VCS | VERIFIED CARBON STANDARD
A Global Benchmark for Carbon

Agriculture, Forestry and Other Land Use (AFOLU) Requirements

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1 | Introduction

This document provides the VCS Program requirements for the development of Agriculture, Forestry and Other Land Use (AFOLU) projects and methodologies, including requirements on project area, project crediting period, eligible project categories, GHG sources and carbon pools, baseline determination, leakage calculation and GHG emission reductions and removals calculation. Eligible AFOLU project categories include Afforestation, Reforestation and Revegetation (ARR), Agricultural Land Management (ALM), Improved Forest Management (IFM), Reduced Emissions from Deforestation and Degradation (REDD) and Peatland Rewetting and Conservation (PRC). The purpose of the document is to assist project proponents, project developers, methodology developers and validation/verification bodies in developing and auditing projects and methodologies.

In addition to the requirements set out in this document, AFOLU projects and methodologies shall adhere to all applicable VCS requirements and rules set out in the VCS Program documents. In particular, readers are referred to the *VCS Program Guide*, the *VCS Standard* and the *AFOLU Non-Permanence Risk Tool*. Where external documents are referenced, such as the *IPCC 2006 Guidelines for National GHG Inventories*, and such documents are updated, the most recent version of the document shall be used.

The basis of this document was the *VCS 2007.1*, the *Guidance for Agriculture, Forestry and Other Land Use Projects* and the *Tool for AFOLU Methodological Issues*, developed by the VCS AFOLU Advisory Group (a group composed of working groups of leading experts in each of the five AFOLU project categories) in 2007 and 2008 through an extensive peer review process. During 2010, after considerable public input and with oversight from the VCS AFOLU Steering Committee, the two documents were combined and revised by the VCS Association. More than thirty independent reviewers, including preeminent risk experts, investors, validation/verification bodies, NGO representatives and project developers supported these efforts and provided detailed feedback during the evolution of these AFOLU rules and requirements.[1]

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

[1] The AFOLU advisory group members, current AFOLU Steering Committee members and contributors to this document may be found on the VCS website.

2 | AFOLU Program Specific Issues

2.1 AFOLU NON-PERMANENCE RISK AND POOLED BUFFER ACCOUNT

2.1.1 Non-permanence risk in AFOLU projects is addressed through the use of a project risk analysis, using the *AFOLU Non-Permanence Risk Tool*, which determines a number of credits to be deposited in the AFOLU pooled buffer account. The pooled buffer account holds non-tradable buffer credits to cover the non-permanence risk associated with AFOLU projects. It is a single account that holds the buffer credits for all projects. The full rules and procedures for AFOLU projects with respect to non-permanence risk are set out in Section 3.6.

2.1.2 The AFOLU pooled buffer account is subject to periodic reconciliation, and operational procedures for reconciling this account will be defined by the VCSA within two years of the first issuance of VCUs generated by AFOLU projects. Reconciliation will be based on a review of existing AFOLU verification reports and an assessment of project performance. This process will identify the projects that have failed or underperformed and seek to identify their common characteristics. The risk analysis criteria and buffer withholding percentages, set out in VCS document *AFOLU Non-Permanence Risk Tool*, will be adjusted accordingly to ensure that there are always sufficient buffer credits in the AFOLU pooled buffer account to cover project losses. Any changes to the tool will not be retroactive (ie, they will apply only to future non-permanence risk assessments).

2.1.3 Project risk analyses will be subject to periodic review by the VCSA and operational procedures for sampling and reviewing such analyses will be defined by the VCSA within two years of the first issuance of VCUs generated by AFOLU projects. This process will consist of a review of a sample of AFOLU project risk reports to identify any inconsistencies in the process and application of the *AFOLU Non-Permanence Risk Tool* and assessment of same by validation/ verification bodies. The risk analysis criteria and risk ratings set out in the tool may be adjusted, to ensure consistent and accurate application of the tool. Any changes to the tool will not be retroactive (ie, they will apply only to subsequent non-permanence risk analyses).

2.2 AFOLU LEAKAGE ASSESSMENTS

2.2.1 Project market leakage assessments will be subject to periodic review by the VCSA and operational procedures for sampling and reviewing such analyses will be defined by the VCSA within two years of the first issuance of VCUs generated by AFOLU projects. This process will consist of a review of a sample of AFOLU projects' leakage assessments to identify any inconsistencies in the process and application of the leakage requirements in Section 4.6 and assessment of same by validation/verification bodies. The leakage requirements set out in Section 4.6 may be adjusted, to ensure consistent and accurate application. Any changes to the leakage requirements will not be retroactive (ie, they will apply only to subsequent leakage assessments).

3 | Project Requirements

3.1 GENERAL REQUIREMENTS

3.1.1 As set out in the *VCS Standard*, standards and factors used to derive GHG emissions data as well as any supporting data for establishing baseline scenarios and demonstrating additionality shall be publicly available and derived from a reputable and recognized source, such as *IPCC 2006 Guidelines for National GHG Inventories or the IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry*.

3.1.2 Implementation of the project activities shall not lead to the violation of any applicable law, regardless of whether or not the law is enforced.

3.1.3 Where an implementation partner is acting in partnership with the project proponent, the implementation partner shall be identified in the project description. The implementation partner shall identify its roles and responsibilities with respect to the project, including but not limited to, implementation, management and monitoring of the project, over the project crediting period.

3.1.4 Project proponents shall identify potential negative environmental and socio-economic impacts and shall take steps to mitigate them. Additional standards such as the Climate, Community & Biodiversity Standards (CCBS) or Forest Stewardship Council (FSC) certification may be applied to demonstrate social and environmental benefits beyond GHG emissions reductions or removals. VCUs may be tagged with additional standards and certifications on the VCS project database where both the VCS and another standard are applied.

3.1.5 Project activities that convert native ecosystems to generate GHG credits are not eligible under the VCS Program. Evidence shall be provided in the project description that any ARR, ALM or PRC project areas were not cleared of native ecosystems to create GHG credits (eg, evidence indicating that clearing occurred due to natural disasters such as hurricanes or floods). Such proof is not required where such clearing or conversion took place at least 10 years prior to the proposed project start date. The onus is upon the project proponent to demonstrate this, failing which the project shall not be eligible.

