



T-VER-P-METH-13-05
Improved Forest Management

Version 01

Sector: 14 –Afforestation and Reforestation

Entry into force on 1 March 2023

1. Methodology Title	Improved Forest Management
2. Project Type	Reduction, absorption and removal of greenhouse gases from the forestry and agriculture sectors
3. Sector	14 –Afforestation and reforestation
4. Project Outline	Greenhouse gas sequestration activities by increasing carbon stocks in the aboveground biomass and underground biomass including dead trees (alternatives). These activities aim to improve the management of planted forests that extend the life of perennial cuttings.
5. Applicability	<ol style="list-style-type: none"> 1. It is an improvement in the management of planted forests that extend the life of perennials (extension of rotation age) 2. It is forest management in both the baseline and project activities related to harvesting or harvesting techniques, for example, complete harvesting, small area harvesting pattern cutting Remaining conservation area cutting, or having organized harvesting for sale for not less than 1 cutting cycle, or having a cutting schedule for sale, or having a cutting cycle during the project implementation period. 3. Baseline area before project implementation is not included in this methodology, if there is no objective to generate income from harvesting or no management in harvesting out to sell lumber. 4. Get certified for sustainable forest management according to one of the following standards: Forest Stewardship Council (FSC) or Programme for the Endorsement Forest Certification (PEFC) or Thailand's standard, Thailand Forest Certification Council (TFCC) prior to verification first time. If there is a commercial timber trade during the credit period, it must be certified to such standards before timber production. 5. Project participant must clearly specify the project period in the project document. 6. The project does not include managed peatland and is not part of the wetland transformation. 7. If fire is used for forest management, there must be fire prevention and control measures, such as building fire breaks or prescribed burning to prevent and control fire spreading and biomass combustion outside the project area

	<p>8. There is no leak from the project activities to the area outside the project that the project developer owns or manages.</p> <p>9. The project area has a land use right certification as required by laws.</p>
6. Project Conditions	<p>1. The project area can combine many areas together.</p> <p>2. Project areas that are not uniform must contain specific geographic details of each sub-area within the project.</p> <p>3. Project participant must demonstrate that throughout the project period, the project developer can control changes in forest management according to project activity conditions within the sub-pots.</p> <p>4. It must be an activity that is in addition to what is already required by law. However, it must not conflict with the laws related to the activities, except activities of government agencies, state enterprises and agencies under the supervision of the state.</p>
7. Project starting date	The date the project participant starts the forest survey for a carbon project
8. Remark	-

Definitions

Baseline	Using a baseline scenario, assess forest management in relation to harvesting techniques
Small scale project	The greenhouse gas reduction project that capable of reducing or removing greenhouse gas emissions up to 16,000 tCO ₂ eq/year.
Large scale project	The greenhouse gas reduction project that capable of reducing or removing greenhouse gas emissions more than 16,000 tCO ₂ eq/year.
Long-term average GHG benefit	Forest projects with harvesting out Carbon losses due to harvesting is included in the project's greenhouse gas emissions. must be used to calculate the long-term average GHG benefit, so the maximum number of credits that can be applied to the project must not exceed the long-term average GHG benefit of the project
Below Ground Biomass: BLG	The dry weight of the part of the tree that is underground.
Above Ground Biomass: AGB	The dry weight of all parts of the tree above the ground, i.e., trunk, branches, leaves, flowers and fruit.
Dead wood	Fallen or dead tree
Litter	The parts of a tree that fall to the ground are branches, stems, leaves, flowers, and fruit.
Allometry equation	The relationship equation between the height at breast height or 1.30 meters (diameter at breast height: DBH) and the total height (Height) of the tree, which is used to calculate the dry weight of the tree, has units in kilograms.
Additionality	A project activity is additional if the project participants can demonstrate that GHG emission are reduced below those that would have occurred in the absence of the project activity or business as usual (BAU). Demonstration of additionality shall be done following the guideline set by TGO.
Diameter at Breast Height: DBH	The height of the trees was measured at a height of 1.30 m.
Document or certificate of land use rights	Land ownership documents. These documents indicate the rights to legally use the land, such as title deed (Nor Sor. 4), certificate of utilization (Nor Sor. 3), document for the right of



	people to utilize the land in the Land Reform Area (Sor Por Kor.), letter of permission for utilization in the settlement area (Nor.Kor.3) or letter of permission for land use from the relevant government unit.
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In addition to the definitions contained in this document, Use definitions consistent with definitions in the T-VER, CDM and IPCC Guidelines.

