INNER MONGOLIA CHAO'ER IMPROVED FOREST MANAGEMENT PROJECT

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Table of Contents

1 PROJECT DETAILS

1.1 Summary Description of the Project

The Inner Mongolia Chao'er Improved Forest Management Project (hereafter "the project") is located in south region of the Greater Khingan Mountains, Hulun Buir City, Inner Mongolia Autonomous Region, and P.R.C. It is implemented by Chao'er Forest Bureau (hereafter "project owner") to protect the once logging forest.

The geographic coordinate of Chao'er Forest Bureau is 120°17'52''~121°37'50''E and 47°35'21''~48°10'13''N, the total area is 426,580ha, of which 421,901 ha is the forestry area, accounting 98.9% of the total area. The forest land area is 355,622 ha, and the forest coverage rate is 83.37%, mainly composed by mountainous regions, the project area has a complex geomorphologic characteristic. The elevation level of the region is ranged from 700~1,500m and the climate feature is cold temperate zone continental monsoon. The dominant tree species within the project area are Brich and Pinus. Prior to the implementation of the project, the forest was logged annually according to the timber production plan issued by Chao'er Forest Industrial Co., Ltd, a subsidiary of Inner Mongolia Forest Industry Group. In order to protect the ecological system, the local forest authority has tried to reduce the annual forest timber volume within the project area, which can be seen from the timber production plan, the commercial harvest is cancelled and only tending and managing is permitted.

The proposed project is implemented in Wuyi Forestry Centre, which is affiliated to Chao'er Forest Bureau and is located in the south west part of it. The project has approximately 11,010ha commercial forest, whose ages ranging from sapling, middle age to mature forest. Before the implementation of the project, the forest within the project area was designed and planted as commercial forest, and logged annually according to the timber production plan issued by Chao'er Forest Industrial Co., Ltd. The main object of the project is to improve the forest coverage rate, protect local ecological environment, reduce carbon emissions and carbon sequestration by enhance the management level and converse logged to protected forest within the project area. The implementation of the project will result in significant carbon sequestration and improve the sustainable development of ecological system. The project is expected to generate 1,386,530 tCO_2e emission reductions within the crediting of 20 years starting from 01/01/2010 with the average annual emission reductions of 69,326 t CO_2e, without buffer deduction, the annual and the total emission reductions are 90,035 and 1,800,701 tCO_2e respectively.

From 2010, the project has strictly cancelled the once annual commercial timber harvest and only allowed tending and managing. In order to control the annual forest timber volume and achieve reliable and verified carbon sequestration, a forest protection plan will be issued by local forest authority, and strictly executed by the project owner. The forest growth amount and forest second class investigation will be monitored by local forestry bureau periodically.

1.2 Sectoral Scope and Project Type

Sectoral scope 14 (AFOLU)

Improved Forest Management: Logged to Protected Forest

1.3 Project Proponent

Organization name	Chao'er Forest Bureau of Inner Mongolia Autonomous Region, P.R.China
Contact person	Shiping Yu
Title	Manager
Address	Ta'erqi Town, Yakeshi City, Inner Mongolia Autonomous Region.
Telephone	86-470-7798329 86-13848039680
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1.4 Other Entities Involved in the Project

Organization name	China Green Carbon Foundation
Role in the project	Partner of the PP
Contact person	Jinliang Li
Title	Chief Engineer
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Telephone	86-10-8423 9419 86-139 1132 3810
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Organization name	CITIC Environment Investment Group Co., Ltd.
Role in the project	Project Consultant
Contact person	Yapeng Zhang
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1.5 Project Start Date

The Project Start Date is represented by the implementation of the forest protection project on 01/01/2010.

1.6 Project Crediting Period

The project crediting period is from 01/01/2010 to 31/12/2029 with the total length of 20 years.

1.7 Project Scale and Estimated GHG Emission Reductions or Removals

Project Scale	
Project	√
Large project	

Year	Estimated GHG emission reductions or removals (tCO_2e) without buffer deduction	Estimated GHG emission reductions or removals (tCO_2e) with buffer deduction
1	103,380.13	79,602.00
2	102,347.75	78,807.00
3	101,315.37	78,012.00
4	100,282.99	77,217.00
5	99,250.61	76,422.00
6	98,218.22	75,628.00
7	97,185.84	74,833.00
8	96,153.46	74,038.00
9	95,121.08	73,243.00
10	128,574.92	99,002.00
11	91,142.95	70,180.00
12	88,197.21	67,911.00
13	85,251.46	65,643.00
14	82,305.72	63,375.00
15	79,359.97	61,107.00
16	76,414.23	58,838.00
17	73,468.48	56,570.00
18	70,522.74	54,302.00
19	67,576.99	52,034.00
20	64,631.25	49,766.00
Total estimated ERs	1,800,701.36	1,386,530.00
Total number of crediting years	20	20
Average annual ERs	90,035.07	69,326.00

1.8 Description of the Project Activity

The project is located in south west part of Chao'er forest bureau, Hulun Buir City. The project area has a cold temperate zone continental monsoon climate feature, the elevation level is between 700m and 1,500m, the annual precipitation level is 400-500 mm, while the annual evaporation is 1,041.2 mm. As the forest coverage rate is 83.37%, the primary business within the project area is forest industry .The existing commercial forest was mainly comprised of Brich and Pinus, all the tree species are native to the project area. According to the timber production plan approved by Chao'er forest industry Co., Ltd, prior to the project implementation, all timber logging including commercial harvest & tending and managing was planned annually at the beginning of every year. The harvested trees will be transported to the local lumber market. From 2010 of the project implementation, the commercial harvest has been cancelled and only tending and managing is allowed.

The project will converse 11,010ha forest from logged to protected, it is located in Wuyi Forestry Centre, a forest centre affiliated to Chao'er forest bureau. The project activity will significantly improve the forest management conditions within the project area, and benefit local ecological environment. The implementation of the project will not only achieve a reliable measurable carbon sequestration by reducing commercial timer, but also contribute to sustainable development of the local community, host country by means of:

- As one of the most precious ecological resources, forest is key to biodiversity and all life forms. The protection of local forest will enrich the biodiversity and provide more opportunity for adaptive response to natural challenges and economic development (e.g. climate change and new medical discoveries);
- Offer job opportunities. Instead of casual labour demand for forest timber (once a year or several years), the protected forest will create some employment opportunities for forest management. The related training process will improve the skill of the local employees.
- Meet the strategy development plan of host country and local area. After the implementation of the project, the increasing forest coverage rate will benefit the local environmental condition by producing more oxygen and absorb more greenhouse gas.

The land parcels of the project are listed as follow:

Parcel number	Department	Serial Number	Area (ha)
1	Yakeshi City Wuyi Forestry Centre	WY	11,010
Total			11,010

Of its 11,010 ha forest land, the brich area is 1,313 ha, and pinus is 9,697 ha, covering a dominant percentage, and also a very small fraction of aspen and willow.

Based on its tree species, two strata has been set out. As stated in P56-57 of the professional college textbook “technology of sampling investigation” published by Chinese Forest Press in 2007, the main purpose of strata is to improve accuracy due to the variation of carbon stock and to reduce the sampling cost. The strata is set out mainly based on the tree species, age and canopy density, but it does not means all these factors should be considered for all the project, more strata could improve the accuracy but also could result in more workload and cost accordingly. Only one single factor for strata determination is also permitted as far as it could decrease the variation within the same stratum and reach the accuracy level under certain degree of freedom. As for the project, the species, which is the most important factor for the carbon stock, is relative simple, then only two strata is set out, and the sampling accuracy has been reached 90% as required, therefore, the strata is reasonable and feasible. the details are list as below:

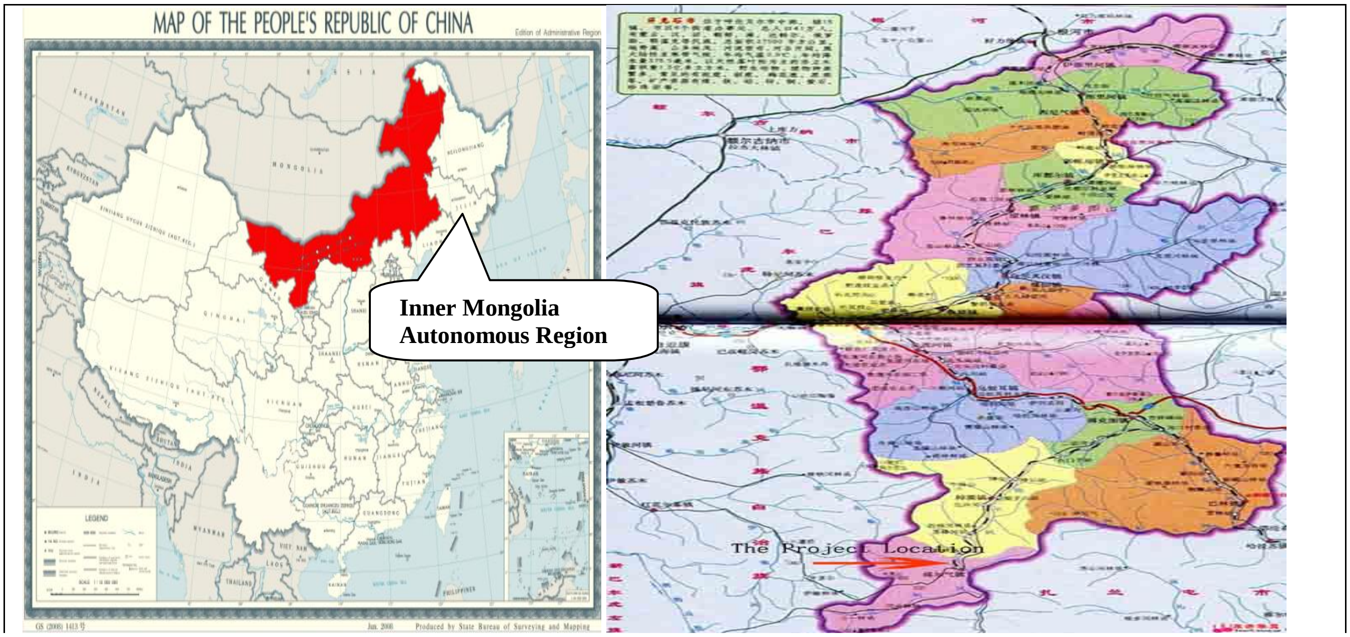
No.	**Dominant Tree Specie**	**Area (ha)**	**Volume(m3)**
SG-BH	Brich[1]	1,313	74,837
SG-LYS	Pinus	9,697	813,400
Total		11,010	888,237