3.1.6 PRC project activities that drain native ecosystems to generate GHG credits are not eligible under the VCS Program. Evidence shall be provided in the project description that any PRC project area was not drained or converted to create GHG credits. Such proof is not required where such draining or conversion took place prior to 1 January 2008. The onus is upon the project proponent to demonstrate this, failing which the project shall not be eligible.

3.1.7 Projects may include multiple project activities where the methodology applied to the project allows more than one project activity and/or where projects apply more than one methodology, as set out in the *VCS Standard*. Such projects shall comply with the respective project requirements of each included AFOLU category. For example, projects that combine agroforestry or enrichment planting with community forestry in a single project where farmers integrate these activities within a single landscape shall follow an ARR methodology for planting activities and an IFM methodology for community forestry activities (except where the activities have been combined in a single methodology). For each activity covered by a different methodology, the geographic extent of the area to which the methodology is applied shall be clearly delineated.

3.1.8 ARR or IFM projects with harvesting activities shall not be issued GHG credits above the long-term average GHG benefit maintained by the project. The long-term average GHG benefit shall be calculated as set out in Section 4.5.3.

3.1.9 For all IFM, REDD and PRC project types, the project proponent shall, for the duration of the project, reassess the baseline every 10 years and have this validated at the same time as the subsequent verification. Baseline projections for deforestation and/or degradation, forest management plans, and peatland drainage beyond a 10 year period are not likely to be realistic because rates of change in land-use and/or land management practices are subject to many factors that are difficult to predict over the long term, hence the need for periodic reassessment of the baseline. This reassessment will capture changes in the drivers and/or behavior of agents that cause the change in land use and/or land management practices and changes in carbon stocks, all of which shall then be incorporated into revised estimates of the rates and patterns of land-use change and estimates of baseline emissions.[2] Ex-ante baseline projections beyond a 10 year period are not required.

3.1.10 Where ARR, ALM, IFM or REDD project activities take place on peatland, the project shall adhere to both the respective project category requirements and the PRC requirements, unless the expected emissions from the soil organic carbon pool or change in the soil organic carbon pool in the project scenario is deemed below *de minimis* as set out in Section 4.3.3, in which case the project shall not be subject to the PRC requirements.

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[2] Brown, S., M. Hall, K. Andrasko, F. Ruiz, W. Marzoli, G. Guerrero, O. Masera, A. Dushku, B. DeJong, and J. Cornell, 2007. Baselines for land-use change in the tropics: application to avoided deforestation projects. Mitigation and Adaptation Strategies for Global Change, 12 (6):1001-1026.

3.2 PROJECT START DATE

3.2.1 As set out in the *VCS Standard*, the project start date of an AFOLU project shall be the date on which activities that lead to the generation of GHG emission reductions or removals are implemented. Such activities may include preparing land for seeding, planting, changing agricultural or forestry practices, or implementing management or protection plans.

3.3 PROJECT CREDITING PERIOD

3.3.1 The project crediting period rules are set out in the *VCS Standard*. Projects shall have a credible and robust plan for managing and implementing the project over the project crediting period.

3.3.2 For ARR or IFM extension of rotation age or low-productive to high-productive projects with harvesting, the length of the project crediting period shall be set to include at least one complete harvest/cutting cycle. In the case of selectively cut IFM projects, where trees are individually selected for harvest, the harvest/cutting cycle is the allowable re-entry period into the harvest area as determined by legal and regulatory requirements, and common practice.

3.4 PROJECT LOCATION

3.4.1 The project location shall be specified in the project description in terms of its project area. The spatial extent of the project shall be clearly specified to facilitate accurate monitoring, reporting and verification of GHG emission reductions and removals and to demonstrate that the project meets the eligibility criteria of the relevant project category. The project location description shall include the following information:

1) Name of the project area (eg, compartment number, allotment number and local name).

2) Maps of the project area.

3) Geographic coordinates of the project area boundary, provided in the format specified in the *VCS Standard*.

4) Total size of the project area.

5) Details of ownership.

Where the project area is comprised of multiple polygons (parcels), the project location details of each polygon/parcel shall be included in the project description.

3.4.2 The project proponent shall demonstrate control over the entire project area with proof of title with respect to one or more rights of use accorded to the project proponent as set out in the *VCS Standard,* noting the following:

1) The entire project area shall be under the control of the project proponent at the time of validation, or shall come to be under the control of the project proponent by the first verification event. Where the project proponent does not yet have control over the entire area

at validation, the entire project area is to be validated as if it were under control and the project is ready to be implemented. Where less than 80 percent of the total proposed area of the project is under current control at validation, the following applies:

a) It shall be demonstrated that the result of the additionality test is applicable to the project area at the time of validation and to the entire project area to come under control in the future.

b) The monitoring plan shall be designed such that it is flexible enough to deal with changes in the size of the project.

c) The project shall be verified within five years of validation. At verification, the size of the project becomes fixed.

d) Where the area fixed at verification is smaller than intended at validation, areas that at verification have not come under control of the project shall be considered in the leakage management, mitigation and accounting. This requires the selection, at validation, of a methodology with appropriate leakage methods that may be used in the event the entire area does not come under control of the project.

2) Where the project intends to add instances (see specification for instances in the *VCS Standard*) of the project activity (eg, additional polygons/parcels), the project shall follow the requirements for grouped projects set out in the *VCS Standard* and below in Section 3.7.

3.4.3 PRC Conservation of Undrained or Partially Drained Peatland (CUPP) projects shall demonstrate that there is either no hydrological connectivity to adjacent areas, or where projects are hydrologically connected to adjacent areas, a buffer zone shall be established to ensure hydrologically connected areas will not have a significant negative impact on the project area, such as causing the water table in the project area to drop, or otherwise impacting the hydrology of the project area, resulting in higher GHG emissions. In addition, the following shall apply:

1) The buffer zone shall be adjacent to the project geographic boundary. Where the buffer zone is adjacent to the project area binding agreements shall be in place with land holders in the buffer zone regarding water management.

2) The project proponent shall demonstrate that the width of the buffer zone is sufficient to avoid such negative impacts on the project area, which may be demonstrated through peer reviewed literature or expert judgment.

3) Where the project activity causes an increase in GHG emissions in the buffer zone, such emissions shall be included in GHG accounting where above *de minimis* (as set out in Section 4.3.3).