T-VER Methodology for Improved Forest Management

1. Scope of project

1.1 Operational characteristics

Project implementation aims to improve forest management by using harvesting techniques such as complete cutting, cutting only small areas, pattern cutting, conservation area, remaining cutting; which has been continuously extended or using forest management techniques. Its related activities promote an increase in carbon sequestration from the baseline.

1.2 Scope of project

The project developer must specify the project location. It must specify the coordinates, locations and details of the area where the project will be carried out in detail, along with presenting a letter showing the right to use the land according to the laws. In the event that there are many project areas, Project participant must take steps to ensure that forest management can be controlled in each area.

2. Selection of carbon pools and greenhouse gases source used for calculations

2.1 Source of carbon pools and greenhouse gases for calculation

Carbon pools	Selected	Explanation
Aboveground Biomass: ABG	Yes	A carbon pool subjected to project activities and is calculated from the tree biomass and saplings stored above the ground, such as stems, branches, and leaves.
Belowground Biomass: BLG	Yes	A carbon pool subjected to project activities and is calculated from the tree biomass and saplings stored underground, such as roots.
Dead Wood: DW	conditions*	A carbon pool that may result from project activities can be calculated from the amount of dead wood in the project area, under the following conditions:

Carbon pools	Selected	Explanation
		<ul style="list-style-type: none"> - Must be evaluated if the project activity causes more wood chips than the baseline value. And the burning of the last bits of wood is part of forest management. - Do not need to be assessed if it is based on conservative principles. The wood chips are left to decompose in the project area.
Litter: LI	No	Changes in carbon stocks in litter within the project area will decrease due to the effect of expanding the cutting cycle.
Soil organic carbon	No	Changes in organic carbon stocks in soil within the project area will decrease due to the effect of expanding the cutting cycle.

2.2 Source and type of greenhouse gas emission used in calculation

Sources	Greenhouse gas	Selected	Explanation
Burning of woody biomass	CO ₂	No	CO ₂ emissions from burned biomass are estimated from changes in carbon stocks
	CH ₄	Yes	Burning from site preparation, other activities in forest management, and the occurrence of forest fires must also be taken into account in the calculation of greenhouse gas emissions
	N ₂ O	Yes	Burning from site preparation, other activities in managing forest plantations, and forest fires must also be taken into account in the calculation of greenhouse gas emissions.
Use of fossil fuel	CO ₂	conditions*	No assessment is required if it follows conservative principles. The use of fuel for machinery within the project

Sources	Greenhouse gas	Selected	Explanation
			area will decrease due to the effect of increasing the cutting cycle.

Remark* Conditional assessment i.e., assess when project activities may cause a significant increase or decrease in greenhouse gas emissions. compared to the baseline

3. Identification of baseline scenario and demonstration of additionality

Start Date and Crediting Period

For projects that combine multiple plots, the project start date must be set on the same day. It was the date of the earliest processing area among all the inspected plots. By requiring that the registration of all sub-plots of the project must specify the same operation date or specify a date after the project start date but not more than 5 years after the project start date.

The project developer must provide evidence to determine the project start date with reference to the documentation (preferably official, legal and/or other bodies) that can be verified such as

- The date the project developer starts the forest carbon survey (project-level surveys only).
- The date that the project developer or the land owner enters into the project co-operation agreement.
- The date the project submitted documents to the TGO for project inspection.