1.9 Project Location

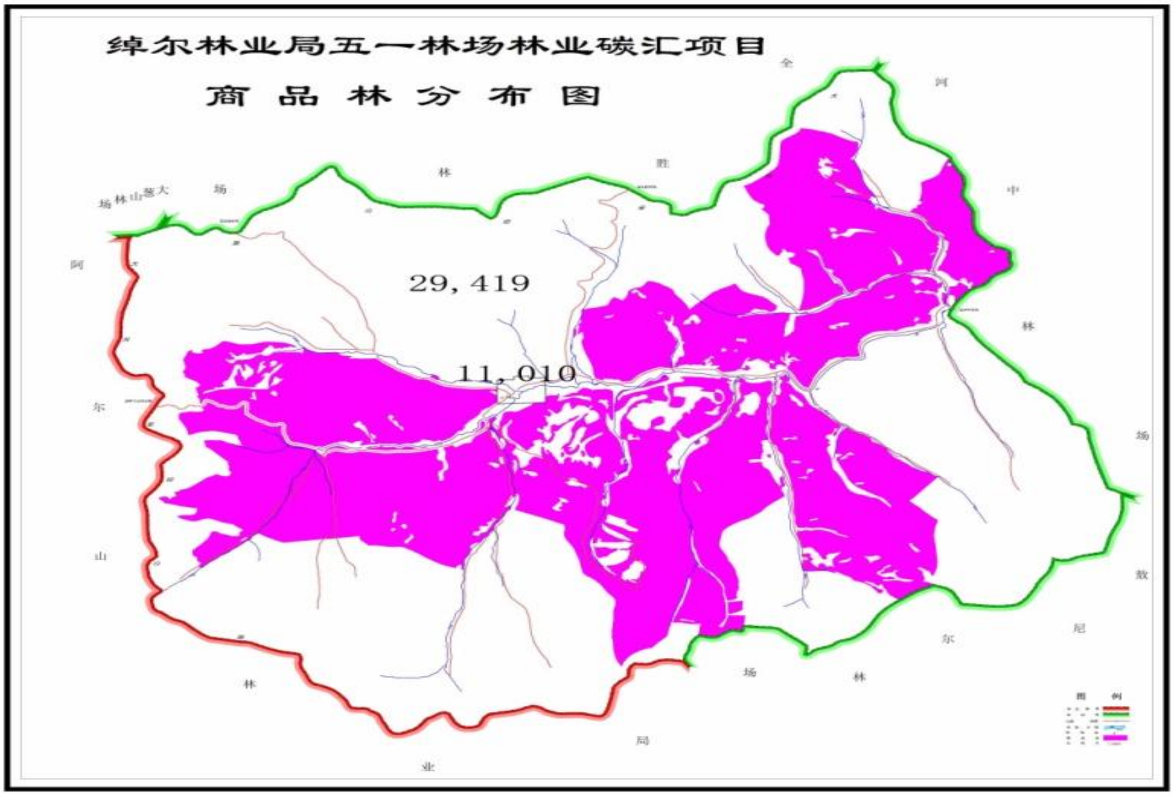
The project locates in Wuyi Forestry Centre, the geographic coordinate is 120°17’52’’~121°37’50’’E and 47°35’21’’~48 10’13’’N. The project area has 11,010 ha commercial forest.

The schematic diagram of the location of the project is shown below

[1] 80ha of poplar and willow is merged in the stratum of “Brich”. On one hand, both of them are broad leaf tree species. On the other, as stated in the “AFOLU Requirement Version 3.4”, 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 the project, the total area of poplar and willow are 80ha, accounting 0.73% of the total area, far smaller than the de minimis limit of 5%, and have little impact on the total emissions, therefore, they are integrated into the stratum “Brich”.


MAP OF THE PEOPLE'S REPUBLIC OF CHINA
Inner Mongolia
Autonomous Region
The Project Location

The location of Inner Mongolia in China The Project site in Yakeshi City



The location of the proposed project in Wuyi Forest Center

1.10 Conditions Prior to Project Initiation

Prior to the implementation of the project, the forest within the project area was logged annually according to the timber production plan.

1.11 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project activity is in line with the Forest Law of People's Republic of China.

1.12 Ownership and Other Programs

1.12.1 Right of Use

The project owner is established in 1958. The project proponent has the ownership and legal right of the carbon sink credit.

1.12.2 Emissions Trading Programs and Other Binding Limits

The project does not involve in any other emission trading programs or binding limits.

1.12.3 Other Forms of Environmental Credit

The project neither has nor intends to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program, or that any such credit has been or will be cancelled from the relevant program.

1.12.4 Participation under Other GHG Programs

The project has not been registered, or is seeking registration under any other GHG programs.

1.12.5 Projects Rejected by Other GHG Programs

N.A.

1.13 Additional Information Relevant to the Project

Eligibility Criteria

N.A.

Leakage Management

N.A.

Commercially Sensitive Information

The commercially sensitive information has been excluded from the public version of the project description.

Further Information

No additional legislative, technical, economic, sectoral, social, environmental, geographic, site-specific and/or temporal information has a bearing on the eligibility of the project, the net GHG emission reductions or removals, or the quantification of the project's net GHG emission reductions or removals.

2 APPLICATION OF METHODOLOGY

2.1 Title and Reference of Methodology

VM0010 version 1.2: Methodology for Improved Forest Management: Conversion of Logged to Protected Forest.

This methodology uses all VCS approved definitions from the most recent VCS version and the VCS Tool for AFOLU Methodological Issues

2.2 Applicability of Methodology

According to VM0010 version 1.2, Projects must fall within the AFOLU project category “IFM Logged to Protected Forest” as defined in the most recent version of the VCS AFOLU Guidance document. Therefore, specific conditions which can be applicable to the methodology are shown below:

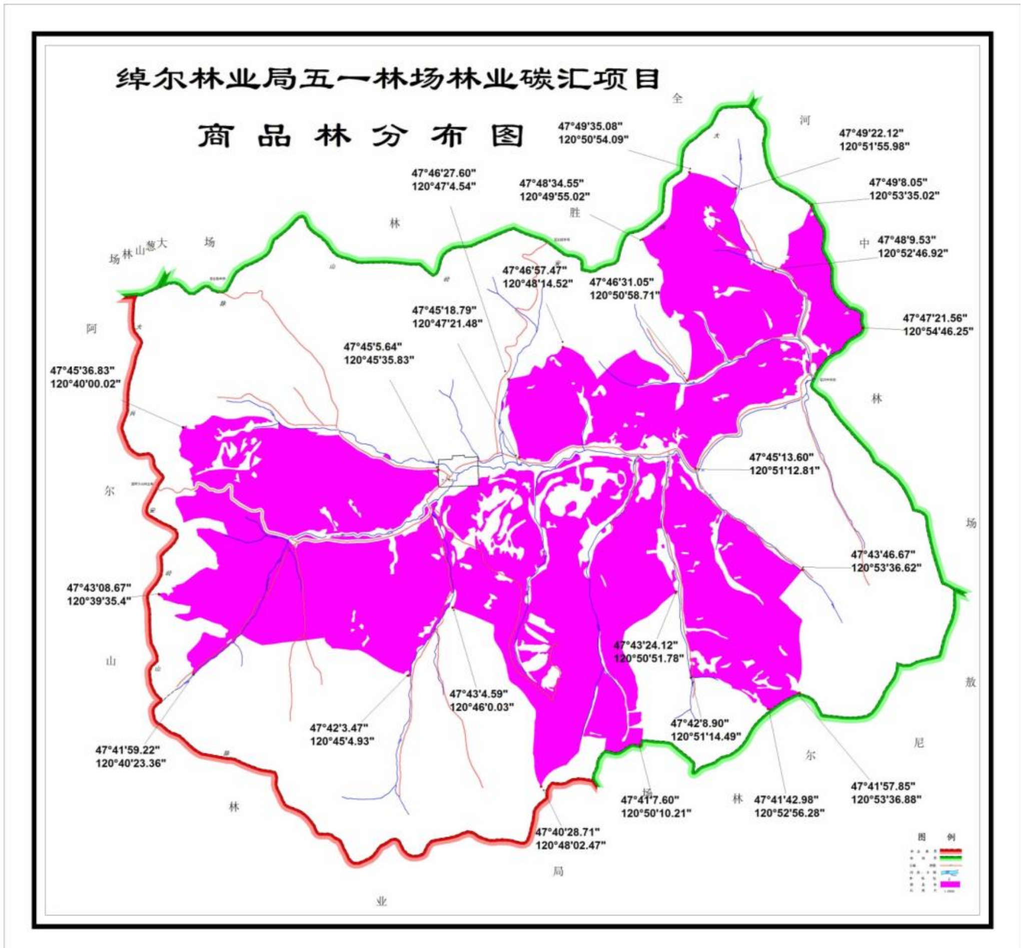
Applicability of Methodology	The Project Activity	Jurisdiction (Y/N)
Forest management in the baseline scenario must be planned timber harvest;	Prior to the implementation of the project, the forest was logged annually according to the timber production plan issued by the local forest bureau;	Y
Under the project scenario, forest use is limited to activities that do not result in commercial timber harvest or forest degradation;	Under the project activity, the commercial logging has been cancelled and only tending and managing is allowed in the timber production plan, which clearly indicate that it will not result in commercial timber harvest or forest degradation;	Y
Planned timber harvest must be estimated using forest second class investigation methods that determine allowable offtake as volume of timber	There are regular forest second class investigation taken to estimate the planned timber harvest and then to determine	Y

($m^3 ha^{-1}$);	allowable offtake as volume of timber ($m^3 ha^{-1}$);	
The boundaries of the forest land must be clearly defined and documented;	The boundaries of the forest land can be identified by the forest map and the forest second class investigation data by authorized institute, both the forest map and forest second class investigation will be monitored periodically by the government according to the local laws and regulations;	Y
Baseline condition cannot include conversion to managed plantations;	According to the previously issued timber production plan, the baseline scenario prior to the project activity is planned timber harvest within the project area, which doesn't include conversion to managed plantations;	Y
Baseline scenario, project scenario and project case cannot include wetland or peatland.	According to the forest second class investigation, the project area is composed of forest land, shrub and grassland, therefore neither wetland nor peatland is involved in baseline scenario, project scenario and project case.	Y

2.3 Project Boundary

2.3.1 Geographic Boundary

The spatial boundaries of the proposed project for each discrete lands are listed as follow:



The geographic boundaries of an IFM project are fixed and thus do not change over the project lifetime.

Following the VCS definition of market leakage the geographic boundaries for leakage from market effects are those of the country in which the project area occurs.

2.3.2 Temporal Boundary

The following temporal boundaries shall be defined:

Start date and length of the project crediting period

According to the latest version of VCS standard, the start date of the project activity is 01/01/2010. The length of the project crediting period is 20 years.

Duration of the monitoring periods

The project proponent decides the periodicity of verifications every 5 years.

2.3.3 Carbon Pool

The carbon pools included or excluded from the project boundary are listed below:

Carbon pools	Included/Optional/Excluded	Justification/Explanation of choice
Aboveground trees	Included	The stock change in the aboveground tree biomass is estimated.
Aboveground non-tree	Excluded	Exclusion is always conservative when forests remains as forest.
Belowground	Excluded	Unlikely to change significantly in forests remaining as forests and is difficult to measure - omission is conservative
Dead wood (logging slash)	Included in the baseline	The dead wood (logging slash) carbon pool is expected to be larger in the baseline than in the project scenario, and therefore this pool must be included.
Dead wood (naturally accumulated)	Excluded	Following IPCC guidelines, it is assumed that carbon stocks in the naturally occurring dead wood pool (both standing and lying) are equivalent in both the project and baseline scenario, and therefore this pool is conservatively excluded.

Carbon pools	Included/Optional/Excluded	Justification/Explanation of choice
Harvested wood products	Included	Will be greater in baseline than project scenario and significant.
Litter	Excluded	Insignificant and exclusion is conservative.
Soil organic carbon	Excluded	Exclusion is always conservative when forests remains as forest.

2.3.3 Greenhouse Gases

The emissions sources included in or excluded from the project boundary are shown in Table below.

Any one of these sources must be neglected (ie, accounted as zero) if the application of the most recent version of the CDM Tool for testing significance of GHG emissions in A/R CDM project activities leads to the conclusion that the emission source is insignificant. In addition, the sum of decreases in carbon pools and increases in emissions that may be neglected must be less than 5% of the total project GHG benefits.

