic deforestation and/or degradation pattern can result when human populations and associated agricultural activities and infrastructure are spread out across the forest landscape. In a mosaic configuration most areas of the forest landscape are accessible to human populations.

      Mosaic deforestation and/or degradation typically occur: where population pressure and local land use practices produce a patchwork of cleared lands, degraded forests, secondary forests of various ages, and mature forests; where the forests are accessible; and where the agents of deforestation and/or degradation are present within the region containing the area to be protected.

Avoided Conversion of Grasslands and Shrublands (ACoGS)

A1.10 Eligible ACoGS activities are those that reduce net GHG emissions by reducing the conversion of grassland and shrubland ecosystems to other land uses with lower carbon densities. Eligible avoided conversion activities include avoiding, at a minimum, the removal/replacement of vegetation and may also include avoiding soil disturbance. There is no specific requirement with respect to the post-conversion land use that would have occurred in the baseline scenario.

A1.11 The project area shall be native grasslands (including savanna) and/or shrublands (including chaparral). Non-forested wetlands, including peatlands, are not eligible under ACoGS and are covered under other AFOLU project categories.

A1.12 Avoiding conversion of ecosystems can affect GHG emissions in a number of ways. Avoiding the conversion of grasslands and shrublands to cropland can reduce emissions from both soil and

biomass carbon pools, with the bulk of avoided emissions likely coming from the soil carbon pool. Avoiding conversion to cropland can also reduce emissions of N_2O that are associated with fertilizer use and other agricultural practices that would have occurred following conversion. Avoiding conversion of shrublands or savanna to agriculture or development uses can reduce GHG emissions associated with the activities of clearing aboveground woody biomass.

A1.13 Activities covered under the ACoGS project category are those that are designed to stop planned (designated and sanctioned) conversion or unplanned (unsanctioned) conversion on public or private lands. This category type only includes avoided conversion of non-forested lands, noting that other management activities on non-forested land may qualify under ALM or ARR project categories.

A1.14 For both avoided planned conversion and avoided unplanned conversion, spatially explicit analysis is required to demonstrate that lands included in the project area are economically and physically suitable for the type of conversion being avoided. For example, where protecting lands from conversion to cropland, areas that are too steep, rocky, infertile for crops, or otherwise not viable for agricultural use, shall be considered unsuitable for conversion. The spatial analysis shall take into account local land use practices that may include the conversion of marginally suitable lands due to subsidies or population pressures. Unsuitable lands shall be excluded from baseline conversion scenarios.

A1.15 Eligible ACoGS activities include:

1) Avoiding Planned Conversion (APC): This category includes activities that reduce net GHG emissions by stopping conversion of grasslands or shrublands that are legally authorized and documented for conversion.

   Planned conversion may include decisions by individual land owners or community groups, whose land is legally zoned for agriculture or other development, not to convert their land(s). Similarly, an owner of land zoned for conversion to agriculture or development may choose to protect lands by partnering with an NGO or conservation organization either in a joint management agreement, conservation easement, or outright sale or lease.

2) Avoiding Unplanned Conversion (AUC): This category includes activities that reduce net GHG emissions by stopping unplanned conversion of grasslands or shrublands.

   Unplanned conversion can occur as a result of socio-economic forces that promote alternative uses of native grasslands or shrublands and the inability of institutions to control these activities. Poor law enforcement and weak or lacking property rights can result in piecemeal land conversion. Unplanned conversion activities may include, inter alia, subsistence agriculture, unsanctioned commercial agriculture and collection of biomass fuel where such collection would result in land conversion.

Wetlands Restoration and Conservation (WRC)

A1.16 Eligible WRC activities are those that increase net GHG removals by restoring wetland ecosystems or that reduce GHG emissions by rewetting or avoiding the degradation of wetlands. The project area shall meet an internationally accepted definition of wetland, such as from the IPCC, Ramsar Convention on Wetlands, those established by law or national policy, or those with broad agreement in the peer-reviewed scientific literature for specific countries or types of wetlands. Common wetland types include peatland, salt marsh, tidal freshwater marsh, mangroves, wet floodplain forests, prairie potholes and seagrass meadows. WRC activities may be combined with other AFOLU project categories, as further explained in Section A1.20.