For crediting period for wood management improvement activities, the project must be set to cover at least one complete harvesting/cutting cycle. All sub-plots of the project will have the same credit period. The project developer can apply for an extension of the credit period by proceeding as follows:

- Improving the forest management simulation plan
- Review the baseline of the new project

3.1 Baseline scenario

Project participant must prepare data showing the evidence of forest management in the project area before implementing the project to establish a baseline scenario. The steps for developing the baseline scenario are as follows:

Step 1 Specifying a reliable alternative forest management simulation plans for project activities

Identify realistic and reliable land use simulation plans. The simulation plan must be feasible for the project developer or other developers with similar goals by taking into account relevant national and/or regional policies and situations such as past land use, practices, and economic trends. The specified land use situation requires the use of planted forest land. This process should clearly identify all potential barriers and benefits of the anticipated situation.

Potential land use scenarios to be assessed must include:

- Continuity of forest management before starting the project (Historical Baseline).
- Legal Requirements for Regional Forest Management (Legal Baseline)
- General Forest Management in the Region (Common Practice Baseline)
- Forest management according to the sample project that has not yet implemented forest management improvement activities

Specifying the situation of realistic and reliable land use, such as land usage records, field survey Information, suggestions from stakeholders, and information from other appropriate source of Information, including Participatory Rural Assessment (PRA).

Project participant should use the following guidelines to formulate a potential land use simulation plans:

Guidelines for identifying legal baseline scenarios

Identify using the forest management model that maximizes current net worth for landowners. At the same time, all legal requirements for specific forest management, such as diameter limits, must be reflected. If there is no relevant legal requirement or not directly clear Project participant may list general forest legal requirements.

Guidelines for common practice baseline

General guidelines for forest management at the regional level. These must be identified by independent forestry consultants and the following elements of forest management should be considered.

- 1) The cutting cycle of trees
- 2) The method of tree cutting
- 3) The tree species planted and cut
- 4) Areas where harvesting is prohibited
- 5) Areas with steep slopes or unstable soil and/or
- 6) Areas designated for small-scale harvesting

Step 2 Selecting a baseline forest management simulation plan

The project developer must assess on the basis of forest management feasibility according to the area conditions. It must be correlated with past operational documents, such as operations with at least 1 cutting cycle record of management based on wood species and domestic management. The project developer must demonstrate how normal forest management practices were in the past and how they need to be modified to improve forest management, using the following documents:

- 1) Document recording timber volume data and timber transportation surveying the area harvesting level
- 2) Document showing legal land use and forest management
- 3) Standards of practice in general for other landowners with similar forest management

The project developer must describe the three assessments with their review and feasibility and the accuracy of the forest management model by showing a forest management plan or a harvesting plan with the participation of the qualified consultancy agency in reviewing additional necessary documents. Alternative simulation plan that does not show obstacles or showing the highest financial potential must be specified in the baseline scenario.

For the project developer implementing forest management improvement activities, the guidelines should be used for choosing a baseline simulation plan for modeling.

It is a guideline for considering the baseline as follows:

- 1) Historical baseline: the document used to consider the feasibility of the baseline scenario as follows:
 - Documentation of the history of forest management that has been undertaken with at least one cutting cycle or more from the project start date
 - Documented history that indicates practical actions that can be taken under local and regional forest legislation
 - Documented history showing that past forest management has overcome financial barriers or able to manage to run the business continuously

If these documents are not available, the project developer can use a legal baseline or a common practice.

- 2) Legal baseline

If the project does not meet the baseline conditions according to past practice, you can choose the legal baseline by selecting a possible baseline simulation plan when the forest management operations are in line with current regulations and are ready for implementation in the project area. It can be done by considering regulations and/or other

limitations that are legally binding on specific forest management practices (e.g. requirements on required timber diameters).

The validation and verification body (VVB) must confirm that the practices specified in the project are legal and reliable considering from the evidence and verifiable. During the project validation, the forestry consultant shall provide the evidence to the project validator and verification unit. The said evidence is considered confidential and must not be published. Examples of evidence are management plans, records of timber sales, or record the cutting guidelines, statistics of timber management in countries and regions, alternative data for spatial analysis or carbon sequestration data by unit. The Project Validator/Project Verification may consult the department for other forest consultancy work to request additional opinions for consideration on the basis of feasibility according to the legal basis.