3.5 LEAKAGE MANAGEMENT, MITIGATION AND ACCOUNTING

3.5.1 The potential for leakage shall be identified, and projects are encouraged to include leakage management zones as part of the overall project design. Leakage management zones can minimize the displacement of land use activities to areas outside the project area by maintaining the production of goods and services, such as agricultural products, within areas under the control of the project proponent or by addressing the socio-economic factors that drive land use change.

3.5.2 Activities to mitigate leakage and sustainably reduce deforestation and/or degradation are encouraged and may include the establishment of agricultural intensification practices, lengthened fallow periods, agroforestry and fast-growing woodlots on degraded land, forest under-story farming, ecotourism and other sustainable livelihood activities, and/or sustainable production of non-timber forest products. Leakage mitigation activities may be supplemented by providing economic opportunities for local communities that encourage forest protection, such as employment as protected-area guards, training in sustainable forest use or assisting communities in securing markets for sustainable forest products, such as rattan, vanilla, cacao, coffee and natural medicines.

3.5.3 Where projects are required to account for leakage, such leakage evaluation shall be documented in the appropriate section of the project description and/or monitoring report, as applicable.

3.5.4 Market leakage assessments shall occur at validation and verification. The rules and requirements for the assessment of market leakage are set out in Section 5 below.

3.5.5 Any leakage shall be subtracted from the number of GHG emission reductions and removals eligible to be issued as VCUs.

3.6 NON-PERMANENCE RISK

3.6.1 Projects with tree harvesting shall demonstrate that the permanence of their carbon stock is maintained and shall put in place management systems to ensure the carbon against which VCUs are issued is not lost during a final cut with no subsequent replanting or regeneration.

3.6.2 PRC projects shall demonstrate that the permanence of their peat carbon stock will be maintained. The maximum quantity of GHG emission reductions that may be claimed by the project is limited to the difference between project and baseline scenario after a 100 year time frame, as set out in Section 4.5.18.

3.6.3 Projects shall prepare a non-permanence risk report in accordance with VCS document *AFOLU Non-Permanence Risk Tool* at both validation and verification. In the case of projects that are not validated and verified simultaneously, having their initial risk assessments validated at the time of VCS project validation will assist VCU buyers and sellers by providing a more accurate early indication of the number of VCUs projects are expected to generate. The non-permanence risk report shall be prepared using the *VCS Non-Permanence Risk Report Template*, which may be included as an annex to the project description or monitoring report, as applicable, or provided as a stand-alone document.

3.6.4 Buffer credits shall be deposited in the AFOLU pooled buffer account based upon the non-permanence risk report assessed by the validation/verification body(s). Buffer credits are not VCUs and cannot be traded.

3.6.5 Projects shall perform the non-permanence risk analysis at every verification event because the non-permanence risk rating may change. Projects that demonstrate their longevity, sustainability and ability to mitigate risks are eligible for release of buffer credits from the AFOLU pooled buffer account. The full rules and procedures with respect to the release of buffer credits are set out in the VCS document *Registration and Issuance Process*.

3.6.6 Assessment of non-permanence risk analyses may be conducted by the same validation/ verification body that is conducting validation or verification of the project and at the same time as the validation or verification of the project, as applicable. The rules and requirements for the process of assessment by validation/verification body(s) are set out in Section 5 below.

3.6.7 Where an event occurs that is likely to qualify as a loss event (see VCS document *Program Definitions* for definition of loss event) and VCUs have been previously issued, the following applies:

1) The project shall prepare and submit a loss event report to the VCS registry administrator, as follows:

    a) The loss event report shall be prepared using the *VCS Loss Event Report Template*. It shall include a conservative estimate of the carbon stocks lost from the project (ie, losses to stocks on which GHG credits have previously been issued to the project), based on monitoring of the full area affected by the loss event.

    b) The loss event report shall be accompanied by a loss event representation signed by the project proponent and representing that the loss estimate is true and accurate in all material respects. The template for the loss event representation is available on the VCS website.

    c) The loss event report shall be submitted to the VCS registry administrator within two years of the loss event. Where a loss event report is not submitted within two years of the date the loss event occurred, the project shall no longer be eligible to issue VCUs.

    d) The VCS registry administrator shall put buffer credits from the AFOLU pooled buffer account on hold, in an amount equivalent to the estimated loss stated in the loss event report.

2) At the verification event subsequent to the loss event, the monitoring report shall restate the loss from the loss event and calculate the net GHG benefit for the monitoring period in accordance with Section 4.7.2 and the methodology applied. In addition, the following applies:

    a) Where the net GHG benefit of the project, compared to the baseline, for the monitoring period is negative, taking into account project emissions, removals and leakage, a reversal has occurred (see VCS document *Program Definitions* for definition of reversal) and buffer credits equivalent to the reversal shall be cancelled from the AFOLU pooled buffer account, as follows:

i) Where the total reversal is less than the number of credits put on hold after the submission of the loss event report, the VCS registry administrator shall cancel buffer credits equivalent to the reversal. Any remaining buffer credits shall be released from their on hold status (though remain in the AFOLU pooled buffer account).

ii) Where the reversal is greater than stated by the loss event report, the full amount of on hold buffer credits put on hold with respect to the submission of the loss event report shall be cancelled, and additional buffer credits from the AFOLU pooled buffer account shall be cancelled to fully account for the reversal.

b) Where the net GHG benefit for the monitoring period is positive, taking into account project emissions, removals and leakage, (ie, all losses have been made up over the monitoring period), a reversal has not occurred and buffer credits put on hold after the submission of the loss event report shall be released from their on hold status (but shall remain in the AFOLU pooled buffer account).

3.6.8 At a verification event, where a reversal has occurred, the following applies:

1) Where the reversal is a catastrophic reversal (see VCS document *Program Definitions* for the definition of catastrophic reversal), the following applies:

a) The baseline may be reassessed, including any relevant changes to baseline carbon stocks and, where reassessed, shall be validated at the time of the verification event subsequent to the reversal.

b) The same geographic boundary shall be maintained. The entire project area, including areas degraded or disturbed by the catastrophic event, shall continue to be a part of project monitoring. GHG credits may not be claimed from any increased rate of sequestration from natural regeneration after a catastrophic reversal until the loss from catastrophic reversals is recovered. At the subsequent VCU issuance, buffer credits shall be deposited in the AFOLU pooled buffer account based upon the non-permanence risk analysis determined in accordance with VCS document *AFOLU Non-Permanence Risk Tool*, as assessed by the validation/verification body(s). In addition, GHG credits from the project equal to the additional number of buffer credits cancelled after the reversal from the AFOLU pooled buffer account on behalf of the project (ie, above what has been previously contributed by the project) shall be deposited in the AFOLU pooled buffer account. For example, if the project previously contributed 100 buffer credits and 150 credits were cancelled from the AFOLU pooled buffer account after a reversal, the project would deposit an additional 50 buffer credits (to replenish the pool at large) in addition to the amount required by the risk analysis at the current verification event. Buffer credits deposited to replenish the pool after a reversal (50 in the example above) shall never be eligible for release back to the project, as set out in Section 3.6.5.