A1.17 Avoiding the degradation or conversion of a wetland can reduce GHG emissions by preventing the release of carbon stored in wetland soils and vegetation. Many wetlands rely on a natural supply of sediments to support soil formation. Sediment supply may be interrupted by a physical alteration to the landscape, such as a river diversion, canal construction or isolation of wetlands behind man-made structures (e.g., road or rail embankments, levees or dams).

Restoring wetland ecosystems reduces and/or removes GHG emissions by creating the necessary physical, biological or chemical conditions that enhance carbon sequestration. Activities that affect the hydrology of the project area are only eligible where changes in hydrology result in the accumulation or maintenance of soil carbon stock.

A1.18 A peatland is an area with a layer of naturally accumulated organic material (peat) at the surface (excluding the plant layer). Peat originates due to water saturation, and peat soils are either saturated with water for long periods or have been artificially drained. Common peatland types include peat swamp forest, mire, bog, fen, moor, muskeg and pocosin. Rewetting of drained peatland and the conservation of undrained or partially drained peatland are sub-categories of restoring wetland ecosystems and conservation of intact wetlands, respectively. These activities reduce GHG emissions by rewetting or avoiding the drainage of peatland. There are specific requirements regarding reductions of GHG emissions from fire (as set out in Sections 3.4.22, 3.6.25, 3.6.33, 3.6.34 and A1.19).

A1.19 Activities that generate net reductions of GHG emissions from wetlands are eligible as WRC projects or combined category projects (such as REDD on peatland). Activities that actively lower the water table depth in wetlands are not eligible. Eligible WRC activities include:

1) Restoring Wetland Ecosystems (RWE): This category includes activities that reduce GHG emissions or increase carbon sequestration in a degraded wetland through restoration activities. Such activities include enhancing, creating and/or managing hydrological conditions, sediment supply, salinity characteristics, water quality and/or native plant communities. For the purpose of these requirements, restoration activities are those that result in the reestablishment of ecological processes, functions, and biotic and/or abiotic linkages that lead to persistent, resilient systems integrated within the landscape, noting the following:

a) Restoration or management of water table depth (e.g., the rewetting of peatlands, the reintroduction of river flows to floodplains, or the reintroduction of tidal flows to coastal wetlands) implies long-term and measurable changes in water table depth that sequester carbon and/or reduce emissions. Methodologies shall establish the appropriate change in water table depth (such as raising, lowering or restoring hydrological function) that is expected for eligible project activities, considering the following baseline scenario conditions:

i) Drained wetlands have a water table depth that is lower than the natural average annual water table depth due to accelerated water loss or decreased water supply resulting from human activities and/or construction, either on- and/or off-site. Baseline activities include purposeful draining through pumping, ditching, stream channelization, levee construction, and purposeful decreases in water supply through dams and water diversions. Examples of this include selectively logged peatland swamp forests in Southeast Asia impacted by logging canals or wetlands with water tables lowered for agriculture.

Activities shall raise the average annual water table depth in a drained wetland by partially or entirely reversing the existing drained state. Rewetting does not require the restoration of the average annual water table depth to the level of the soil or peat surface. However, RWE projects shall raise the water table depth close to the surface in order to be eligible to generate GHG credits. A clear relationship between GHG emissions and water table depth in wetlands, including peatlands[14] has been established in scientific literature with most changes in emissions occurring with water table depths close to the surface. This relationship is most dramatic on highly-organic soils (e.g., peatland). On such sites, activities that establish a higher water table depth compared to the baseline scenario can be eligible where they measurably decrease the rate of soil subsidence due to oxidation to decrease or cease within the project crediting period, and where the permanence requirements set out in Section 3.6.28 can be satisfied.

ii) Impounded wetlands have a water table that has been artificially raised, intentionally or unintentionally, as a result of impaired natural drainage behind a constructed feature and can result in CH_4 emissions. Examples of impounded wetlands include flooded areas behind artificial barriers to natural drainage (such as road or rail embankments or levees), flooded areas for the purpose of subsidence reversal, man-made reservoirs and fish and shrimp ponds.

[14] For a literature review see Couwenberg, J, Dommain, R, Joosten, H. 2010. *Greenhouse gas fluxes from tropical peatlands in south-east Asia*. Global Change Biology 16: 1715-1732.

Activities that restore hydrological function to an impounded wetland or lower the water table depth shall restore hydrological flow, considering the dynamics of the system and the hydrological connectivity necessary to maintain carbon stock and GHG fluxes.

iii) Open water is an area continuously flooded or subject to natural periods of flooding, without in-situ vegetation contributing to soil carbon accumulation. Wetlands convert to open water in response to impaired sediment supply, sea level rise and/or impaired water quality.