3) Common practice baseline

The selection of baselines as a general practice must be done under the feasibility plan. When past documented records are insufficient to qualify for a baseline based on past practice and there are no legal regulations to support forest management in the project area. It is likely that the general practice baseline and the project simulation plan are similar. Therefore, in this case the project will not be considered incremental.

3.2 Additionality

The project developer must demonstrate the additionality using the calculation tool *T-VER-P-TOOL-01-01 Combined tool to identify the baseline scenario and demonstrate additionality in forest project activities*

4. Stratification

Stratification can be carried out using the calculation tool *T-VER-P-TOOL-01-08 Calculation of Appropriate Number of Sample Plots for Carbon Measurements in Forest Project Activities* in combination with the consideration of important variables that cause changes in the amount of carbon retention from forest management such as

- Management system
- Area Index/Expected Growth Rate
- Wood species or
- Age class

For this method, it is important to stratify according to forest management. It will make you know that cutting out or cutting only a small area will be done during what year or within what year will be evaluated for each layer with different area indexes, wood species and age

classes. The project area must be divided according to the forecast. If it is found that the above factors cannot be confirmed as causing changes in carbon stocks, soil and climate factors should be considered. This is useful for predicting forest management stratification.

While the estimation after the implementation of the project, which depends on the actual operation according to the planting and management plan. In the event that there is an impact on the project from natural or human disasters such as forest fires, or other factors such as soil type, there is a change tendency in the project's biomass carbon storage. A new classification of hierarchies is needed accordingly.

5. Baseline net GHG removals by sinks

During project implementation, the carbon sequestration in the selected carbon deposit of the baseline must be calculated before the project commencement. and calculate the change in carbon content in the selected carbon deposits of the baseline after the project implementation. The net GHG storage of the baseline can be calculated as follows:

$$\Delta C_{BSL,t} = \Delta C_{TREE_BSL,t} + \Delta C_{SAP_BSL,t} + \Delta C_{DW_BSL,t} - \Delta GHG_{Burning_BSL,t}$$

When

$\Delta C_{BSL,t}$ = Change in carbon stock in baseline in year t (tons of carbon dioxide equivalent)

$\Delta C_{TREE_BSL,t}$ = Change in the carbon stocks in tree biomass in baseline in year t (tons of carbon dioxide equivalent) can be carried out using the calculation tool *T-VER-P-TOOL-01-02 Calculation for carbon stocks and change in carbon stocks of trees in forest project activities*

$\Delta C_{SAP_BSL,t}$ = Change in the carbon stocks in sapling in baseline in year t (alternative) (tons of carbon dioxide equivalent) can be carried out using the calculation tool *T-VER-P-TOOL-01-02 Calculation for carbon stocks and change in carbon stocks of trees in forest project activities*

$\Delta C_{DW_BSL,t}$ = Change in the carbon stocks in dead wood in baseline in year t (alternative) (tons of carbon dioxide equivalent) can be carried out using the calculation tool *T-VER-P-TOOL-01-03 Calculation of carbon stocks and change in carbon stocks in dead wood and litter in forest project activities*

$\Delta GHG_{Burning_BSL,t}$ Change in GHG emissions from biomass burning in the baseline in year t (alternative) (tons of carbon dioxide equivalent) can be

carried out using the calculation tool *T-VER-P-TOOL-01-05 Calculation for non-CO₂ greenhouse gas emissions from burning of biomass in forest project activities*

Remark: The amount of change estimation for greenhouse gas emissions from biomass burning in the baseline, in the event that the implementation of the project significantly, reduces greenhouse gas emissions from the baseline or may be set to zero according to conservative guidelines.

The carbon stock of the baseline and/or the net change in GHG removal by sink of the baseline for any year may be set to zero, if the conditions set forth in the GHG sequestration change quantification tool of the relevant carbon pools are met.