Gas	Sources	Included?	Justification/Explanation
Carbon dioxide (CO_2)	Combustion of fossil fuels (in vehicles machinery and equipment)	Excluded	Conservative as emissions will be greater in the baseline scenario than in the project case.
	Removal of herbaceous vegetation	Excluded	Based on CDM EB decision reflected in paragraph 11 of the report of the 23rd session of the board: cdm.unfccc.int/Panels/ar/023/ar_023_rep.pdf.
Methane (CH_4)	Combustion of fossil fuels (in vehicles machinery and equipment)	Excluded	Conservative as emissions will be greater in the baseline scenario than in the project case.
	Burning of Biomass	Included	Included as CO_2 equivalent emission.
Nitrous oxide (N_2O)	Combustion of fossil fuels (in vehicles machinery and	Excluded	Potential emissions are negligible

Gas	Sources	Included?	Justification/Explanation
	equipment)		
	Nitrogen based fertilizer	Excluded	Potential emissions are negligible. Following the VCS update to the Tool for AFOLU Methodological Issues and Guidance for AFOLU Projects emissions through the use of fertilizer are considered insignificant and are not considered here.
	Burning of Biomass	Excluded	Potential emissions are negligible

2.4 Baseline Scenario

In compliance with the “Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities” (version 3.0), the following steps are applied for the demonstration of the additionality for the proposed project:

a) STEP 1. Identification of alternative land use scenarios to the AFOLU project activity;

b) STEP 2. Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios; or

c) STEP 3. Barriers analysis; and

d) STEP 4. Common practice analysis.

Step 1. Identification of alternative land use scenarios to the proposed VCS AFOLU project activity

Sub-step 1a. Identify credible alternative land use scenarios to the proposed VCS AFOLU project activity

a) Identify realistic and credible land-use scenarios that would have occurred on the land within the proposed project boundary in the absence of the AFOLU project activity under the VCS. The identified land use scenarios includes:

i) Continuation of the pre-project land use as the timber production plan;

ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project;

iii) If applicable, activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from:

- Legal requirements; or

- Extrapolation of observed similar activities in the geographical area with similar socioeconomic and ecological conditions to the proposed VCS AFOLU project activity occurring in the period beginning ten years prior to the project start date.

For (ii), the NPV under this scenario is obviously not financially attractive compared to the scenario of logging.

For (iii), the lands within the project boundary of the proposed VCS AFOLU project are all with the same legal requirements and are existed as forests more than ten years prior to the project start date. So (iii) is not applicable.

Therefore, the baseline scenario is continuation of the pre-project land use as the timber production plan.

The baseline is further confirmed by the timber production plan issued by the forestry authority and is determined both in PD and MR.

According to VM0010 version 1.2, a historical baseline scenario is used for determining how to model the baseline management scenario as:

1. Historical records of forest management exist for 5 years preceding the project start date;

2. Historical records indicate that the management practices have surpassed the legal requirements provided by conforming to all local and regional forest legislation;

3. Historical records that indicate that the historical management surpasses financial barriers by providing above average financial returns.

Box 1. Timber Harvest Plan

The description of harvesting in the form of a timber harvest plan forms the basis of the baseline scenario for greenhouse gas accounting.

The timber harvest plan describes the harvest of timber products and including:

a) reference the forest volume inventory (see Section 8.1.1 – parameter $V_{j,i|BSL}$) to identify the relative number of trees per hectare potentially available for harvest by species in each stratum;

b) demarcate all non-harvest areas within the forest based on legally required exclusions for environmental features such as slope, swamp areas or conservation buffers;

c) divide the harvestable forest into annual operating areas (referred to throughout this methodology as land parcels) using common practice;

d) include a design and presentation of the transport system to move harvested timber products from the land parcels to downstream processing or market entry points; and

e) list necessary harvest and transport machinery.

The timber harvest plan is in line with the local best practice for timber harvest and the timber resource volume and extraction quotas defined in the legal requirements.

For the purpose of estimating the net annual changes in carbon stocks resulting from planned timber harvest in the baseline scenario a detailed planned timber harvesting schedule will be developed from the timber harvest plan, spelling out details of harvest for each land parcel in the project area in terms of the following:

a) the species to be harvested;

b) the year (1,2,3...) in which timber harvest of each land parcel is scheduled to occur;

c) the number of years each land parcel is in a post-harvest state during the project crediting period;

d) the maximum and minimum diameters at breast height (DBH), at stump and at top for tree harvesting;

e) the planned harvesting regime (clearfelling, specie/stratum-selective logging, area-selective logging);

f) technical specifications for the categories of wood products to be harvested; and

g) the total volumes or fractions to be harvested, broken down by categories of wood products defined as sawnwood, wood-based panels, other industrial roundwood, paper and paper board, and other.

The planned timber harvest schedule is determined ex ante to reflect the timber harvesting plan as stipulated in the legal right to harvest. The planned timber harvesting schedule will be developed for the Project Area to include all land parcels within the project boundary for the proposed IFM activity.

The output of the timber harvest plan shall be the mean extracted volume per unit area by species in each stratum in each year ($V_{EX,j,i|BSL}$).

The planned timber harvesting schedule will be submitted by project proponents as part of the VCS-PD.

The timber harvest and management plan describes the harvest of timber products and includes:

<table>
<tr><th>Timber harvest plan</th><th>The project activity</th></tr>
<tr><td>reference the forest volume inventory (see Section 8.1.1 – parameter $V_{j,i|BSL}$) to identify the relative number of trees per hectare potentially available for harvest</td><td>According to the forest volume inventroy, the $V_{j,i|BSL}$ is listed as follows:
<table>
<tr><td>Domient Species</td><td>Area （ha）</td><td>Volume (m^3)</td><td>$V_{j,I,BSL}$(m^3/ha)</td></tr>
</table></td></tr>
</table>

by species in each stratum;	Brich | 1,313 | 74,837 | 57.00 Pinus | 9,697 | 813,400 | 83.88
demarcate all non-harvest areas within the forest based on legally required exclusions for environmental features such as slope, swamp areas or conservation buffers;	The project area contains only the commercial forest, others with environmental or ecological requirements are excluded from the project boundary, therefore, the legally required exclusions for environmental features such as slope, swamp areas or conservation buffer are obviously non-harvest areas, which is also clearly demarcated in the timber harvest and management plan.
divide the harvestable forest into annual operating areas (referred to throughout this methodology as land parcels) using common practice;	Yes, the harvestable forest are listed into annual operating areas. The timber harvest schedule is listed yearly by such harvest type as final felling and tending harvest.
include a design and presentation of the transport system to move harvested timber products from the land parcels to downstream processing or market entry points; and	The timber products from the land parcel will be fist transported to the warehouse by tractor, second, they will be treated by some process such as bucking, selection, mill scale classification and piling, and then be transported to the customers based on their requirements.
list necessary harvest and transport machinery.	The necessary harvest and transport machinery is listed as: Harvest: Chain saw transport: Tractor(from the land parcel to the warehouse) Railway or highway (form the warehouse to the customers)

The timber harvest schudule	The project activity
the species to be harvested;	The species within the project area are brich and pinus, the latter is the dominant species of the project area;
the year (1,2,3...) in which timber harvest of each land parcel is scheduled to occur;	The timber production schedule is specifically stated the land parcel by the harvest type.
the number of years each land parcel is in a post-	According to the timber harvest plan, the land

harvest state during the project crediting period;	parcel will be regenerated by three methods after timber harvest, the post-harvest state during the project crediting period will be not more than a year.
the maximum and minimum diameters at breast height (DBH), at stump and at top for tree harvesting;	The code of timber harvest practice has no specific requirement for the maximum and minimum diameters at breast height (DBH), at stump and at top for tree harvesting, which is not applicable in China.
the planned harvesting regime (clear felling, specie/stratum-selective logging, area- selective logging);	Two kinds of harvesting applied to the project activity, they are final felling and tending. For the former, they can select clear felling, selective logging and shelter wood cutting.
technical specifications for the categories of wood products to be harvested; and	There is no technical specifications for the categories of the wood products, they will be determined by the requirements of the customers.
the total volumes or fractions to be harvested, broken down by categories of wood products defined as sawnwood, wood-based panels, other industrial roundwood, paper and paper board, and other.	The wood products of the project is only sawnwood, no others such as wood-based panels, other industrial roundwood, paper and paper board, etc.

In compliance with the methodology, if the proposed project area contains different forest types or forests with different carbon density, stratification must be carried out in order to improve the accuracy and precision of carbon stock estimates.

For estimation of base year carbon stocks, strata must be defined on the basis of parameters that are key variables in any method used to estimate changes in managed forest carbon stocks. Strata will include either forest type, vegetation type and/or target timber species.

Based on the availability of data regarding the nature and composition of forest stocks in the project area, stratification will be developed on the basis of either:

a) existing vegetation mapping or stratification, where these are documented in the legal right to harvest; or

b) estimates developed from sampling the project area using standard forest assessment protocols specific to the forest region where the project area is located.

Baseline stratification is developed ex ante as follow:

No.	Dominant Tree Specie	Area (ha)	Volume(m3)
SG-BH	Brich	1,313	74,837
SG-LYS	Pinus	9,697	813,440
Total		11,010	888,237

2.5 Additionality

According to VM0010 version 1.2, the additionality of the project is demonstrated using the VCS “Tool for the Demonstration and Assessment of Additionality in VCS Agriculture, Forestry and Other Land Use (AFOLU) Project Activities” version 3.0.

Step 1: Identification of alternative land use scenarios to the AFOLU project activity;

Step 1.1: Identify credible alternative land use scenarios to the proposed VCS AFOLU project activity

a) Identify realistic and credible land-use scenarios that would have occurred on the land within the proposed project boundary in the absence of the AFOLU project activity under the VCS. The scenarios should be feasible for the project area taking into account relevant national and/or sectoral policies and circumstances, such as historical land uses, practices and economic trends.

The identified land use scenarios shall at least include:

i) Continuation of the pre-project land use as the timber harvest plan as analysed in section 2.4;

ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project.

iii) If applicable, activities similar to the proposed project activity on at least part of the land within the project boundary of the proposed VCS AFOLU project at a rate resulting from:

- Legal requirements; or
- Extrapolation of observed similar activities in the geographical area with similar socioeconomic and ecological conditions to the proposed VCS AFOLU project activity occurring in the period beginning ten years prior to the project start date.

For (iii), the lands within the project boundary of the proposed VCS AFOLU project are all with the same legal requirements and are existed as forests more than ten years prior to the project start date. So (iii) is not applicable.

Pre-project land use scenario is the timber forest which is the common practice in China, it is feasible for the project area taking into account Forest Law of People’s Republic of China. And there is no land within the Project boundary performed being registered as the VCS AFOLU project.

b) All identified land use scenarios must be credible. All land-uses within the boundary of the proposed VCS AFOLU project that are currently existing or that existed at some time in the period beginning ten years prior to the project start date but no longer exist, may be deemed realistic and credible. For all other land use scenarios, credibility shall be justified. The justification shall include elements of spatial planning information (if applicable) or legal requirements and may include assessment of economic feasibility of the proposed land use scenario.

The (i) and (ii) identified land-use scenarios that would have occurred on the land within the proposed project boundary in the absence of the AFOLU project activity under the VCS are realistic and credible, as all land-uses within the boundary of the project activity that existed in the period beginning ten years prior to the project start date but no longer exist. Therefore, it is deemed realistic and credible. Outcome of Section 2.5.1.1:

The identified land use scenarios include the two below:

i) Continuation of the pre-project land use as the timber harvest plan as analysed in section 2.4;

ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project.

Step 1.2: Consistency of credible land use scenarios with enforced mandatory applicable laws and regulations

The scenarios are feasible for the project area taking into account Forest Law of People's Republic of China,. Therefore, the 2 identified realistic and credible alternative land used scenarios that could have occurred on the land within the project boundary of the VCS AFOLU project are listed above.

The identified land use scenarios include the two below:

i) Continuation of the pre-project land use as the timber harvest plan as analysed in section above;

ii) Project activity on the land within the project boundary performed without being registered as the VCS AFOLU project.

Step 2: Investment analysis to determine that the proposed project activity is not the most economically or financially attractive of the identified land use scenarios; or

This section will determine whether the proposed project activity, without the revenue from the sale of GHG credits is economically or financially less attractive than at least one of the other land use scenarios. To conduct the investment analysis, use the following sections.