2) Where the reversal is a non-catastrophic reversal (eg, due to poor management or over-harvesting), the following applies:

a) No further VCUs shall be issued to the project until the deficit is remedied. The deficit is equivalent to the full amount of the reversal, including GHG emissions from losses to project and baseline carbon stocks.

b) The same geographic boundary shall be maintained. The entire project area, including areas degraded or disturbed by the non-catastrophic event, shall continue to be a part of project monitoring. Projects may not claim GHG credits from any increased rate of sequestration from natural regeneration after a reversal.

3.6.9 As set out in the VCS document *Registration and Issuance Process*, where projects fail to submit a verification report within five or ten years from the previous verification event, a percentage of buffer credits are put on hold under the conservative assumption that the carbon benefits represented by buffer credits held in the AFOLU pooled buffer account may have been reversed or lost in the field. Where projects fail to submit a verification report within 15 years from the previous verification event, buffer credits are cancelled under the same assumption. The full rules and requirements with respect to the cancellation and holding of buffer credits are set out in the VCS document *Registration and Issuance Process*.

3.6.10 The remaining balance of buffer credits is cancelled at the end of the project crediting period.

3.6.11 Although buffer credits are cancelled to cover carbon known, or believed, to be lost, the VCUs already issued to projects that subsequently fail are not cancelled and do not have to be "paid back". However, all VCUs issued to AFOLU projects (as with all projects) are permanent. The VCS approach provides atmospheric integrity because the AFOLU pooled buffer account will always maintain an adequate surplus to cover unanticipated losses from individual project failures and the net GHG benefits across the entire pool of AFOLU projects will be greater than the total number of VCUs issued.

3.7 GROUPED PROJECTS

3.7.1 Grouped projects are projects structured to allow the expansion and crediting of a project activity subsequent to project validation. AFOLU grouped projects shall follow the requirements for grouped projects set out in the *VCS Standard*.

3.7.2 AFOLU non-permanence risk analyses, where required, shall be assessed for each geographic area specified in the project description (for requirements related to geographic areas of grouped projects see the *VCS Standard*). Where risks are relevant to only a portion of each geographic area, the geographic area shall be further divided such that a single total risk rating can be determined for each geographic area. Where a project is divided into more than one geographic area for the purpose of risk analysis, the project's monitoring and verification reports shall list the total risk rating for each area and the corresponding net change in the project's carbon stocks in the same area, and the risk rating for each area applies only to the GHG emissions reductions generated by project activity instances within the area.

3.7.3 Activity shifting and market leakage assessments, where required, shall be undertaken as set out in Section 4.6, and the methodology applied, on the initial group of instances of each project activity and reassessed where new instances of the project activity are included in the project.

4 | Methodology Requirements

4.1 GENERAL REQUIREMENTS

4.1.1 In addition to the requirements for methodologies set out in the *VCS Standard*, methodologies shall establish criteria and procedures in accordance with this Section 4.

4.1.2 As set out in the *VCS Standard*, standards and factors used to derive GHG emissions data as well as any supporting data for baseline scenarios and additionality shall be publicly available and come from a reputable and recognized source, such as *IPCC 2006 Guidelines for National GHG Inventories or the IPCC 2003 Good Practice Guidelines for Land Use, Land-Use Change and Forestry*.

4.1.3 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.

4.2 ELIGIBLE AFOLU PROJECT CATEGORIES

There are currently five AFOLU project categories under the VCS Program, as further described below. Proposed methodologies shall fall within one or more of these AFOLU project categories.

Afforestation, Reforestation and Revegetation (ARR)

4.2.1 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 Section 3.1.5.

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

Agricultural Land Management (ALM)

4.2.2 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 (eg, 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 (eg, 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 (eg, split application), improved formulations (eg, 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 (eg, 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 4.2.2(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 (eg, 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 soils to perennial non-woody vegetation, where there is substantial reduction or elimination of drainage, is an eligible practice but shall follow both the PRC and ALM requirements.

   c) Grassland conversions to cropland production (eg, 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 have a negative impact on local ecosystems as set out in Section 3.1.4 and 3.1.5.

Note - Biofuel crop production activities are eligible under AFOLU only to the extent that they generate measurable long-term increases in aboveground, belowground, and/or soil carbon stocks or substantially reduce soil organic carbon losses. Biofuel crop production on rewetted peatland shall also follow the PRC requirements. Although a number of biofuel crops require drainage, some forms of biomass production on peatland (ie, paludicultures) are compatible with rewetting and may even lead to peat accumulation in the long run. This activity is feasible with crops that grow on wet peatlands and that do not consume the peat body, such as alder, papyrus, reeds, sedges, and willow. Biofuel crop production activities on drained peatland or on peatland cleared of, or converted from, native ecosystems are not eligible.

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)

4.2.3 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 *IPCC 2006 Guidelines on National GHG Inventories*, and the project area shall be designated, sanctioned or approved for wood product management by a national or local regulatory body (eg, as logging concessions or plantations).

4.2.4 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 (eg, by implementing directional felling or vine cutting);

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

   c) Improving planning of log landing decks, skid trails and roads (eg, 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 (eg, 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 do not contain much 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 timber value or growth rates.

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

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

Note - Activities that reduce GHG emissions from unsanctioned forest degradation (eg, illegal logging) are considered REDD activities. Projects focusing solely on the reduction of forest fires are not eligible under IFM. Activities that drain peatlands to increase forest production are not eligible.

Reduced Emissions from Deforestation and Degradation (REDD)

4.2.5 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, 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.

4.2.6 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.

4.2.7 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.

4.2.8 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 Section 3.1.7.