Long-term average GHG benefit

The project developer must prepare a simulation plan to improve timber management to demonstrate the carbon dioxide removal calculations of harvesting based on projected cutting cycles. According to the principles of cultivating methods for planted forest management, the long-term carbon stocks of plantations are subject to changes in carbon stocks as a result of harvesting activities in each cutting cycle. Therefore, to accurately and predictably calculate the carbon stock within the harvesting plantations, long-term sequestration of carbon dioxide (which mean tree biomass) must be considered. For improving wood management according to this method. The mean biomass of trees in a forested area will change with time of harvesting or planned harvesting period. The carbon loss due to harvesting is included in the project's greenhouse gas emissions. Long-term average GHG benefit can be calculated using the calculation tool *T-VER-P-TOOL-01-11 Calculation of Long-term average GHG benefit*.

The maximum amount of credits applicable to a project must not exceed the project's long-term average GHG emissions benefits.

6. Actual net GHG removals by sinks

The net greenhouse gas removal by sink from the project is calculated from greenhouse gas removal occurred from the change of carbon stock of project activities from the selected carbon stock source, and the greenhouse gas emissions that increase from project activities. The calculation of the net greenhouse gas removal by sink from the project activities is as follows:

$$\Delta C_{ACTUAL,t} = \Delta C_{P,t} - GHG_{E,t}$$

When

- $\Delta C_{ACTUAL,t}$ = Change in GHG removal by sink of project activities in year t (tons of carbon dioxide equivalent)
- $\Delta C_{P,t}$ = Change in carbon stock of project activities from selected carbon pools in year t (tons of carbon dioxide equivalent)
- $GHG_{E,t}$ = Additional GHG emission from project activities in year t (tons of carbon dioxide equivalent)
- t = Period after project activities (years)

6.1 Change in carbon stock of project activities

The change in carbon stock of project activities from selected carbon sinks in any given year that perform follow-up can be calculated as follows:

$$\Delta C_{P,t} = \Delta C_{TREE_P,t} + \Delta C_{SAP_P,t} + \Delta C_{DW_P,t}$$

When

- $\Delta C_{P,t}$ = Change in carbon stock of project activities of project activities in year t (tons of carbon dioxide equivalent)
- $\Delta C_{TREE_P,t}$ = Change in the carbon stocks in tree biomass of project activities in year t (tons of carbon dioxide equivalent) was carried out using the calculation tool *T-VER-P-TOOL-01-02 Calculation for carbon stocks and change in carbon stocks of trees in forest project activities*
- $\Delta C_{SAP_P,t}$ = Change in the carbon stocks in sapling of project activity in year t (alternative) (tons of carbon dioxide equivalent) was carried out using the calculation tool *T-VER-P-TOOL-01-02 Calculation for carbon stocks and change in carbon stocks of trees in forest project activities*
- $\Delta C_{DW_P,t}$ = Change in the carbon stocks in dead wood of project activities in year t (alternative) (tons of carbon dioxide equivalent) can be calculated using the calculation tool *T-VER-P-TOOL-01-03 Calculation of carbon stocks and change in carbon stocks in dead wood and litter in forest project activities*
- t = Period after project activities (years)

6.2 Calculation of GHG emissions increased from project activities

If the project requires assessment of emissions of non-CO₂ gases from biomass burning, and greenhouse gas emissions from the combustion of fossil fuels from the use of machinery in activities. Calculation of GHG emissions increased from project activities can be calculated from the equation

$$GHG_{E,t} = GHG_{Burning,t} + GHG_{Fuel,t}$$

When

- $GHG_{E,t}$ = GHG emissions that increase from project activities in year t (tons of carbon dioxide equivalent)
- $GHG_{Burning,t}$ = GHG emissions from burning biomass from project activities (tons of carbon dioxide equivalent) calculated as per *T-VER-P-TOOL-01-05 Calculation for non-CO₂ greenhouse gas emissions from burning of biomass in forest project activities*
- $GHG_{Fuel,t}$ = GHG emissions from fossil fuel use in project activities (tons of carbon dioxide equivalent) are calculated as the equation

$$GHG_{Fuel,t} = \sum (FC_i \times (NCV_i \times 10^{-6}) \times EF_{CO_2i}) \times 10^{-3}$$