Step 2.1: Determine appropriate analyses method

Determine whether to apply simple cost analysis, investment comparison analysis or benchmark analysis. If the VCS AFOLU project generates no financial or economic benefits other than VCS related income, then apply the simple cost analysis (Option I). Otherwise, use the investment comparison analysis (Option II) or the benchmark analysis (Option III). Note, that Options I, II and III are mutually exclusive hence, only one of them can be applied.

According to the tool, Option I is not applicable for the proposed project since the project will generate other financial and economic benefits (e.g. sales revenue from wood products) other than VCS related income.

The benchmark analysis is not applicable for the proposed project since there is neither practical nor public available standard benchmark for forest industry within the project area.

Therefore, the investment comparison analysis (Option II) will be applied for the demonstration of financial barrier for the proposed project.

Step 2.2: Apply investment comparison analysis

Identify the financial indicator, NPV (net present value), for the project and decision-making context.

Step 2.3: Calculation and comparison of financial indicators (only applicable to options II and III):

a) Calculate the suitable financial indicator for the proposed VCS AFOLU project without the financial benefits from the VCS and baseline scenarios. Include all relevant costs and revenues, and, as appropriate, non-market cost and benefits in the case of public investors.

No	Item	Baseline Scenario	Project Scenario	Unit	Data source
Sales Revenue					
Timber Price					
1	Pinus	893	893	CNY/m^3	Economic assessment parameter Table
2	Brich	808	808		
3	Other timber product from tending and managing instead of commercial harvest	700	700		
Extracted Volume					
4	Pinus	46,080	0	m^3/year	Economic assessment parameter Table
5	Brich	4,020	0		
6	Other timber product from tending and managing instead of commercial harvest	10,000	10,000		

Seedling Cost					
1	Pinus	168	168	CNY/mu	Economic assessment parameter Table
2	Brich	150	150	CNY/mu	
3	Populus	120	120	CNY/mu	
Other					
1	Project Area	11,010	11,010	Ha	Forest second class investigation Data
2	Labor Cost (Plantation)	150	150	CNY/working day	Economic assessment parameter Table
3	Labor Cost (Protection)	100	100	CNY/working day	
4	Management Cost	5%	5%	%	
5	Additional Maintenance Cost for Protected Forest	0	0.1	working day/mu	
6	Social Discount Rate	8%	8%	%	Economic Assessment method and code for Construction Projects

(b) Present the investment analysis in a transparent manner and provide all the relevant assumptions in the VCS AFOLU project description.

The NPV before and after the conversion of logged to protected forest is shown in the Table below. The NPV under the scenario of logging is CNY 7,931.61 *$10^4$with the discount rate of 8%. However, the NPV under the scenario of protected forest is CNY-6,270.20 *$10^4$with the discount rate of 8%, which is lower than the scenario of logging. Therefore, the NPV under the scenario of protected forest is obviously not financially attractive compared to the scenario of logging. With revenue from VCS at the assumed price level, the project would be more financially attractive. Table below shows the comparison of the NPV between project and baseline scenario.

	NPV (10^4 CNY)
Baseline Scenario	7,931.61
Project Activity	-6,270.20

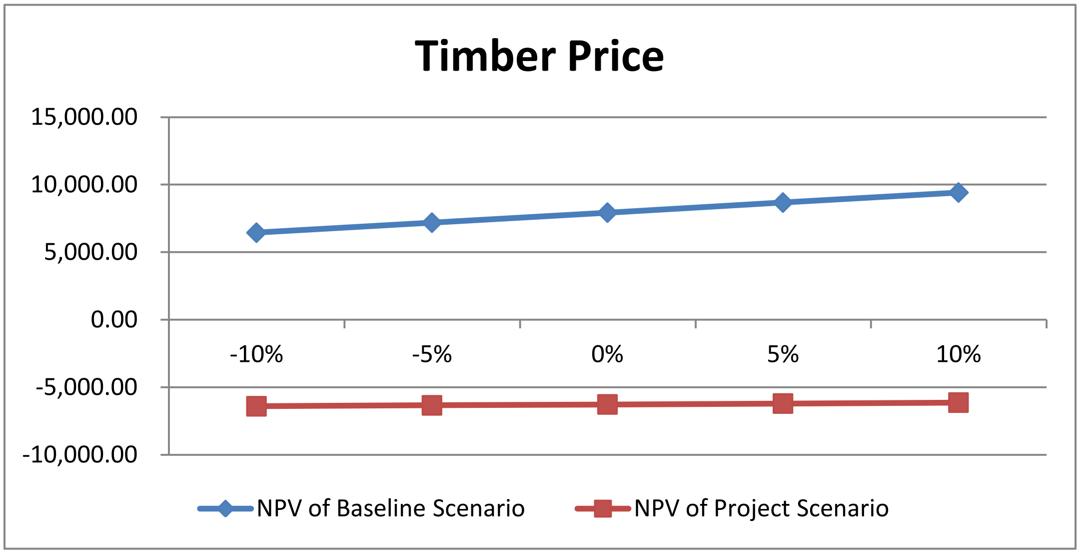
Step 2.4: Sensitivity analysis:

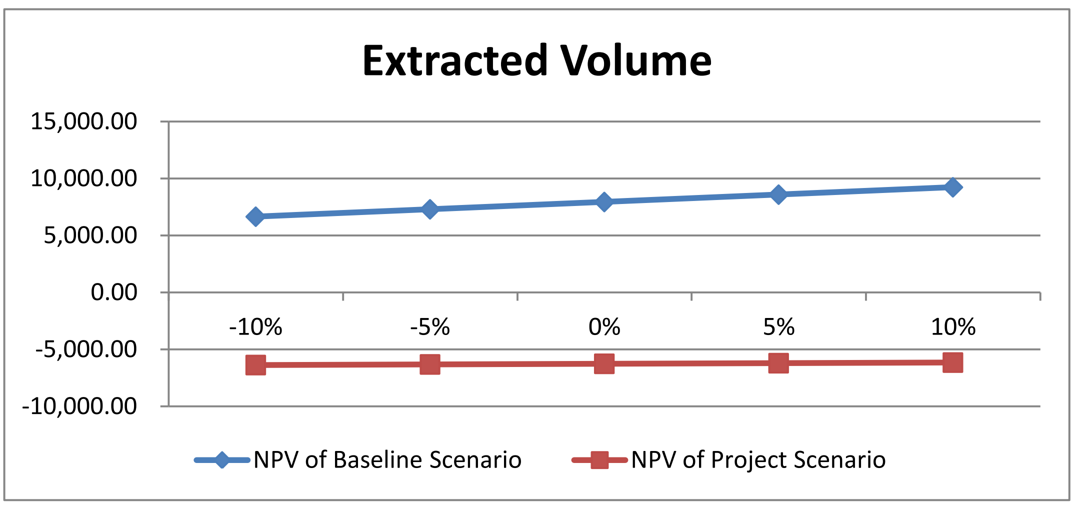
The objective of the sensitivity analysis is to show whether the conclusion regarding the financial attractiveness is robust to reasonable variations in the critical assumptions. The investment analysis provides a valid argument in favour of additionality only if it consistently supports (for a realistic range of assumptions) the conclusion that the proposed VCS AFOLU project without the financial benefits from the VCS is unlikely to be financially attractive.

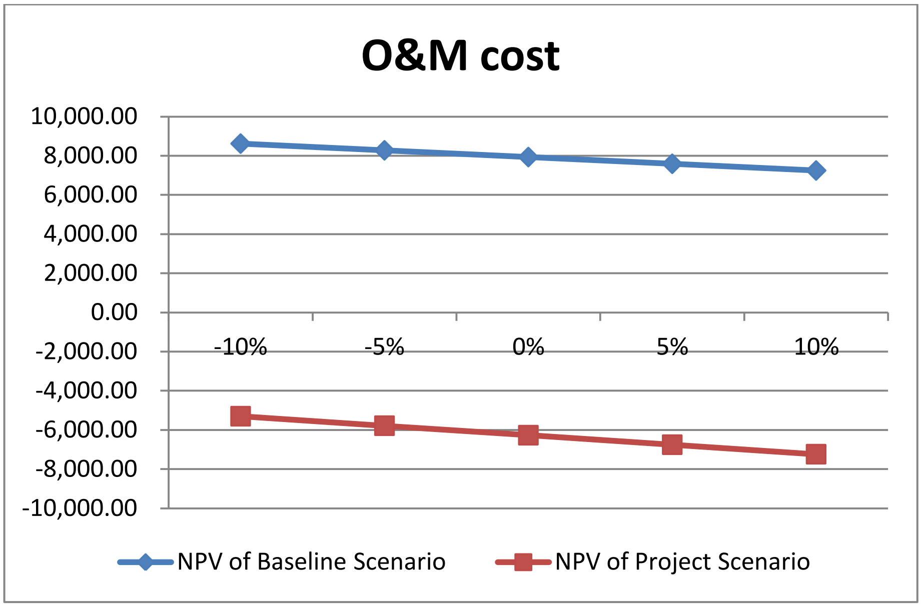
For the project, the key parameters, including timber price, extracted volume, O&M cost will be taken into account of the sensitivity analysis. Results of the comparison between the baseline and project scenario is listed in the table below and sensitivity analysis of the three parameter are shown in the figure below.

The NPV comparision between the baseline and project scenario

Parameters	NPV of Baseline Scenario					NPV of Project Scenario				
	-10%	-5%	0%	5%	10%	-10%	-5%	0%	5%	10%
Timber Price	6,444.40	7,188.00	7,931.61	8,675.21	9,418.82	-6,406.75	-6,338.47	-6,270.20	-6,201.93	-6,133.66
Extracted Volume	6,641.29	7,286.45	7,931.61	8,576.77	9,221.93	-6,379.44	-6,324.82	-6,270.20	-6,215.59	-6,160.97
Cost	8,618.38	8,274.99	7,931.61	7,588.22	7,244.84	-5,300.64	-5,785.42	-6,270.20	-6,754.99	-7,239.77







Sensitivity Analysis of the Project

By referring to the Figures above, the NPV under protected scenario will not exceed the baseline scenario if the timber price, the extracted volume and the O&M cost varies within ±10%.

In the baseline scenario, the project receives revenue from both the commercial harvest and timber products derived from tending and managing. The latter covers a very small fraction, with only 9.18%(350/38,14.2) of the total revenue, and the commercial harvest accounts for 90.82%(1-9.18%) of the total. Under the project scenario, all the commercial harvest has been cancelled and only tending and managing is allowed, the only revenue of the project scenario is the very little income from the selling of the timber products from tending and managing, which remains the same amounts as the baseline scenario. It is obvious that the revenue of the project is only a small part of the baseline scenario, which would not be influenced by the variation of the timber price and extracted volume. While on the other hand, the cost in the project scenario will increase due to the more cost on tending and maintenance. Therefore, theoretically, it is impossible for the NPV of the project scenario to reach to the baseline scenario no matter how the two parameters vary.

In order to show the opportunity of the NPV under protected scenario exceeding the baseline scenario is very little, the analysis of critical assumption is conducted as below. That is, for the three parameters, to what extent, the NPV of the project scenario can reach to that of the baseline scenario.

Parameters	Range Extent(When the NPV of the project scenario reached to the baseline scenario)
Timber Price	1,040.08%
Extracted Volume	1,300.1%
O&M Cost	-146.48%

1) timber price

It is assumed that only when the timber product price for tending and managing increased 1,040.08%, the nominal NPV of the project scenario could reach to 7,931.61*10^4. Since the timber price for the project scenario and the baseline scenario remains the same. Therefore, the project scenario will not become equal to the baseline scenario.