Activities that restore hydrological function to an open water wetland shall restore the hydrological flow, considering the dynamics of the system and the hydrological connectivity necessary to maintain carbon stock and GHG fluxes.

b) RWE projects may generate GHG credits from the reduction of GHG emissions associated with avoiding peat fires on drained or partially drained peatlands. Fire-related activities on peatlands that exclude rewetting as part of the project are not eligible, because fire reduction activities on drained peatland are unlikely to be effective over the long term without rewetting.

Note – Activities that increase net GHG removals through carbon sequestration by restoring soil carbon sequestration conditions (e.g., peat-forming conditions) are eligible under RWE. The restoration of conditions that favor soil carbon sequestration requires high water table depths over the long term and the presence of vegetation that produces soil carbon. Carbon sequestration rates resulting from rewetting and restoring drained non-tidal wetlands tend to be low on a unit-per-land area basis compared to GHG emissions reduced by avoiding soil carbon oxidation. Soil carbon sequestration restoration is therefore considered to have a relatively small contribution to GHG mitigation from non-tidal RWE projects. Soil carbon sequestration in tidal wetlands can be relatively rapid compared to non-tidal wetlands and will typically be expected to contribute significantly to the GHG mitigation effectiveness of RWE projects. Methodologies for forecasting soil carbon sequestration in tidal wetlands may be proposed, noting that they shall separate the sequestration of carbon as a result of project activities from the deposit of carbon rich soil into the project area as a result of sedimentation, (as set out in Section 3.6.29).

2) Conservation of Intact Wetlands (CIW): This category includes activities that reduce GHG emissions by avoiding degradation and/or the conversion of wetlands that are intact or partially altered while still maintaining their natural functions, including hydrological conditions, sediment supply, salinity characteristics, water quality and/or native plant communities.

Wetland degradation or conversion can be planned (designated and sanctioned) or unplanned (unsanctioned). Planned and unplanned degradation or conversion of wetlands can therefore encompass a wide variety of activities such as those listed under REDD while adding a wetland component. Activities covered under the CIW project category are those that are designed to stop or reduce planned or unplanned degradation or conversion in the project area to other land uses. The following CIW activities are eligible:

a) Avoiding Planned Wetland Degradation (APWD): This activity reduces GHG emissions by avoiding degradation of wetlands, or further degradation in partially drained wetlands that are legally authorized and documented for conversion.

b) Avoiding Unplanned Wetland Degradation (AUWD): This activity reduces GHG emissions by avoiding unplanned degradation of wetlands, or by avoiding further degradation in partially degraded wetlands. Unplanned wetland degradation can occur as a result of socio-economic forces that promote alternative uses of wetlands and the inability of institutions to control these activities. Poor law enforcement and weak or lack of property rights can result in piecemeal wetland conversion. Unplanned conversion activities may include, inter alia, subsistence farming, illegal logging, unsanctioned commercial agriculture and collection of biomass fuel where such collection would result in land conversion subsistence agriculture.

Note – Activities where drainage is continued or maintained are not eligible. This includes, for example, projects that require the maintenance of drainage channels to maintain the pre-project drainage level on a partially drained peatland (e.g., where periodic deepening may be needed to counteract peat subsidence). Projects that allow selective harvesting that results in a lowering of the water table depth (e.g., by extracting timber using drainage canals) or affects the ability of vegetation to act as a major hydrological regulation device (e.g., extracting trees which support the peat body) are also not eligible. Project activities may include selective harvesting where harvesting does not lower the water table, for example by extracting timber using wooden rails instead of drainage canals.

Note – WRC activities that are unable to establish and demonstrate a significant difference in the net GHG benefit between the baseline and project scenarios for at least 100 years are not eligible, as set out in Section 3.6.30.

A1.20 Activities that generate net GHG emission reductions by combining other AFOLU project activities with wetlands restoration or conservation activities are eligible as WRC combined projects. RWE may be implemented without further conversion of land use or it may be combined with ARR, ALM, IFM, REDD or ACoGS activities, referred to as ARR+RWE, ALM+RWE, IFM+RWE, REDD+RWE or ACoGS+RWE, respectively. CIW may be implemented on non-forest land or combined with IFM, REDD or ACoGS activities, referred to as IFM+CIW, REDD+CIW or ACoGS+CIW, respectively.