4.2.9 Eligible REDD activities include:

1) Avoiding Planned Deforestation (APD): This category includes activities that reduce net GHG emissions by stopping or reducing deforestation on forest lands that are legally authorized and documented to be converted to non-forest land, noting the following:

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

   b) Planned deforestation can encompass a wide variety of activities, 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.

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

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

   c) Avoided planned deforestation 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 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.

   d) Avoiding planned degradation (eg, legally sanctioned timber extraction) is an eligible activity under IFM. APD only refers to planned deforestation. However in many countries, valuable timber would likely be extracted before the land is deforested and this shall be accounted for in the baseline emissions scenario (see IFM section for requirements on how to address this wood product component).

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.

Peatland Rewetting and Conservation (PRC)

4.2.10 Eligible PRC activities are those that reduce GHG emissions by rewetting or avoiding the drainage of peatland. 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. The project area shall meet an internationally accepted definition of peatland, such as from the IPCC, FAO, or those established in the scientific literature for specific countries or types of peatlands. Common names for peatland include peat swamp (forest), mire, bog, fen, moor, muskeg and pocosin.

4.2.11 Table 1 illustrates the types of PRC 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 peatland in the baseline scenario, the land use in the baseline scenario and the project activity. Eligible PRC activity types include Rewetting of Drained Peatland (RDP) and Conservation of Undrained or Partially Drained Peatland (CUPP).

Table 1: Eligible AFOLU Combined Category Projects

Baseline Scenario		Project Activity	Applicable Guidance
Condition	Land Use		
Drained peatland	Non-forest	Rewetting	RDP
		Rewetting and conversion to forest/ revegetation	RDP+ARR
		Rewetting and paludiculture/ erosion avoidance	RDP+ALM
	Forest	Rewetting	RDP
	Forest with deforestation/ degradation	Rewetting and avoided deforestation	RDP+REDD
	Forest managed for wood products	Rewetting and improved forest management	RDP+IFM
Undrained peatland	Non-forest	Avoided drainage	CUPP
	Forest	Avoided drainage	CUPP
	Forest with deforestation/ degradation	Avoided drainage and deforestation	CUPP+REDD
	Forest managed for wood products	Avoided drainage improved forest management	CUPP+IFM

4.2.12 Activities that generate net reductions of GHG emissions from peatland are eligible as PRC projects or combined category projects (such as REDD on peatland). Project activities that actively lower the water level in peatlands are not eligible. Eligible PRC activities include:

1) Rewetting of Drained Peatland (RDP): This category includes practices that establish a higher water level on peatland that has been drained and reduce net GHG emissions by reducing oxidation and decreasing the rate of peat subsidence or by enabling carbon sequestration through new peat accumulation, noting the following.

    a) Rewetting implies raising the average annual water level in drained peatland by partially or entirely reversing the existing drained state, resulting in reduced net GHG emissions. Rewetting in PRC projects (or projects with a PRC component) does not require the restoration of the average annual water level to the level of the peat surface; however, RDP projects shall raise the water level close to the surface in order to generate GHG credits. A clear relationship between GHG emissions and water level has been established in scientific literature with most changes occurring at water levels close to the surface.[3] Project activities may be implemented to establish a higher water level compared to the baseline scenario if this causes the rate of peat subsidence due to oxidation to decrease or cease within the project crediting period, and if the permanence requirements set out in Section 4.5.18 can be satisfied.

b) Drained peatlands have a water level that is lower than the natural average annual water level due to accelerated water loss or decreased water supply resulting from human activities and construction, both on- and off-site. An example of this is selectively logged peatland swamp forests in Southeast Asia with logging canals.

c) Rewetting projects may generate GHG credits from the reduction of GHG emissions associated with anthropogenic fires. Fire-related projects 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 peat-forming conditions may be eligible under RDP. The restoration of peat-forming conditions requires high and stable water levels over the long-term and the presence of vegetation that produces peat. Carbon sequestration rates resulting from rewetting and restoring drained peatland tend to be low compared to GHG emissions reduced by avoiding peat oxidation. Carbon sequestration in peat through restoration is therefore considered to have a relatively small contribution to GHG mitigation from PRC projects. In addition, while methods exist to monitor small changes in peat carbon stocks, their application at project scales is likely not to be cost effective or practical. However, should a credible methodology be developed and approved for monitoring such practice, activities that increase net GHG removals though carbon sequestration from restoring peat-forming conditions would be an eligible activity under PRC.

2) <u>Conservation of Undrained or Partially Drained Peatland (CUPP)</u>: This category includes activities that reduce net GHG emissions by avoiding drainage in undrained, or further drainage in partially drained, peatlands, thereby reducing CO_2 emissions from avoided peat oxidation and/or increased fire incidence.

Peatland drainage can be planned (designated and sanctioned) or unplanned (unsanctioned). Planned and unplanned drainage of peatland can therefore encompass a wide variety of activities such as those listed under REDD while adding a peatland component. Activities covered under the CUPP project category are those that are designed to stop or reduce planned or unplanned drainage in the project area. The following CUPP activities are eligible:

a) <u>Avoiding Planned Peatland Drainage (APPD)</u>: This activity reduces GHG emissions by avoiding drainage of undrained, or further drainage in partially drained, peatlands that are legally authorized and documented to be planned for conversion to drained land.

[3] 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.

b) Avoiding Unplanned Peatland Drainage (AUPD): This activity reduces GHG emissions by avoiding drainage of undrained, or further drainage in partially drained, peatland at the drainage frontier that has been expanding historically, or is expected to expand in the future, as a result of improved access, often through the construction of roads or canals. AUPD is an eligible activity in the case of mosaic pattern peatland drainage (cf. VCS REDD).

Note – Projects that continue or maintain active drainage are not eligible. This includes, for example, projects that require the maintenance of drainage channels (eg, where periodic deepening may be needed to counteract peat subsidence) to maintain the pre-project drainage level on a partially drained peatland; and, projects that allow selective harvesting that results in a lowering of the water level (eg, by extracting timber using drainage canals) or affects the ability of vegetation to act as a major hydrological regulation device (eg, extracting trees which support the peat body). 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.

3) Combined categories: Projects may reduce net GHG emissions from peatland by combining rewetting or avoidance of drainage with other AFOLU activities. RDP may be implemented without further conversion of land use or it may be combined with ARR, ALM, IFM or REDD activities, referred to as ARR+RDP, ALM+RDP, IFM+RDP or REDD+RDP, respectively. CUPP may be implemented on non-forest land or combined with REDD or IFM activities, referred to as REDD+CUPP or IFM+CUPP, respectively.