2) Extracted Volume

It is assumed that only when the extracted volume for tending and managing increased 1,300.1%, the nominal NPV of the project scenario could reach to 7,931.61*10^4. As the extracted volume of the project is determined in the timber production plan issued by the forestry authority yearly, which remains the same since 2006, keeping constant for 10 years, and it is also impossible to increase 1,300.1%. Therefore, it is impossible for the NPV of the project scenario to reach to the baseline scenario within the crediting period.

3) O&M cost

The NPV of the Project will reach to 7,931.61*10^4 if the O&M cost reduced by 146.48%, and it is obvious that when the O&M cost reduced by 100%, it would become zero, that is impossible to occur for the normal project operating, not even to mention the decrease of 146.48%. In fact, the agricultural means of production price index and the labour cost have been increasing according to the latest financial reports issued by the Hohhot Branch of People's bank of China[2]. Since the two factors are the main components of the O&M cost, it further demonstrates that O&M cost cann't decrease by 146.48%.

In summary, the NPV of the project can't reach to the baseline scenario even when the three main parameters vary within the sensitivity range of ±10%. Also, it confirms that, the NPV of project scenario can't reach to that of the baseline no matter how these three parameters vary.

2.6 Methodology Deviations

N.A.

[2] http://www.pbc.gov.cn/image_public/UserFiles/goutongjiaoliu/upload/File/2013 年内蒙古自治区金融运行报告.pdf

3 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

3.1 Baseline Emissions

Calculation of baseline scenario greenhouse gas emissions requires the application of the equations presented in this section to complete the greenhouse gas accounts for all land parcels in the baseline case.

The following table lists the baseline emissions modelled by the methodology:

Including in modelling
Emission from wood product conversion Decomposition of dead wood from harvested trees Emissions from wood product retirement Stock change due to regrowth following timber harvest
Conservatively excluded from modelling
Decomposition of trees incidentally killed during tree felling Decomposition of trees killed through skid trail creation Decomposition of trees killed through road construction Emissions through fossil fuels burned in baseline harvesting practices Emissions through subsequent forest re-entry

Baseline projections are calculated ex-ante and are not adjusted through-out the project lifetime.

The baseline net greenhouse gas emissions are determined from calculation of deadwood generated in the process of timber harvest, the emissions resulting from production and subsequent retirement of wood products derived from the timber harvesting, minus the rates of forest regrowth post timber harvest.

Baseline commercial timber volumes must be derived for development of the timber harvest plan and for ex-post accounting of emissions resulting from natural forest disturbance.

The equations calculate the total emissions across the project crediting period for each emission source. Total emissions are averaged across the crediting period to give annual emissions and are multiplied by t*, time elapsed since the start of project activity. EX-post, t* is updated so baseline projections are available for each proposed future verification date.

Data for input into these carbon stock change calculations for the baseline scenario shall be established from the same data used to create the timber harvesting plan. According to VM0010 version 1.2, the baseline emissions are calculated in the sections below:

3.1.1 Calculation of carbon stocks in commercial timber volumes

This section calculates $C_{HB,j,i|BSL}$, the mean carbon stock in total harvested biomass in tC • ha^{-1} and $C_{EX,j,i|BSL}$, the mean carbon stock in extracted timber (merchantable timber that leaves the forest) in tC • ha^{-1} .

In compliance with the methodology, the pre-existing forest second class investigation data are used as the data:

a) represents the project strata;

b) is not more than 10 years old.

The forest second class investigation data is investigated by local forestry government following related laws and regulations (e.g. *State Technical Regulation for Forestry Investigation*). The investigation is mainly carried out through following steps:

- Regional division and stratification through GPS and Aerophotography;
- Investigate forestry inventory for typical forest by Angle Gauge Measurement;
- Investigate forestry inventory for non-typical forest by Systematic Sampling;
- Data comprehensive analysis and system management.

The QA/QC procedure for the above mentioned steps is in line with state laws and regulations, for each investigated strata, at least 1 sample plot will be selected in 1 subcompartment , the mean volume is calculated from a sample plot with 0.04 ha. The relevant accuracy would satisfies the essential requirement stipulated by the *Tool for Calculation of the Number of Sample Plots for Measurements within A/R CDM Project Activities*.

The estimate of merchantable volume for each species j at the sample plot level will be calculated as:

$$V_{j,i,sp} = \sum_{l}^{L} V_{l,j,i,sp} \qquad (1)$$

Where:

$V_{j,I,sp}$	merchantable volume for species j in stratum i in sample plot sp, m^3;
$V_{l,j,I,sp}$	merchantable volume for tree l of species j in stratum i in sample plot sp, m^3;

l	1, 2, 3 ⋯L sequence of individual trees in sample plot;
i	1, 2, 3 ⋯M strata;
sp	1, 2, 3 ⋯SP sample plots; and
j	1, 2, 3 ⋯J tree species.

Therefore, the merchantable volume per unit area of species j in stratum i will be calculated as the mean merchantable volume in all sample plots in stratum i:

$$V_{j,i,BSL} = \frac{1}{SP} * \sum_{sp=1}^{SP} \frac{V_{j,i,sp}}{A_{sp}} \qquad (2)$$

Where:

$V_{j,i,BSL}$	mean merchantable volume per unit area of species j in stratum i in the baseline scenario, $m^3 \cdot ha^{-1}$;
$V_{j,i,sp}$	merchantable volume for species j in stratum i in sample plot sp; m^3;
A_{sp}	area of sample plot sp, ha;
i	1, 2, 3 ⋯M strata;
sp	1, 2, 3 ⋯SP sample plots; and
j	1, 2, 3 ⋯J tree species.

Therefore, the carbon stock of timber harvested per unit area for species j in stratum i will be calculated from this mean volume of extracted timber:

$$C_{HB,j,i,BSL} = V_{EX,j,i,BSL} * BCEF_R * CF_j \qquad (3)$$

Where:

$C_{HB,j,i,BSL}$	mean carbon stock of harvested biomass per unit area for species j in stratum i, $tC \cdot ha^{-1}$;
$V_{EX,j,i,BSL}$	mean volume of extracted timber per unit area for species j in stratum i, $m^3 \cdot ha^{-1}$;
$BCEF_R$	biomass conversion and expansion factor applicable to wood removals in the project area, t.d.m m^{-3};

CF_j biomass conversion and expansion factor applicable to wood removals in the project area, t.d.m m^{-3};

i 1, 2, 3 ⋯M strata; and

j 1, 2, 3 ⋯J tree species.

Not all of the harvested biomass leaves the forest because the timber harvested has two components: 1) wood removed to market (extracted timber) and, 2) wood remaining in the forest as a result of harvest.

Therefore, the mean carbon stock of extracted timber per unit area for species j in stratum i will be calculated from the mean volume of extracted timber multiplied by density and carbon fractions:

$$C_{EX,j,i,BSL} = V_{EX,j,i,BSL} * D_j * CF_j \qquad (4)$$

Where:

$C_{EX,j,i,BSL}$ mean carbon stock of extracted timber per unit area for species j in stratum i; tC • ha^{-1};

$V_{EX,j,i,BSL}$ mean volume of extracted timber per unit area for species j in stratum i; in m^3 • ha^{-1};

D_j basic wood density of species j; t d.m. m^{-3};

CF_j carbon fraction of biomass for species j; tC t d.m.$^{-1}$;

i 1, 2, 3 ⋯M strata; and

j 1, 2, 3 ⋯J tree species.

3.1.2 Calculation of dead wood (logging slash) generated in the process of timber harvest

This section calculates Δ $C_{DWSLASH,i,p,BSL}$, the change in carbon stock in dead wood resulting from timber harvest in stratum i in land parcel p, using $C_{EX,j,i,BSL}$ and $C_{HB,j,i,BSL}$ as calculated in above section.

The simplifying assumption is made that dead wood created during timber harvest is emitted in the year of harvest. Therefore, the change in carbon stock in the dead wood pool in stratum i in land parcel p will be calculated as the difference between the total carbon stock of the harvested biomass and the carbon stock of the extracted timber:

$$\Delta C_{DWSLASH,i,p,BSL} = \sum_{j=1}^{J} (C_{HB,j,i,BSL} - C_{EX,j,i,BSL}) \qquad (5)$$

Where:

$\Delta C_{DWSLASH,i,p,BSL}$	change in carbon stock of dead wood as logging slash resulting from timber harvest per unit area in stratum i in land parcel p, in $tCha^{-1}$;
$C_{HB,j,i,BSL}$	mean carbon stock of harvested biomass per unit area for species j in stratum i, $tC \cdot ha^{-1}$;
$C_{EX,j,i,BSL}$	mean carbon stock of extracted timber per unit area for species j in stratum i, $tC \cdot ha^{-1}$;
j	1, 2, 3 ⋯J tree species;
i	1, 2, 3 ⋯M strata; and
p	1, 2, 3 ...P land parcels.

3.1.3 Calculation of baseline carbon sequestered in wood products

The carbon stock of extracted timber across species is calculated as:

$$C_{EX,i,BSL} = \sum_{j=1}^{J} C_{EX,j,i,BSL} \qquad (6)$$

Where:

$C_{EXi,BSL}$	change in carbon stock of extracted wood products resulting from timber harvest per unit area in stratum i in land parcel p, $tC \cdot ha^{-1}$;
$C_{EX,j,i,BSL}$	mean carbon stock of extracted wood per hectare, $tC \cdot ha^{-1}$;
j	1, 2, 3 ⋯J tree species;
i	1, 2, 3 ⋯M strata.

In accordance with the VCS AFOLU Requirements, the amount of carbon stored in wood products that would decay within 3 years after harvest (ie, the Wood Waste (WW) and the Short Lived Fraction (SLF)), are assumed to be emitted at the time of harvest.

Wood products that are retired between 3 and 100 years after harvest (ie, the Additional Oxidised Fraction, OF), must be accounted according to a 20 year linear decay function. This decay function is applied when the net greenhouse gas emissions/removals are calculated on an annual basis in equations 8 and 9.

All other wood product pools are considered to permanently store carbon.

Therefore, the carbon stock of extracted timber that is immediately emitted to the atmosphere at the time of harvest is calculated as:

$$C_{WPO,i,BSL} = \sum_k C_{EX,i,k,BSL} * (WW_k + SLF_k) \quad (7)$$

Where:

$C_{WPOi,BSL}$	carbon stock of extracted timber from stratum i that is assumed to be emitted immediately at the time of harvest, in tC • ha^{-1};
$C_{EX,i,k,BSL}$	mean carbon stock of extracted timber per unit area in stratum i, for wood product type k, tC • ha^{-1};
WW_k	fraction of biomass carbon from wood waste that is assumed to be emitted to the atmosphere immediately at the time of harvest for wood product k, dimensionless;
SLF_k	fraction of biomass carbon from the short lived wood product pool that is assumed to that be emitted to the atmosphere immediately at the time of harvest for wood product k, dimensionless;
i	1, 2, 3 ⋯M strata; and
k	Wood products (sawnwood, wood base products, etc).

The amount of extracted carbon stock that is assumed to enter the wood products pool that is not immediately emitted at harvest is calculated as per equation 8 below:

$$C_{WP,i,BSL} = \sum_k C_{EX,i,k,BSL} - C_{WPO,i,BSL} \quad (8)$$

Where:

$C_{WPi,BSL}$	carbon stock of extracted timber from stratum i that is assumed to enter the wood products pool that is not immediately emitted at the time of harvest ,in tC • ha^{-1};
$C_{EXi,BSL}$	mean carbon stock of extracted timber per unit area in stratum i, for wood product type k, tC • ha^{-1};
$C_{WPOi,BSL}$	carbon stock of extracted timber from stratum i that is assumed to be emitted immediately at the time of harvest, in tC • ha^{-1};

SLF_k fraction of biomass carbon from the short lived wood product pool that is assumed to that be emitted to the atmosphere immediately at the time of harvest for wood product k, dimensionless;

i 1, 2, 3 ⋯M strata; and

k Wood products (sawnwood, wood base products, etc).