When

- $GHG_{Fuel,t}$ = GHG emissions from fossil fuel use in project activities (tons of carbon dioxide equivalent)
- FC_i = Type i fuel consumption in project activities (Unit)
- NCV_i = Net Calorific Value of type i fuel consumption (megajoules per unit)
- EF_{CO_2i} = GHG emissions from the combustion of type i fossil fuels (kilogram carbon dioxide/terajoules)

7. Leakage emission

Calculation of greenhouse gas emissions outside the project boundaries. If the implementation of the project activities affects the economic situation related to the demand and supply of harvesting, for example, the reduction of income from harvesting due to changes in the quantity and timing of harvesting. Therefore, the project under the applicable conditions of this method must consider GHG emissions due to market impact caused by changes in harvest Which will have to calculate the amount of carbon emissions from the leak as follows:

$$LK_t = LK_{Market\ Effects}$$

- LK_t = GHG emissions from all leakages
(tons of carbon dioxide equivalent)
- $LK_{Market\ Effects}$ = GHG emissions due to project impacts related to timber supply and demand (tons of carbon dioxide equivalent)

7.1 Leakage from changes in marketing activities

If the project can be demonstrated that its implementation will result in less than 5% reduction in wood products, the leakage from the change in marketing activities will be considered zero.

If the project reduces the production of wood products by more than 5%, when compared to the baseline, all Project participant and land owners involved in the project must demonstrate that there is no leakage in the operation outside the project area. These activities are, for example, managed/operated outside the scope of the project or can provide evidence record, the history of harvesting and its productivity; able to show trends of historical harvesting volumes against harvesting during the project period without deviation from the past trends. According to the forest management plan, the project must prepare more than 24 months before the project start date or show harvesting plans of its owned land or wholly managed land comparing with the past records and the project timelines. There must be no deviation from the planned management plan.

7.2 Leakage factor for market impact calculation

$$LK_{Market\ Effects} = LF * (\Delta C_{ACTUAL,t} - \Delta C_{BSL,t})$$

When:

- $LK_{Market\ Effects}$ = GHG emissions due to project impact related to wood demand and supply (tons of carbon dioxide equivalent)
- LF = Leakage factor Constants for Market Impact Calculations
- $\Delta C_{ACTUAL,t}$ = Net GHG removals by sinks in from project activities in year t
(Tons of Carbon Dioxide Equivalent)
- $\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks in year t (Tons of Carbon Dioxide Equivalent)
- t = Duration after the project activity (year)

Leak factors for market impact calculations is determined by the country's harvesting that will increase as a result of the timber cutting life extension program, resulting in fewer timber products coming to the market. If the area outside the project is a harvesting area, the

amount of carbon accumulated is higher than in the project area. may cause a higher tendency of leakage.

$LF = 0$ When the project demonstrates that there are no market-affected leaks or has extended the cutting cycle for less than 5 years

$LF = 0.1$ When the cutting cycle is extended between 5 - 10 years and there is no more than 25 percent of harvesting changes throughout the project life.

If the cutting cycle is extended for more than 10 years, the proportion of the reduction in the selling price of each type of wood must be considered, preliminarily setting the LF not exceeding 0.4.

8. Net anthropogenic GHG removals by sinks

8.1 Net GHG capture from project implementation can be calculated from the equation below

$$\Delta C_{IFM,t} = \Delta C_{ACTUAL,t} - \Delta C_{BSL,t} - LK_t$$

When:

$\Delta C_{IFM,t}$ = GHG removals by sinks in from timber management improvement projects (tons of carbon dioxide equivalent)

$\Delta C_{ACTUAL,t}$ = Net GHG removals by sinks in from project activities in year t (tons of carbon dioxide equivalent)

$\Delta C_{BSL,t}$ = Baseline net GHG removals by sinks in year t (tons of carbon dioxide equivalent)

LK_t = GHG emissions outside project boundaries (tons of carbon dioxide equivalent)

t = Year of monitoring (year)

9. Uncertainty

The Project participant must demonstrate the calculation of the project's uncertainty from the uncertainties arising from the calculation of greenhouse gas emissions and the changes in carbon stocks in the project implementation, both from the baseline scenario and from the project activities while carrying out the project as per conservation principle. This methodology determines the uncertainty at 10%, with a confidence interval of 90%. The project developer was able to assess the uncertainty according to the calculation tools used or theoretically. If the project has cumulative uncertainty for the project greater than 10%,

the resulting value must be deducted from the amount of change in carbon deposits both from the baseline and from project operations. according to the conservation principle as in Table 1.