The requirements for ARR, ALM, IFM and REDD shall be applied in conjunction with the requirements for rewetting or avoidance of peatland drainage. The following combined categories are eligible:

a) ARR on Peatland (ARR+RDP): RDP may be implemented in combination with ARR, for example by planting a native or adapted tree or shrub species on peatland. While existing oxidation in drained conditions is accounted for in the baseline, ARR activities shall not enhance peat oxidation, therefore this activity requires at least some degree of rewetting. ARR+RDP on already drained peatland without full rewetting may be accepted in cases where the biomass carbon stock increases more than the peat carbon stock decreases by oxidation over a period of centuries.[4]

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

[4] 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.

b) ALM on Peatland (ALM+RDP): This is an eligible activity if the water level of agricultural peatland is raised to a level that can still support agriculture. The following ALM+RDP practices qualify as eligible activities:

i) Rewetting of peatland combined with adapted wet agriculture that includes the cultivation of biomass on undrained or rewetted peatland. The peatland shall be sufficiently wet so as to avoid long-term net peat losses as set out in Section 4.5.18.

ii) 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.

iii) 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 project activities that involve regular tillage and/or nitrogen fertilization on peat soil or that actively lower the water level in peatlands are not eligible project activities.

c) IFM and REDD on Peatland (IFM+RDP, IFM+CUPP, REDD+RDP and REDD+CUPP): RDP and CUPP may be implemented in combination with IFM and REDD project activities. Such activities reduce GHG emissions by increasing or avoiding the loss of forest carbon stocks, and avoiding the drainage required to undertake such baseline activities, noting the following:

i) REDD project activities on forested peatland shall not increase drainage. With respect to the forest biomass component, the requirements provided for IFM or REDD apply.

ii) For IFM+CUPP projects 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. CUPP projects that have clear-cut or patch-cut harvesting activities are not eligible.

iii) For IFM+RDP projects, activities that avoid fire of the peat layer are eligible for crediting. IFM projects focusing solely on the reduction of forest fires are not eligible under AFOLU, as set out in Section 4.2.4.

4.2.13 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.

4.3 PROJECT BOUNDARY

General

4.3.1 The relevant carbon pools for AFOLU project categories are aboveground tree biomass (or aboveground woody biomass in ARR and ALM 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
ALM		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 perennial tree crop[5] as the land cover in the baseline scenario	Y	Y	O	N	O	N	S
PRC		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 4.3.7 to 4.3.20. 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 and ALM 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.

4.3.2 Additional guidance and further requirements with respect to specific carbon pools and GHG sources are set out below in Sections 4.3.7 to 4.3.20.

4.3.3 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 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 and PRC: GHG emissions from the removal or burning of herbaceous

5 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.

vegetation and collection of non-renewable wood sources for fencing of the project area.

3) ARR, IFM, REDD and PRC: 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, emissions shall be accounted for if above *de minimis*, as set out in Section 4.3.3.

4.3.4 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.

4.3.5 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.

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

ARR

4.3.7 Where the 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 4.3.3), the relevant carbon pool shall be included in the project boundary.

ALM

4.3.8 Where the 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.

4.3.9 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.

4.3.10 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.

4.3.11 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.

IFM

4.3.12 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 4.3.3).

4.3.13 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.

4.3.14 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.

4.3.15 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.

REDD

4.3.16 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 4.3.3) or may be conservatively excluded (as set out in Section 4.3.4).

4.3.17 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.

PRC

4.3.18 Combined category projects (ARR+RDP, ALM+RDP, IFM+RDP, IFM+CUPP, REDD+RDP and REDD+CUPP) shall use the relevant PRC requirements for the soil carbon pool and the respective non-PRC AFOLU project category requirements for the other pools, unless the former may be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4)

4.3.19 As transient peaks of CH_4 may arise after rewetting peatland, PRC rewetting methodologies shall include CH_4 emissions in the project boundary. The methodology shall establish the criteria and procedures by which the CH_4 source may be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4)

4.3.20 For RDP projects, N_2O emissions shall be included in the project boundary. The methodology shall establish the criteria and procedures by which the N_2O source may be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4).

4.4 BASELINE SCENARIO

General

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

ARR

4.4.2 (No specific requirements)

ALM

4.4.3 The criteria and procedures for identifying alternative baseline scenarios 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 *IPCC 2006 Guidelines for National GHG Inventories*.

4.4.4 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/ha by 2007 after intensive tillage, the minimum baseline carbon stock for a project established in 2008 would be 100 tonnes/ha.

IFM

4.4.5 Methodologies that establish criteria and procedures for identifying alternative baseline scenarios using a project-based approach, rather than a performance benchmark approach, 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 (and implementing partner, if applicable) is a new owner or management entity with no history of logging practices in the project region, the baseline shall reflect the local common practices and legal requirements. However, if the common practice is unsustainable and unsustainable practices contravene the mission of the new owner or management entity, then a sustainable baseline is the minimum that can be adopted. Where the project proponent (including an entity with a conservation or sustainability mission) takes over ownership or management of a property specifically to stop logging or reduce the impact of logging to reduce forest management emissions, then the project baseline may be based on the projected management plans of the previous property owners and/or operators (ie, the baseline shall represent what would have most likely occurred in the absence of the project).

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 (ie, 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.

REDD

4.4.6 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.

4.4.7 For inclusion of the non-CO_2 gases, evidence shall be provided 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 *IPCC 2006 Guidelines for National GHG Inventories* may be used to estimate such GHG emissions.

4.4.8 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) APD: The criteria and procedures for identifying 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.

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

b) Where the agent of deforestation is not the landowner (eg, 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 identifying the baseline scenarios 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 (eg, 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 (ie, 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 identifying alternative baseline scenarios shall require the project proponent to take into account deforestation/degradation that would have occurred in the project area during the project crediting period.

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 4.4.8(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 (eg, 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 identifying alternative baseline scenarios 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 1000 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.

PRC

4.4.9 RDP: The criteria and procedures for identifying alternative baseline scenarios shall take into account the current and historic layout of the drainage system and the long-term average climate variables influencing water levels prior to project start. 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 worth of data.

The criteria and procedures for identifying alternative baseline scenarios shall also consider non-human induced rewetting brought about by:

1) Collapsing dikes or ditches that would have naturally closed over time.
2) Progressive subsidence, leading to raising relative water levels, increasingly thinner aerobic layers and reduced CO_2 emission rates.