Therefore, the carbon stock of wood products assumed to be retired between 3-100 years following harvest is calculated as:

$$C_{WP100,i,BSL} = C_{WP,i,BSL} * OF_k \quad (9)$$

Where :

$C_{WP100,i,BSL}$ Amount of carbon stored in wood products that are assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, tC • ha^{-1};

$C_{WP100,i,BSL}$ carbon stock of extracted timber from stratum i that is assumed to enter the wood products pool that is not immediately emitted at the time of harvest ,in tC • ha^{-1};

OF_k fraction of biomass carbon for wood product type k that is assumed to be emitted to the atmosphere between 3 and 100 years of timber harvest, dimensionless; and

i 1, 2, 3 ⋯M strata.

3.1.4 Change in carbon stocks due to forest regrowth after harvest

The carbon sequestration in the baseline resulting from forest regrowth after timber harvest up to year t is equal to the forest regrowth rate of each stratum.

Therefore, carbon sequestration resulting from forest regrowth after timber harvest is calculated as:

$$C_{RG,i,p,BSL} = \sum_i RGR_i \quad (10)$$

Where:

$C_{RG,i,p,BSL}$ carbon sequestration resulting from forest regrowth after timber harvest in stratum i in land parcel p, tC ha^{-1} yr^{-1};

RGR_i regrowth rate of forest post timber harvest for stratum i, tCha^{-1} yr^{-1};

i 1, 2, 3 ⋯M strata.

3.1.5 Change in carbon stocks due to forest regrowth after harvest

The net carbon stock change to be converted to emissions is equal to the carbon stock change as a result of timber harvest plus the carbon stock change resulting from conversion and retirement of wood products minus carbon sequestration from forest regrowth after harvest.

In order to generate the annual carbon stock change in the baseline scenario, the total net change in carbon stocks for parcels within is multiplied by the area of forest in the particular age class (ie, years since harvest in the baseline).

The annualized calculations vary between years 1, 2-10; 10-20; and all years since the start of the project activity, depending on which decay functions apply.

Therefore, the net change in carbon stock from wood products and logging slash across all parcels within the first year of harvest in the baseline is calculated as:

$$\Delta C_{NET,BSL(1)} = \sum_{i,p} A_{1,i,p} * \sum_{i=1}^{M} (C_{DWSLASH,i,p\backslash BSL}/10) + C_{WPO,i,p\backslash BSL} + (C_{WP100,i,p\backslash BSL}/20) \quad (11)$$

Where:

$\Delta C_{NET,BSL(1)}$	net change in carbon stock across all parcels in the baseline scenario in the first year since harvest in the baseline scenario, in tC;
$\Delta C_{DWSLASH,i,p,BSL}$	change in carbon stock of dead wood as logging slash resulting from timber harvest per unit area in stratum i in land parcel p, in tC ha^{-1};
$\Delta C_{WP0,i,p,BSL}$	change in carbon stock resulting from wood product conversion and retirement from stratum i in land parcel p, that is assumed to be emitted in the first year of harvest in the baseline tC ha^{-1};
$\Delta C_{WP100,i,p,BSL}$	Amount of carbon stored in wood products that is assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, tC ha^{-1};
$A_{1,i,p}$	the area of stratum i in land parcel p that was harvested 1 year ago, ha;
i	1, 2, 3 ⋯M strata; and
p	1, 2, 3 ...P land parcels harvested within the project crediting period.

The net change in carbon stock from wood products and logging slash across all parcels the years 2-10 since harvest in the baseline are calculated as:

$$\Delta C_{NET,\,BSL(2-10)} = \sum_{i,p} A_{2-10,\,i,\,p} * \sum_{i=1}^{M} (C_{DWSLASH,\,i,\,p\backslash\,BSL} / 10) + (C_{WP\,100,\,i,\,p\backslash\,BSL} / 20) \tag{12}$$

Where:

$\Delta C_{NET,BSL(2\text{-}10)}$	net change in carbon stock across all parcels in the baseline scenario in years 2-10 since harvest in the baseline scenario, in tC;
$\Delta C_{DWSLASH,i,p,BSL}$	change in carbon stock of dead wood as logging slash resulting from timber harvest per unit area in stratum i in land parcel p, in tC ha^{-1};
$\Delta C_{WP100,i,p,BSL}$	Amount of carbon stored in wood products that is assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, tC ha^{-1};
$A_{2\text{-}10,p}$	the area of stratum i in land parcel p that was harvested 2 and 10 years ago, ha;
i	1, 2, 3 ⋯M strata; and
p	1, 2, 3 ...P land parcels harvested within the project crediting period.

The net change in carbon stock from wood products across all parcels the years 11-20 since harvest in the baseline are calculated as:

$$\Delta C_{NET,\,BSL(11-20)} = \sum_{i,p} A_{11-20,\,i,\,p} * \sum_{i=1}^{M} (C_{WP\,100,\,i,\,p\backslash\,BSL} / 20) \tag{13}$$

Where:

$\Delta C_{NET,BSL(11\text{-}20)}$	net change in carbon stock across all parcels in the baseline scenario in years 11-20 since the start of the project activity, in tC;
$\Delta C_{WP100,i,p,BSL}$	Amount of carbon stored in wood products that is assumed to be retired between 3-100 years after harvest from stratum i in land parcel p, tC ha^{-1};
$A_{11\text{-}20,i,p}$	the area of stratum i in land parcel p that was harvested 11 and 20 years ago, ha;
i	1, 2, 3 ⋯M strata; and
p	1, 2, 3 ...P land parcels harvested within the project crediting period.

The net change (sequestration) in carbon stock due to forest regrowth across all parcels in all years since harvest in the baseline scenario are calculated according to equation 14 below. Note that there will be no more emissions quantified from decay of logging slash or wood products.

$$\Delta C_{NET,\,BSL(1+)} = \sum_{i,p} A_t * \sum_{i=1}^{M} (-\Delta C_{RG,\,i,\,p \setminus BSL}) \qquad (14)$$

Where:

$\Delta\ C_{NET,BSL(1+)}$	net change in carbon stock due to forest regrowth in all parcels that have been harvested in the baseline scenario, in tC;
$\Delta\ C_{RG,i,p,BSL}$	carbon sequestration resulting from forest regrowth after timber harvest in stratum i in land parcel p, tC ha^{-1};
A_t^*	Cumulative area harvested until time t*, ha;
i	1, 2, 3 ⋯M strata; and
p	1, 2, 3 ...P land parcels harvested within the project crediting period.

Therefore, net change in carbon stock across all parcels harvested over each year of the project crediting period in the baseline scenario since the start of the project activity is calculated as:

$$\Delta C_{NET,\,BSL,\,t^*} = \sum_{p=1}^{p} \Delta C_{NET,\,p,\,BSL(1)} + \Delta C_{NET,\,p,\,BSL(2-10)} + \Delta C_{NET,\,p,\,BSL(11-20)} + \Delta C_{NET,\,p,\,BSL(1+)} \qquad (15)$$

Where:

$\Delta\ C_{NET,BSL,t^*}$	net change in carbon stock across all parcels in the baseline scenario in the year t* since the start of the project activity, in tC;
$\Delta\ C_{NET,BSL(1)}$	net change in carbon stock in the baseline scenario for all parcels p that are within 1 year of harvest in the baseline scenario, in tC;
$\Delta\ C_{NET,BSL(2-10)}$	net change in carbon stock in the baseline scenario for all parcels p, that were harvested between 2-10 years ago in the baseline scenario, in tC;
$\Delta\ C_{NET,BSL(11-20)}$	net change in carbon stock in the baseline scenario in parcel p, that were harvested between 11-20 years ago in the baseline scenario, in tC;
$\Delta\ C_{NET,BSL(1+)}$	net change in carbon stock due to forest regrowth in the baseline scenario for all parcels p that have been harvested in the baseline

scenario, in tC;

t^* time elapsed since the start of the project, in years; and

p 1, 2, 3 ...P land parcels harvested within the project crediting period.

The net carbon stock change in the baseline scenario must be converted to net greenhouse gas emissions and is calculated as:

$$GHG_{NET,\,BSL,\,t^*} = \Delta C_{NET,\,BSL,\,t^*} * \frac{44}{12} \qquad (16)$$

Where:

GHG_{NET,BSL,t^*}	net greenhouse gas emissions in the baseline scenario in the year t* since the start of the project activity, tCO_2e;
$\Delta\ C_{NET,BSL}$	net change in carbon stock across all parcels in the baseline scenario in the year t* since the start of the project activity, tC; and
44/12	ratio of molecular weights of carbon dioxide and carbon, tCO_2-e tC^{-1}.

3.2 Project Emissions

In consistence with the methodology, this section calculates $GHG_{NET,PRJ}$, the net greenhouse gas emissions in the project scenario, in tCO_2e with the following procedure.

3.2.1 Ongoing forest growth in the project scenario

This section calculates $\Delta\ C_{AB,t,PRJ}$ annual carbon stock change in aboveground biomass of trees in the project scenario, in tCO_2e.

3.2.1.1 Allometry

Select the appropriate allometric equation for forest type/group of species j (e.g. tropical humid forest or tropical dry forest) or for each species or family j (group of species) found in the inventory (hereafter referred to as species group) that converts tree dimensions from field timber inventories on sample plots to aboveground biomass of trees.

3.2.1.2 Measurements

Only the individual trees, species and strata which were to be harvested in the baseline scenario are to be measured. Any minimum values employed in inventories are held constant for the duration of the project.

3.2.1.3 Determining Sample Plot Carbon Stocks

The carbon stock in aboveground biomass for each individual tree of species group j in the sample plot located in stratum i will be estimated using the selected allometric equation applied to the tree dimensions resulting from section above.

Therefore, the sum of the carbon stock in each sample plot will be calculated as:

$$C_{AB,\ j,\ i,\ t,\ sp,\ PRJ} = \sum_{l=1}^{Lj,i,sp,t} f_j(X,Y...) * CF \qquad (17)$$

Where:

$C_{AB,j,i,t,sp,PRJ}$	carbon stock in aboveground biomass of trees of species j in plot sp in stratum i at time t in the project scenario, tC;
CF_j	carbon fraction of biomass for tree group j, tC t d.m.-1;
$f_{j(X,Y...)}$	aboveground biomass of trees based on allometric equation for species group j based on measured tree variable(s), t. d.m. tree-1;
i	1, 2, 3, ⋯M strata;
j	1, 2, 3 ⋯ J tree species;
l	1, 2, 3, ⋯ Lj,i,t,sp sequence number of individual trees of species group j in stratum i at time t in sample plot sp;
t	0, 1, 2, 3, ⋯t* years elapsed since start of the project activity; and
sp	1, 2, 3 ⋯SP sample plots.

3.2.1.4 Determining Stratum Carbon Stocks

The total carbon stock in the aboveground biomass of all trees present in sample plot sp in stratum i at time t, must be calculated as:

$$C_{AB,\ i,\ t,\ sp,\ PRJ} = \sum_{J=1}^{J} C_{AB,\ j,\ i,\ sp,\ PRJ} \qquad (18)$$

Where:

$C_{AB,i,t,sp,PRJ}$	aboveground biomass carbon stock of all trees of stratum i at time t in sample plot sp in the project scenario, tC;
$C_{AB,j,i,t,sp,PRJ}$	carbon stock in aboveground biomass of trees of species j in stratum i at time t in plot sp in the project scenario, tC;

i 1, 2, 3, …M strata;

j 1, 2, 3 … J tree species;

t 0, 1, 2, 3, …t* years elapsed since start of the project activity.