Table 5 illustrates the types of WRC activities that may be combined with other AFOLU project categories. The table identifies the applicable AFOLU requirements that shall be followed for combined category projects, based on the condition of the wetland in the baseline scenario, the land use in the baseline scenario and the project activity.

Table 5: Eligible WRC Combined Category Projects

Baseline Scenario		Project Activity	Applicable Guidance
Condition	Land Use		
Degraded wetland (including, drained, impounded, and with interrupted sediment supply)	Non-forest (including aquacultures, grasslands and shrublands)	Restoration of wetlands*	RWE
		Restoration of wetlands* and revegetation or conversion to forest	ARR+RWE
		Restoration of wetlands* and conversion to wetland agriculture (including paludiculture)	ALM+RWE
		Restoration of wetlands* and avoided conversion of grasslands or shrublands	ACoGS+RWE
	Forest	Restoration of wetlands*	RWE
	Forest with deforestation/ degradation	Restoration of wetlands* and avoided deforestation/degradation	REDD+RWE
	Forest managed for wood products	Restoration of wetlands* and improved forest management	IFM+RWE
Non-wetland or open water	Non-forest	Creation of wetland conditions and afforestation, reforestation or revegetation	ARR+RWE
	Open water or impounded wetland	Creation or restoration of conditions for vegetation development and afforestation, reforestation or revegetation	ARR+RWE
Intact wetland	Non-forest (including grasslands and shrublands)	Avoided drainage and/or interrupted sediment supply	CIW
		Avoided conversion to open water or impounded wetland (including excavation to create fish ponds)	CIW
		Avoided drainage and/or interrupted sediment supply and avoided conversion of grasslands and shrublands	ACoGS+CIW
	Forest	Avoided drainage and/or interrupted sediment supply	CIW
		Avoided conversion to open water or impounded wetland	CIW
	Forest with deforestation/ degradation	Avoided drainage and/or interrupted sediment supply and avoided deforestation/degradation	REDD+CIW
		Avoided conversion to open water or impounded wetland and avoided	REDD+CIW

		deforestation/degradation	
	Forest managed for wood products	Avoided drainage and/or interrupted sediment supply and improved forest management	IFM+CIW

* *Restoration of wetlands* includes all the activities set out in Section A1.19(1).

The eligible WRC combined categories are further elaborated below:

1) ARR on Wetland (ARR+RWE): RWE may be implemented in combination with ARR, for example by planting a native or adapted tree or shrub species on peatland or in mangroves. While existing oxidation in drained conditions is accounted for in the baseline, ARR activities on peatland shall not enhance peat oxidation, therefore this activity requires at least some degree of rewetting. ARR+RWE on already drained peatland without full rewetting is permitted in cases where the biomass carbon stock increases more than the peat carbon stock decreases by oxidation over a period of centuries.[15]

Note – ARR activities that involve nitrogen fertilization, active peatland drainage or lowering of the water table depth, such as draining in order to harvest, are not eligible project activities, as they are likely to enhance net GHG emissions. Activities involving selective logging, combined with artificial drainage and/or construction of channels to extract the timber are not eligible as these may result in decomposition and subsidence of the peat which could be accompanied by an increase in CO_2 emissions or additional GHG fluxes.

2) ALM on Wetland (ALM+RWE): This is an eligible activity if the water table depth of an agricultural wetland is raised to a level that can still support agriculture. The following ALM+RWE practices qualify as eligible activities:

   a) Rewetting a wetland combined with adapted wet agriculture that includes the cultivation of biomass on undrained or rewetted wetland. The wetland shall be sufficiently wet so as to avoid long-term net soil organic carbon losses as set out in Section 3.6.28.

   b) Improved grassland management activities that reduce overgrazing, high-intensity use and gully erosion for reducing peat erosion on sloping peatlands. In many steppe and mountain regions with dry climates, and also in cold or humid regions ("blanket bogs"), peatlands are the most productive and attractive, or the only available, lands for grazing. Overgrazing on sloping peatlands, frequently leads to vegetation damage and peat soil degradation.

[15] For more information on the relationship between biomass carbon stock increases and peat carbon stock decreases, see Laine, J. & Minkkinen, K. 1996. *Forest drainage and the greenhouse effect*. In: Vasander, H. (Ed.) Peatlands in Finland. Finnish Peatland Society, Helsinki, pp 159-164.

c) Improved cropland and grassland management activities that reduce wind erosion on peatlands that are devegetated or sparsely vegetated due to overgrazing, soil degradation or crop production.