4.4.10 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 future would be under risk of anthropogenic fires.

4.4.11 CUPP: The criteria and procedures for identifying alternative baseline scenarios are handled differently for each of the eligible CUPP activities:

1) AUPD: The criteria and procedures for identifying the baseline scenario shall require the project proponent to reference a period of at least 10 years for modeling a spatial trend in drainage, taking into account the long-term (20-year) average climate variables, and the observed drainage practices (eg, 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 worth of data.
2) APPD: The criteria and procedures for identifying the baseline scenario shall require the project proponent to provide verifiable evidence to demonstrate that, 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), the project area was intended to be drained. The annual rate and depth of drainage shall be based on the common practice in the area—that is, how much peatland is typically drained each year and to what depth by similar

baseline activities.

4.4.12 Combined category projects (ARR+RDP, ALM+RDP, IFM+RDP, IFM+CUPP, REDD+RDP and REDD+CUPP) shall use the relevant PRC requirements and the respective non-PRC AFOLU project category requirements for the determination and establishment of the baseline scenario.

4.5 BASELINE AND PROJECT EMISSIONS/REMOVALS

General

4.5.1 Methodologies shall establish procedures to quantify the GHG emissions or removals for the project and baseline scenario. *The IPCC 2006 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.

4.5.2 The *IPCC 2006 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.[6] ratios and equations, or the Cairns equations).

ARR

4.5.3 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

[6] 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

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 = The 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 = The 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, unless the long-term average is increased. For an example of determining the long-term average GHG benefit, see the VCS website.

7) Buffer credits are withheld only when GHG credits are issued. As set out in Section 4.7.2, 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 = The carbon stock in the project scenario (tCO_2e)

BC = The carbon stock projected for the baseline scenario (tCO_2e)

t = Year

n = Total number of years in the established time period

ALM

4.5.4 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 4.3.3) or conservatively excluded (as set out in Section 4.3.4).

4.5.5 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.

4.5.6 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 the *VCS Standard*.

4.5.7 Procedures to estimate soil carbon stock shall use soil carbon stock change factors that are based on measurements of soil carbon stocks to the full depth of affected soil layers (usually 30 cm), accounting for differences in bulk density as well as organic carbon concentrations.

4.5.8 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.

IFM

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

4.5.10 Procedures for quantifying GHG emissions/removals in wood products may reference Skog et al. 2004[7] or other sources published in scientific peer-reviewed literature.

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

4.5.12 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 4.5.3.

REDD

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

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

PRC

4.5.15 The criteria and procedures for quantifying GHG emissions/removals in the baseline scenario shall:

1) Determine the peat depletion time (PDT): No GHG emissions reductions may be claimed for a given area of peatland for longer than the time it would have taken for the peat to be completely lost under baseline conditions. The PDT is the time during which GHG emissions would occur in the baseline until the peat has disappeared due to gradual oxidation or other losses, within the project boundary based on peat depth maps, water levels, and associated CO_2 emissions and subsidence rates. The procedure for determining the peat depletion time shall conservatively consider peat depth and oxidation rate within the project boundary and may be estimated based on, for instance, the relationship between water level, subsidence[8], and peat depths in the project area. The PDT is considered part of the baseline and thus shall be reassessed with the baseline in accordance with Section 3.1.9.

[7] 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

[8] For instance, by using the peat depletion and water level relationships established in scientific literature.

2) Estimate water levels or another justifiable proxy, as established in scientific literature, of GHG emissions projected throughout the project crediting period.

3) Estimate net baseline GHG emissions during the project crediting period, including emissions associated with the estimated water levels 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. Emissions of CH_4 from peatland drainage are negligible and may conservatively be neglected in the baseline.

4.5.16 Baseline emissions shall be estimated conservatively and consider that the water level 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 4.4.9.

4.5.17 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 level or subsidence, or remote sensing techniques that adequately assess and monitor soil moisture. Because of the dominant relationship between water level and CO_2 emissions, drainage depth can be used as a proxy for CO_2 emissions in the absence of emissions data.[9] Where relevant, the micro-topography of the project area (ie, the proportion of hummocks and hollows and vegetation patterns) 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.

4.5.18 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 peatlands remaining partially drained or not fully rewetted, or where drainage continues, the peat will continue to oxidize leading to GHG emissions and eventually complete depletion of the peat. To determine this long-term net GHG benefit, projects shall estimate the remaining peat carbon stock adjusted for any project emissions and leakage emissions in both the baseline and project scenarios at the 100-year mark, 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.

4.5.19 Emissions of CH_4 from peatland drainage are negligible and may be conservatively neglected in the baseline scenario.

4.5.20 As rewetting may involve initial high peaks of CH_4 emissions, methodologies shall establish procedures to estimate such emissions, and shall establish the criteria and procedures by which

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

the source may be deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4). Where relevant, the micro-topography of the project area (ie, the proportion of hummocks and hollows and vegetation patterns) shall be considered.

4.5.21 Combined category projects shall use the relevant PRC requirements and the respective AFOLU project category requirements for quantifying GHG emissions/removals, unless the former may be deemed insignificant as set out in Section 4.3.3 and 4.3.4.

4.5.22 RDP projects 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.

4.5.23 Methodologies for RDP projects explicitly addressing the frequency, intensity, and extent of anthropogenic peatland fires occurring in drained peatlands shall establish procedures for determining or conservatively estimating the baseline frequency and intensity of fire occurrence 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 *IPCC 2006 Guidelines for National GHG Inventories*, or other methods based on scientific, peer-reviewed literature.

4.6 LEAKAGE

General

4.6.1 Methodologies 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 4.6. 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 degradation moves to an area outside of the project boundary and continues their deforesting activities elsewhere.

3) Ecological leakage occurs in PRC 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.

4.6.2 Leakage that is determined, in accordance with Section 4.3.3, to be below *de minimis* (ie, 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*.

4.6.3 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 4.7 includes an example of indirect leakage accounting.

4.6.4 Projects shall account for market leakage where the production of a commodity (eg, timber) is significantly affected by the project. The significance of timber production is determined as set out in Section 4.3.3 above or as set out in Section 4.6.15 below.