3.2.1.5 Determining Mean Carbon Stocks

Therefore, the mean carbon stock in aboveground biomass for each stratum per unit area is calculated as:

$$C_{AB,i,t,PRJ} = \frac{1}{SP} * \sum_{sp=1}^{SP} \left(\frac{C_{AB,i,t,sp,PRJ}}{A_{sp}} \right) \qquad (19)$$

Where:

$C_{AB,i,t,PRJ}$ mean aboveground biomass carbon stock of trees in stratum i at time t, tC ha^{-1};

$C_{AB,i,t,sp,PRJ}$ aboveground biomass carbon stock of trees in stratum i at time t in sample plot sp, tC;

A_{sp} area of sample plot sp, ha;

sp 1, 2, 3 … SP sample plots;

i 1, 2, 3, …M strata; and

t 0, 1, 2, 3, …t* years elapsed since start of the project activity.

3.2.1.6 Determining Carbon Stock Changes

The annual carbon stock change in aboveground biomass of trees in year t is the difference in mean carbon stock in aboveground biomass between sampling events and, when expressed in tCO_2e, is calculated as:

$$C_{AB,t,PRJ} = \left(\sum_{i=1}^{M} \left(Ai * \frac{C_{ABi,t2,PRJ} - C_{AB,i,t1,PRJ}}{T} \right) \right) * \frac{44}{12} \qquad (20)$$

Where:

$\Delta\ C_{AB,t,PRJ}$ annual carbon stock change in aboveground biomass of trees in year t, $tCO_2e\ yr^{-1}$;

$C_{AB,i,t,PRJ}$ mean aboveground biomass carbon stock of trees in stratum i at time

	t, tC ha^{-1};
	area covered by stratum i, ha;
sp	1, 2, 3 ··· SP sample plots;
T	number of years between monitoring time t1 and t2 (T=t2 – t1); years;
i	1, 2, 3, ···M strata;
t	0, 1, 2, 3, ···t* years elapsed since start of the project activity; and
44/12	ratio of molecular weights of carbon dioxide and carbon, $tCO_2e\ tC^{-1}$.

The carbon stock change in aboveground biomass of trees ($\Delta C_{AB,t|PRJ}$) is the output of this section and is necessary to calculate net greenhouse gas emissions in the project scenario.

3.2.2 Forest disturbance in the project scenario

This section calculates $\Delta C_{DIST_FR,t,PR}$J, carbon stock change due to fire disturbance in the project scenario; tCO_2-e, $\Delta_{CDIST,t,PRJ}$, carbon stock change due to non-fire natural disturbance in the project scenario; tCO_2-e

3.2.2.1 Natural disturbance

3.2.2.1a Natural Disturbance – Fire

Where fires occur ex post in the project area, the area burned shall be delineated. Therefore, based on the IPCC 2006 Inventory Guidelines, estimation of greenhouse gas emissions from biomass burning shall be calculated as:

$$\Delta C_{DIST-FR,\mathrm{t,PRJ}} = \sum_{i=1}^{M} A_{burn,i,t} * B_{i,t,PRJ} * \mathrm{COMF_i} * \mathrm{G_{g,i}} * 10 - 3.\mathrm{GWP_{CH4}} \tag{21}$$

Where:

$\Delta C_{DIST\_FR,t,PRJ}$	net greenhouse gas emissions resulting from fire disturbance in year t, TCO_2e ;
$A_{burn,i,t}$	area burnt for stratum i at time t, ha;
$B_{i,t,PRJ}$	average aboveground biomass stock present in the project scenario but absent in the baseline scenario before burning stratum i, time t; t d. m. ha^{-1};
$COMF_i$	combustion factor for stratum i, dimensionless;

$G_{g,i}$ emission factor for stratum i for methane, g kg^{-1} dry matter burnt;

GWP_{CH4} global warming potential for CH_4 (IPCC default: 21), tCO_2e tCH_4^{-1};

i 1, 2, 3, …M strata;

t 0, 1, 2, 3, …t* years elapsed since start of the project activity.

The average aboveground biomass stock present in the project scenario but absent in the baseline scenario before burning for a particular stratum shall be calculated as:

$$B_{i,t,PRJ} = \sum_{j=1}^{J} \{V_{EX,i,j,BSL} * BCEF_R\} \quad (22)$$

Where:

$B_{i,t,PRJ}$ average aboveground biomass stock present in the project scenario but absent in the baseline before burning for stratum i, time t, t d. m. ha^{-1};

$V_{EX,j,I,BSL}$ mean volume of extracted timber per unit area for species j in stratum i, $m^3 \cdot ha^{-1}$;

$BCEF_R$ biomass conversion and expansion factor applicable to wood removals in the project area, t.d.m m^{-3};

GWP_{CH4} global warming potential for CH_4 (IPCC default: 21), tCO_2e tCH_4^{-1};

i 1, 2, 3, …M strata;

j 1, 2, 3 …J tree species; and

t 0, 1, 2, 3, …t* years elapsed since start of the IFM project activity.

3.2.2.1b Natural Disturbance – Non-Fire

There are no fire disturbance occurred in the project area, therefore, $\Delta C_{DIST\_FR,t|PRJ}=0$.

Where non-fire natural disturbances occur ex post in the project area, the area disturbed must be delineated.

$$\Delta C_{DIST,t,PRJ} = \sum_{i=1}^{M} (A_{dist,i,t} * \sum_{j=1}^{J} \{C_{AB,j,i,BSL}\}) * \frac{44}{12} \quad (23)$$

Where:

$\Delta\ C_{DIST,t,PRJ}$	net greenhouse gas emissions resulting from non-fire natural disturbance in year t, tCO_2e ;
$A_{dist,i,t}$	area disturbed for stratum i at time t, ha;
$C_{AB,i,BSL}$	carbon stock in aboveground biomass per unit area in stratum i, $tC \cdot ha^{-1}$;
44/12	ratio of molecular weights of carbon dioxide and carbon, $tCO_2e\ tC^{-1}$;
i	1, 2, 3, ⋯M strata;
j	1, 2, 3 ⋯J tree species; and
t	0, 1, 2, 3, ⋯t* years elapsed since start of the IFM project activity.

There are non-fire natural disturbances occur ex post in the project area, therefore, $\Delta\ C_{DIST,t,PRJ}=0$

3.2.2.2 Illegal logging

Where the PRA and the limited sampling indicate degradation is occurring, net carbon stock changes as a result of illegal logging shall be calculated as:

$$\Delta C_{DIST-1L,t,PRJ} = \sum_{i=1}^{M} (A_{Dist-1L,j} * \frac{C_{DIST-1L,i,t,PRJ}}{AP_i}) \qquad (24)$$

Where:

$\Delta\ C_{DIST\_IL,t,PRJ}$	net carbon stock changes as a result of illegal logging at time t, tCO_2e;
$A_{dist,i,t}$	area disturbed for stratum i at time t, ha;
$C_{DIST\_IL,i,t,BSL}$	biomass carbon of trees cut and removed through illegal logging in stratum i at time t, tCO_2e;
A_{Pi}	total area of illegal logging sample plots in stratum i, ha;
i	1, 2, 3, ⋯M strata;
t	0, 1, 2, 3, ⋯t* years elapsed since start of the IFM project activity.

3.2.3 Net greenhouse gas emissions in the project scenario

This section calculates $\Delta\ C_{NET,t,PRJ}$, the net greenhouse gas emissions in the project scenario in year t, in tCO_2e.

The net greenhouse gas emissions in the project scenario are the sum of net greenhouse gas emissions resulting from fire and non-fire forest disturbance, plus any carbon stock changes that occur as a result of illegal logging, minus the annual carbon stock change in the aboveground biomass of trees due to forest growth.

Therefore, net greenhouse gas emissions in the project scenario in year t, is calculated as:

$$\Delta C_{NET,t,PRJ} = (\Delta C_{DIST-FR,t,PRJ} + \Delta C_{DIST,t,PRJ} + \Delta C_{DIST-1L,t,PRJ}) - \Delta C_{AB,t,PRJ} \quad (25)$$

Where,

$\Delta C_{NET,t,PRJ}$	net greenhouse gas emissions in the project scenario in year t, tCO_2-e;
$\Delta C_{DIST\_FR,t,PRJ}$	net greenhouse gas emissions resulting from fire disturbance in year t, tCO_2e
$\Delta C_{DIST,t,PRJ}$	net greenhouse gas emissions resulting from non-fire natural disturbance in year t, tCO_2e;
$\Delta C_{DIST\_IL,t,PRJ}$	Net carbon stock changes as a result of illegal logging at time t, tCO_2e;
$\Delta C_{AB,t,PRJ}$	annual carbon stock change in aboveground biomass of trees in year t, $tCO_2e\ yr^{-1}$; and
t	0, 1, 2, 3, ⋯t* years since start of the project activity.

The net greenhouse gas emissions across in the project scenario since the start of the project activity is calculated as:

$$GHG_{NET,PRJ} = \sum_{t=1}^{t*} \Delta C_{NET,t,PRJ} \quad (26)$$

Where:

$GHG_{NET,PRJ}$	net greenhouse gas emissions in the project scenario since the start of the project activity, tCO_2e
$\Delta C_{NET,t,PRJ}$	net greenhouse gas emissions in the project scenario in year t, tCO_2e; and
t	0, 1, 2, 3, ⋯t* years since start of the project activity.

3.3 Leakage

3.3.1 Activity shifting leakage

The project does not involve in the activity shifting leakage due to the following reasons:

- It can be found from the historical records, that the trends in harvest volumes paired with records from the with- project time period showing no deviation from historical trends;

  As indicates by the historical timber production completion records from 2008 to 2014, the total extracted volume of Chao'er Forestry Industrial Co., Ltd is decreasing paired with the plan from the with-project time period. In 2008, 2010 and 2014 the total timber production of Chao'er Forestry Industry Co., Ltd is 275,600 m^3, 225,500m^3, and 143,900m^3, with the drop rate of 44.42%, obviously, the project owner doesn't make up for the decrease of the project activity from other lands.

- Forest management plans prepared ≥24 months prior to the start of the project showing harvest plans on all owned lands paired with records from the with-project time period showing no deviation from management plans.

  As indicates by the timber production plan issued by Chao'er Forestry Industrial Co., Ltd issued every year based on the overall national five-year-plan, the total timber production plan is decreasing. Take the plan of 2001, 2008 2010,2014 for example, the figure dropped from 299,700,275,600, 225,500 to 143,900, with a sharp drop rate of 47.79%. It is clear that the total timber production plan is decreasing instead of increasing, not affected by the reducing of the project activity.

Therefore, the timber plans and land-use designations of other lands controlled by the project owner have not changed as a result of the planned project (designating new lands as timber concessions or increasing harvest rates in lands already managed for timber).

3.3.2 Market leakage

Leakage due to market effects is equal to the net emissions from planned timber harvest activities in the baseline scenario multiplied by an appropriate leakage factor:

$$GHG_{LK,\,LtPF,\,t*} = LF_{ME} * GHG_{NET,\,BSL,\,t*} \qquad (27)$$

Where:

$GHG_{LK,Lt,PF}$	is total market leakage as a result of IFM LtPF activities, tCO_2e;
LF_{ME}	is the dimensionless leakage factor for market-effects calculations;
$GHG_{NET\|BSL,t*}$	net greenhouse gas emissions in the baseline scenario in the year t* since the start of the project activity, tCO_2e.

According to the methdology, the leakage factor is defined as considering where in the country logging will be increased as a result of the decreased supply of the timber caused by the project. If the areas liable to be logged have a higher ratio of merchantable biomass to total biomass higher than the project area it is likely that the proportional leakage is higher and vice versa:

Therefore,

$LF_{ME} = 0$

If it can be demonstrated that no market-effects leakage will occur within national boundaries, that is if no new concessions are being assigned AND annual extracted volumes cannot be increased within existing national concessions AND illegal logging is absent (or de minimis) in the host country.