Table 1 Uncertainty discount factors

Uncertainty: U	Discount (% of uncertainty)	Applicability
$U \leq 10\%$	0%	Example Mean value of biomass = 60 ± 9 ton dry weight/rai Uncertainty = $9/60 \times 100 = 15\%$ Discount = $25\% \times 9 = 2.25$ tons dry weight/rai The discount calculation is based on conservation principles as follows: Baseline = $60 + 2.25 = 62.25$ tons dry weight/rai Project implementation = $60 - 2.25 = 57.75$ tons of dry weight/rai
$10 < U \leq 15$	25%	
$15 < U \leq 20$	50%	
$20 < U \leq 30$	75%	
$U > 30\%$	100%	

10. Monitoring Procedure

10.1 Monitoring Plan

The Project Performance Monitoring Plan provides for the collection of data needed to quantify changes in carbon sequestration from selected carbon deposits and greenhouse gas emissions from project activities and greenhouse gas emissions outside the project area.

10.2 Monitoring of project implementation

Information for monitoring the project results will be provided in the Project Design Document (PDD). The parameters required for monitoring including measurement methods and Monitoring Frequency must follow the TGO's requirements.

11. Relevant Parameters

11.1 Parameter not required monitoring

Parameter	$FC_{BSL,a,t}$
Unit	Fuel unit
Definition	Type <i>a</i> fossil fuel consumption in the baseline, in year <i>t</i>
Source of information	Monitoring report and reference record
Remark	-

Parameter	NCV_i
Unit	megajoules per unit

Definition	Net Calorific Value of type i fossil energy
Source of information	Option 1 The net calorific value of fossil fuels indicated on the invoice from the fuel supplier. Option 2 from monitoring Option 3 Thailand Energy Statistics Report Department of Alternative Energy Development and Efficiency ministry of energy
Remark	

Parameter	$EF_{CO_2,i}$
Unit	kg carbon dioxide/terajoules
Definition	Greenhouse gas emissions from the combustion of type i fossil fuels
แหล่งของข้อมูล	Table 1.4 2006 IPCC Guidelines for National GHG Inventories
Remark	-

For other parameters not required monitoring, details appear in relevant calculation tools.

11.2 Parameter required monitoring

Parameter	Project location
Unit	UTM or Latitude, Longitude
Definition	Coordinates indicate the location of the project area
Source of information	Monitoring report
Monitoring method	Geocoded values from a geolocation tool, or the value from the map of the state unit. At least 4 points specifying location information in different directions, namely extreme north, southernmost, easternmost and westernmost.
Monitoring Frequency	Follow-up assessment cycle for certification A follow-up is recommended every 3-5 years.
Remark	-

Parameter	Project area
Unit	Rai
Definition	Area size/area with excavation/area with drainage/area with erosion/area with greenhouse gas emissions in area i in year t
Source of information	Monitoring report

Monitoring method	- Area exploration - Use Satellite Imagery or Aerial Photography
Monitoring Frequency	Following a cycle of follow-up assessments for certification.
Remark	-

Parameter	$\Delta C_{TREE_BSL,t}$
Unit	tons of carbon dioxide equivalent
Definition	The amount of change in tree carbon sequestration of the baseline in year t
Source of information	Monitoring report
Monitoring method	<i>T-VER-P-TOOL-01-02 Calculation for carbon stocks and changes in carbon stocks of trees in forest project activities</i>
Monitoring Frequency	Following a cycle of follow-up assessments for certification.
Remark	-