Note – ALM activities that involve regular tillage and/or nitrogen fertilization on wetland soil or that actively lower the water table depth in wetlands are not eligible project activities.

3) IFM, REDD and ACoGS on Wetland (IFM+RWE, IFM+CIW, REDD+RWE, REDD+CIW, ACoGS+RWE and ACoGS+CIW): RWE and CIW may be implemented in combination with IFM, REDD and ACoGS project activities. Such activities reduce GHG emissions by increasing, or avoiding the loss of, forest, shrubland or grassland carbon stocks, and avoiding the drainage required to undertake such baseline activities, noting the following:

a) IFM, REDD and ACoGS project activities on wetlands shall not increase drainage. With respect to the forest biomass component, the requirements provided for IFM, REDD or ACoGS apply.

b) For IFM+CIW projects on peatland that include harvesting activities in the project scenario, selective harvesting shall not significantly affect the hydrology of the peat layer and cause peat decomposition. Where the peat layer in the baseline scenario is partially drained, the effect of harvesting on top soil hydrology is likely to be much less significant. CIW projects that have clear-cut or patch-cut harvesting activities are not eligible.

c) For IFM+RWE projects, activities that avoid fire of a peat layer are eligible for crediting.

A1.21 Many seagrass meadows sit upon significant stocks of soil carbon. Degradation of seagrass meadows likely increases the vulnerability of carbon stocks to disturbance and recirculation. Increases in CO_2 in the water column from decomposition of seagrass bed carbon stocks will lead to an increased CO_2 flux to the atmosphere, although the flux to the atmosphere could be reduced by dissolution of the carbonate soils underlying some seagrass meadows or by the export of CO_2-enriched waters to deeper waters below the mixing depth. Methodologies shall include credible methods for quantifying and forecasting GHG emissions to the atmosphere associated with seagrass degradation.

A1.22 Peat may be used as fuel, soil improver or horticultural substrate. Due to the existence of extensive local, regional and global markets, projects that avoid peat mining are likely to suffer significant (and potentially 100 percent) leakage emissions and therefore are not eligible. Project activities that serve the demand side and avoid peat mining by providing alternatives for peat as fuel or substrate, are outside the scope of AFOLU but may qualify under another sectoral scope.

APPENDIX 2 DOCUMENT HISTORY

Version	Date	Comment
v4.0	19 Sep 2019	Initial version released under VCS Version 4.
v4.1	20 Jan 2022	Main updates: 1) Added a new approach for establishing dynamic performance benchmarks (Sections 2.3, 3.2 and 3.4). 2) Clarified that the IFM leakage default factors are inclusive of both market and activity-shifting leakage (Section 3.7). 3) Clarified that SOC stock change calculations shall be calculated on an Equivalent Soil Mass (ESM) basis (Section 3.6.10).
v4.2	22 Jun 2022	Main updates (all effective on issue date, unless otherwise stated): 1) Updated requirements and methods for estimating uncertainty, based on the IPCC definition (Section 2.4). This update is effective for methodologies that receive a first VVB assessment report on or after 22 December 2022. 2) Updated requirements on peer-reviewed literature eligible for use in establishing default emission factors (Section 2.5.2). This update is effective for methodologies that receive a first VVB assessment report on or after 22 December 2022. 3) Clarified that requirements relevant to soil carbon pools in Wetland Restoration and Conservation projects do not apply to soil carbon stock loss from sea level rise (Section 3.6.30).
v4.3	21 Dec 2022	Updates to this version of the VCS Methodology Requirements include: 1) Various updates made to align the VCS Methodology Requirements with the new Methodology Development and Review Process document, including updates to terminology and applicability conditions. 2) Requirement added in Section 2.2.4 to clarify that a standardized method shall be used as the preferred option for additionality. 3) Minor corrections made to uncertainty calculation example equation in Section 2.4.2. 4) Update to note in Section A.1.4 regarding eligibility of IFM project activities focusing on fire reduction activities. 5) Updated text which references the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* to instead reference the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*.
v4.3	17 Jan 2023	Minor formatting errors were corrected.

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Verified Carbon Standard

Jurisdictional & Nested REDD+

Climate, Community & Biodiversity Standards

Sustainable Development Verified Impact Standard

Plastic Waste Reduction Standard