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

4.6.6 Where leakage mitigation measures include tree planting, agricultural intensification, fertilization, fodder production, and/or other measures to enhance cropland and/or grazing land areas, then any significant increase in GHG emissions associated with these activities shall be accounted for, unless deemed *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4).

4.6.7 Projects shall not account for positive leakage (ie, where GHG emissions decrease or removals increase outside the project area due to project activities).

ARR

4.6.8 Activity shifting leakage in ARR projects can result from, inter alia, the shifting of grazing animals, shifting of households or communities, shifting of 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 such projects may 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*.

4.6.9 Where deforestation increases outside the project area due to leakage from project activities, the effects of this deforestation on all carbon pools shall be assessed and quantified, unless determined to be *de minimis* (as set out in Section 4.3.3) or conservatively excluded (as set out in Section 4.3.4).

ALM

4.6.10 ALM projects setting aside land for conservation shall quantify activity shifting leakage emissions associated with the displacement of pre-project activities, unless determined to be *de minimis* in accordance with Section 4.3.3 and 4.3.4. 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 4.3.3 and 4.3.4).

4.6.11 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 4.3.3.

4.6.12 Where livestock are displaced to outside the project area, such activity shifting leakage shall be quantified to capture potential reductions in carbon stocks and potential increases in livestock-derived CH_4 and N_2O emissions from outside the project area.

IFM

4.6.13 Leakage in IFM 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 forest 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 (eg, 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.

4.6.14 Leakage in IFM projects is predominantly attributable to market leakage (market effects), which shall be quantified by either of the following:

1) Applying the appropriate market 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 (ie, 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.[10]

[10] The following three papers may be helpful in assessing market 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)

Table 3: Market Leakage Discount Factors

Project Action	Leakage Risk	Market Leakage Discount Factor
IFM activity with no effect or minimal effect on total timber harvest volumes (eg, RIL with less than 25% reduction)	None	0%
IFM activity that leads to a shift in harvests across time periods but minimal change in total timber harvest over time (eg, ERA with rotation extension of 5-10 years)	Low	10%
IFM activity that substantially reduces harvest levels permanently (eg, 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%

REDD

4.6.15 Leakage shall be assessed and managed 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. Such forest land could be used to make up for the generation of

- 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)

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 deforestation agent can be identified, it shall 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 (eg, 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).

b) Where the deforestation agent cannot be specifically 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 4.6.14.

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.

4.6.16 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 4.6.14 and 4.6.15. 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.

PRC

4.6.17 PRC project activities may be prone to leakage, particularly activity shifting of drainage activities and drainage-related activities (eg, deforestation of forested peatlands) from the project area to outside the project area, leading to an increase in GHG emissions.

4.6.18 RDP projects involving rewetting of forested peatlands 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 (ie, GHG emissions from logging and/or drainage elsewhere). The requirements for leakage in REDD project activities shall be applied to deal with this type of leakage, accounting for both activity shifting and market leakage including, where applicable, the expected GHG emissions from drainage.

4.6.19 Where rewetting in the project area leads to higher water levels beyond the project boundary, the project shall be required to demonstrate that higher water levels caused by the project do not lead to increases in GHG emissions outside the project area. Otherwise, the affected areas shall be identified and the resulting leakage shall be quantified and accounted for in the GHG emissions.

4.6.20 For CUPP, REDD+CUPP and IFM+CUPP the following requirements shall apply, noting that for combined category projects, the IFM or REDD leakage requirements also apply:

1) <u>APPD</u>: 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 peatland within the country. These other peatlands could be used to make up for the generation of goods and/or services lost through implementation of the PRC 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 deforestation agent can be identified, it shall 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 (eg, 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).

   b) Where the deforestation agent cannot be specifically 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.

2) <u>AUDD</u>: The potential for leakage shall be identified and the project shall address the socio-economic factors that drive peatland draining. Leakage shall be calculated by monitoring peatland areas surrounding the project and other peatland areas within the country susceptible to leakage from project activities.

4.6.21 Rewetting projects 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.

4.7 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

4.7.1 Methodologies shall establish procedures for quantifying net GHG emission reductions and removals (the net GHG benefit), which shall be quantified as the difference between the GHG emissions and/or removals from GHG sources, sinks and carbon pools in the baseline scenario and the project scenario. The GHG emissions and/or removals in the project scenario shall be adjusted for emissions resulting from project activities and leakage. Methodologies shall also 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.

4.7.2 The number of GHG credits issued to projects 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 document *Registration and Issuance Process*. This calculation process is illustrated in the example below.

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

	tCO_2e	Comment
Project Compared to Baseline		
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 2)	-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

4.8 MONITORING

4.8.1 The methodology shall establish criteria and procedures for monitoring, and specify the data and parameters to be monitored, as set out in the *VCS Standard*.

4.8.2 Leakage shall be monitored as set out in Section 4.6.

5 | Validation and Verification Requirements

5.1 NON-PERMANENCE RISK ANALYSIS AND MARKET LEAKAGE EVALUATIONS

5.1.1 Non-Permanence risk analysis and market leakage evaluations shall be assessed by validation/verification bodies that are eligible to perform either validation or verification under the VCS Program for sectoral scope 14 (AFOLU). The project proponent shall contract the validation/verification body (ie, the VCSA is not involved in the process).

5.1.2 The validation/verification body shall assess the risk analysis carried out by the project proponent in accordance with VCS document *AFOLU Non-Permanence Risk Tool*. The project proponent shall respond to all and any of the validation/verification body's findings. As a result of any such findings, the project proponent shall amend the documentation as necessary and update the risk rating accordingly.

5.1.3 The validation/verification body shall produce an assessment report in accordance with all applicable VCS Program requirements and best practice. In addition to adhering to such requirements and best practice, the assessment report shall also contain the following:

1) A description of all and any of the validation/verification body's findings and the project proponent's response to them.
2) An assessment statement, which is issued in accordance with the requirements for validation conclusions set out in the *VCS Standard*, mutatis mutandis. Such statement shall also state the version number of the non-permanence risk report or market leakage evaluation documentation upon which the statement is based.
3) The non-permanence risk rating, leakage emissions and number of GHG emission reductions or removals eligible to be issued as VCUs.

The assessment may be included in the validation report or verification report, as applicable, or may be provided as a separate stand-alone document.

APPENDIX 1: DOCUMENT HISTORY

Version	Date	Comment
v3.0	8 Mar 2011	Initial version released under *VCS Version 3*