Parameter	$\Delta C_{SAP_BSL,t}$
Unit	tons of carbon dioxide equivalent
Definition	The amount of change in carbon sequestration of the sapling of the baseline in year t
Source of information	Monitoring report
Monitoring method	<i>T-VER-P-TOOL-01-02 Calculation for carbon stocks and changes in carbon stocks of trees in forest project activities</i>
Monitoring Frequency	Following a cycle of follow-up assessments for certification.
Remark	-

Parameter	$\Delta C_{DW_BSL,t}$
Unit	tons of carbon dioxide equivalent
Definition	The amount of change in dead wood carbon sequestration of the baseline in year t
Source of information	Monitoring report

Monitoring method	<i>T-VER-P-TOOL-01-03 Calculation of carbon stocks and change in carbon stocks in dead wood and litter in forest project activities</i>
Monitoring Frequency	Following a cycle of follow-up assessments for certification.
Remark	Alternative carbon deposits

Parameter	$\Delta C_{TREE_P,t}$
Unit	tons of carbon dioxide equivalent
Definition	Amount of change in carbon sequestration of timber generation of project activities in year t
Source of information	Monitoring report
Monitoring method	<i>T-VER-P-TOOL-01-02 Calculation for carbon stocks and changes in carbon stocks of trees in forest project activities</i>
Monitoring Frequency	Following a cycle of follow-up assessments for certification.
Remark	-

Parameter	$\Delta C_{SAP_P,t}$
Unit	tons of carbon dioxide equivalent
Definition	Amount of change in carbon sequestration of timber generation of project activities in year t
Source of information	Monitoring report
Monitoring method	<i>T-VER-P-TOOL-01-02 Calculation for carbon stocks and changes in carbon stocks of trees in forest project activities</i>
Monitoring Frequency	Following a cycle of follow-up assessments for certification.
Remark	-

Parameter	$\Delta C_{DW_P,t}$
Unit	tons of carbon dioxide equivalent
Definition	The amount of change in settler carbon sequestration of project activities in year t
Source of information	Monitoring report
Monitoring method	<i>T-VER-P-TOOL-01-03 Calculation of carbon stocks and change in carbon stocks in dead wood and litter in forest project activities</i>

Monitoring Frequency	Following a cycle of follow-up assessments for certification.
Remark	Alternative carbon deposits

For other parameters required monitoring, details appear in relevant calculation tools.

12. Reference

- 1) ACR: Improve Forest Management Methodology for Quantifying GHG Removal and Emission reductions through Increased Forest Carbon Sequestration on Non-Federal U.S. Forestlands Version 1.3
- 2) AR-ACM0003 A/R Large-scale Consolidated Methodology: Afforestation and reforestation of lands except wetlands Version 02.0
- 3) AR-AMS0007 Afforestation and reforestation project activities implemented on lands other than wetlands Version 03.1
- 4) การปลูกป่าอย่างยั่งยืน (T-VER-METH-FOR-01 Sustainable Forestation Version 06)
- 5) Combined tool to identify the baseline scenario and demonstrate additionality in A/R CDM project activities
- 6) Demonstration of additionality of small-scale project activities
- 7) Estimation of carbon stocks and change in carbon stocks of trees and shrubs in A/R CDM project activities
- 8) Estimation of carbon stocks and change in carbon stocks in dead wood and litter in A/R CDM project activities
- 9) Gold Standard Afforestation/Reforestation (A/R) GHG Emissions Reduction & Sequestration Methodology Version 01
- 10) Tool for estimation of change in soil organic carbon stocks due to the implementation of A/R CDM project activities
- 11) Estimation of non-CO₂ greenhouse gas (GHG) emissions resulting from burning of biomass attributable to an A/R CDM project activity
- 12) Estimation of the increase in GHG emissions attributable to displacement of pre-project agricultural activities in A/R CDM project activity
- 13) 2006 IPCC Guidelines
- 14) VCS Methodology for Improved Forest Management Through Extension of Rotation Age (IFM ERA)
- 15) VM0003 Methodology for Improved Forest Management Through Extension of Rotation Age (IFM ERA) Version 1.2

Document information

Version	Amendment	Entry into force	Description
01	--	1 March 2023	-