For the project,

- According to the 11th Five-year plan issued by State Forest Bureau (Guofa[2005]No.41), the annual extracted volume from 2006 to 2009 is 24,815.5*10^4 m^3, and the extracted volume of the project is 30.05*10^4 m^3, accounting 0.12% of the national extracted volume, which will not result in the significant national concession and illegal logging;
- The *Notice of the Review Opinion* published by the State Council, the extracted volume could not be increased within existing national concessions AND, Illegal logging is strictly forbidden and severely punished.

Therefore,

$LF_{ME} = 0$

The actual value will be monitored when verification.

3.4 Net GHG Emission Reductions and Removals

3.4.1 Net Project Greenhouse Gas Emission Reductions

Knowledge of the greenhouse gas emission level calculations for baseline scenario, project scenario and leakage allows an ex-ante estimation of the level of net GHG emission reductions resulting at the end of each year over the project crediting period from the implementation of the proposed Logged to Protected Forest (LtPF)-IFM project.

Therefore, the project GHG credits are calculated as:

$$GHG_{CREDITS,LtPF,t^*} = GHG_{NET,BSL,t^*} - GHG_{NET,PRJ,t^*} - GHG_{LK,LtPF,t^*} \quad (28)$$

Where:

$GHG_{CREDITS,Lt,PF,t^*}$ project greenhouse gas credits associated with the implementation of improved forest management (IFM) activities in the year t* since the start of the project activity, in the project scenario, tCO_2e

$GHG_{NET,BSL,t*}$	net greenhouse gas emissions in the baseline scenario in the year t* since the start of the project activity, tCO_2e;
$GHG_{NET,PRJ,t*}$	net greenhouse gas emissions in the project scenario in the year t* since the start of the project activity, tCO_2e; and
$GHG_{LK,Lt,PF,t*}$	total greenhouse gas emissions due to leakage arising outside the project boundary as a result of the implementation of improved forest management (IFM) activities in the year t* since the start of the project activity, in the project scenario, tCO_2e

3.4.2 Project Verified Carbon Units

The number of Verified Carbon Units (VCUs) for each year t in the project crediting period is the greenhouse gas emission reductions and removals adjusted for uncertainty and risk.

3.4.2.1 Adjustment for uncertainty

Estimated greenhouse gas emissions and emission reductions from IFM activities have uncertainties associated with parameters and coefficients including estimates of area, carbon stocks, regrowth and expansion factors. It is assumed that the uncertainties associated with input data are available, either as default uncertainty values given in most recent IPCC guidelines, or as statistical estimates based on sampling.

Uncertainty at all times is defined at the 95% confidence interval where the estimated variance exceeds +/- 15 percent from the mean. Procedures including stratification and the allocation of sufficient measurement plots will help ensure that low uncertainty results and ultimately full crediting can result.

Uncertainties arising from the measurement and monitoring of carbon pools and greenhouse gases shall always be quantified. Errors in each pool shall be weighted by the size of the pool so that projects may reasonably target a lower precision level in pools that only form a small proportion of the total stock.

For both the baseline and the with-project case the total uncertainty is equal to the square root of the sum of the squares of each component uncertainty and is calculated at the time of reporting through propagating the error in the baseline stocks and the error in the project stocks. Therefore, total uncertainty for the project is calculated as:

$$U_{TOTAL,\,LtPF} = \sqrt{U^2{}_{PRJ} + U^2{}_{BSL}} \qquad (29)$$

Where:

$U_{total,LtPF}$	total uncertainty for LtPF Project, dimensionless;

U_{PRJ} total uncertainty for the improved forest management activities in the project scenario, dimensionless; and

U_{BSL} total uncertainty for the baseline scenario, dimensionless.

Project proponents must justify the selection of uncertainty propagation in the VCS-PD.

If $U_{total|LtPF} \leq 0.15$ then no deduction will result for uncertainty.

If $U_{total|LtPF} > 0.15$ then the amount of greenhouse gas emission credits associated with IFM

activities will be deducted as follows:

$$\mathrm{Credits}_{\mathrm{total,LtPF}} = \mathrm{GHG}_{\mathrm{credits,LtPF}} \cdot (1 - \mathrm{U}_{\mathrm{total,LtPF}}) \quad (30)$$

Where:

$\mathrm{Credits}_{total|LtPF}$ total greenhouse gas credits adjusted for uncertainty for each year t in

the project crediting period;

$\mathrm{GHG}_{credits|LtPF}$ project greenhouse gas credits associated with the implementation of

improved forest management (IFM) activities in the project scenario, $tCO_2e \cdot year^{-1}$; and

$U_{total|LtPF}$ total uncertainty for LtPF Project, dimensionless.

3.4.2.2 Calculation of verified carbon units

The amount of greenhouse gas credits estimated at section 3.4.2.1 above shall be adjusted to account for risk.

They shall be subject to deductions based on application of the most recent version of the VCS Tool for “AFOLU Non-Permanence Risk Analysis and Buffer Determination. ”

Therefore, the amount of VCU’s that can be issued at time t=t2(the date of verification) for monitoring period T=t2-t1, is calculated as:

$$\mathrm{VCU}_{\mathrm{net,LtPE}} = \left(\mathrm{Credits}_{\mathrm{total,t2,LtPF}} - \mathrm{Credits}_{\mathrm{total,t1,LtPF}}\right) - \mathrm{Bu}_{\mathrm{IFM-VCS}} \quad (31)$$

Where:

$V_{CUnet|LtPF}$ number of verified carbon units; dimensionless;

$\mathrm{Credits}_{total.t1|LtPF}$ net anthroprogenic greenhouse gas removals by sinks, as estimated

for t*=t1 in tCO_2e;

$Credits_{total.t2|LtPF}$ net anthroprogenic greenhouse gas removals by sinks, as estimated for t*=t2 in tCO_2e; and

$Bu_{|IFM\text{-}VCS}$ total number of credits withheld in VCS buffer account.

3.4.3 the calculation process

3.4.3.1 The calculation of $GHG_{NET|BSL}$, according to section 3.1, the process is shown below:

Stratum	Area(ha)	$V_{EX,j,I,BSL}$(m3/ha)	BEF	D(tdm/m3)	BCEF(tdm/m3)	CF(tc/tdm)	$C_{HB,J,I,BSL}$(tc/ha)	$C_{EX,j,I,BSL}$(tc/ha)	$C_{DW,slash,I,p,BSL}$(tc/ha)	WW_k	SLF_k	$C_{WP,0,I,BSL}$(tc/ha)	$C_{WP,I,BSL}$(tc/ha)
SG-BL	1,313	26.800	1.586	0.443	0.703	0.5	9.415	5.936	3.479	24%	0.12	2.137	3.799
SG-LYS	9,697	65.830	1.416	0.490	0.694	0.5	22.838	16.128	6.709	24%	0.12	5.806	10.322

Stratum	OFk	$C_{WP,100,BSL}$(tc/ha)	Ai,p(ha)	△ $C_{NET,BSL(1)}$(tc)	△ $C_{NET,BSL(2-10)}$(tc)	△ $C_{NET,BSL(11-20)}$(tc)	regrowth amount(m3/mu/year)	△ $C_{NET,BSL(1+)}$(tc)	△ CNET,BSL,t (tc)	GHGNEt,BSL,t（tCO2）
SG-BL	0.62	2.355	150	390.40	69.85	17.67	0.17	134.37	343.54	1,259.65
SG-LYS	0.62	6.400	700	4,757.89	693.63	223.99	0.25	910.67	4,764.84	17,471.09

Parameter	Data Source	Notes
Forest Area(a) and Volume	Calculated from the forest inventory.	$V_{j,i,BSL}$ is divided by the two parameters.
$V_{EX,j,I,BSL}$	Calculated from the historical timber harvest plan.	
BEF and D	The national GHG emission list.	
CF,WW_k,SLF_k and OF_k	Adopted as the default value from the methodology.	

The baseline emission during the crediting period is listed as follows:

Year	$\triangle C_{NET,BSL(1+)}$(tc)	$\triangle C_{NET,BS,t}$(tc)	Conversion factor	$GHG_{NET,BSL,t}$（tCO_2）
1	1,045.04	4,103.25	3.67	15,045.26
2	2,090.07	3,821.69	3.67	14,012.88
3	3,135.11	3,540.14	3.67	12,980.50
4	4,180.15	3,258.58	3.67	11,948.11
5	5,225.18	2,977.02	3.67	10,915.73
6	6,270.22	2,695.46	3.67	9,883.35
7	7,315.26	2,413.90	3.67	8,850.97
8	8,360.29	2,132.34	3.67	7,818.59
9	9,405.33	1,850.78	3.67	6,786.21
10	1,045.04	10,974.56	3.67	40,240.04
11	11,495.41	765.84	3.67	2,808.08
12	12,540.44	-37.54	3.67	-137.66
13	13,585.48	-840.93	3.67	-3,083.41
14	14,630.52	-1,644.31	3.67	-6,029.15
15	15,675.55	-2,447.70	3.67	-8,974.90
16	16,720.59	-3,251.08	3.67	-11,920.64
17	17,765.63	-4,054.47	3.67	-14,866.39
18	18,810.66	-4,857.85	3.67	-17,812.13
19	19,855.70	-5,661.24	3.67	-20,757.88
20	20,900.74	-6,464.63	3.67	-23,703.63

3.4.3.2 ex-ante estimation of project emissions

The ex-ante estimation of project emission of the proposed project is as follows:

Stratum	Area(ha)	Ongoing growth rate(m3/mu/yr)	BEF	D(tdm/m3)	BCEF(tdm/m3)	CF(tc/tdm)	Conversion factor	△ CAB,t,PRJ(tCO2)	△ CDIST-FR,t,PRJ(tCO2)	△ CDIST,t,PRJ(tCO2)	△ CDIST_IL,I,t,PRJ(tCO2)	△ CNET,t,PRJ(tCO2)
SG-BL	1,313	0.2	1.586	0.443	0.703	0.5	3.67	5,073.81	0	0	0	-5,073.81
SG-LYS	9,697	0.45	1.416	0.490	0.694	0.5	3.67	83,261.06	0	0	0	-83,261.06

$\triangle C_{DIST-FR,t,PRJ}$,$\triangle C_{DIST,t,PRJ}$,$\triangle C_{DIST\_IL,I,t,PRJ}$ are assumed to be zero ex-ante, on-going growth rate is predicted by the project owner based on the historical data, in the mornitoring report, the actual sampling data will be adopted.

Year	$\triangle C_{DIST-FR,t,PRJ}(tCO_2)$	$\triangle C_{DIST,t,PRJ}(tCO_2)$	$\triangle C_{DIST\_IL,I,t,PRJ}(tCO_2)$	[3] $\triangle C_{AB,t,PRJ}(tCO_2)$	$\triangle C_{NET,t,PRJ}(tCO_2)$
1	0	0	0	88,334.87	-88,334.87
2	0	0	0	88,334.87	-88,334.87
3	0	0	0	88,334.87	-88,334.87
4	0	0	0	88,334.87	-88,334.87
5	0	0	0	88,334.87	-88,334.87
6	0	0	0	88,334.87	-88,334.87
7	0	0	0	88,334.87	-88,334.87
8	0	0	0	88,334.87	-88,334.87
9	0	0	0	88,334.87	-88,334.87
10	0	0	0	88,334.87	-88,334.87
11	0	0	0	88,334.87	-88,334.87
12	0	0	0	88,334.87	-88,334.87
13	0	0	0	88,334.87	-88,334.87
14	0	0	0	88,334.87	-88,334.87
15	0	0	0	88,334.87	-88,334.87
16	0	0	0	88,334.87	-88,334.87
17	0	0	0	88,334.87	-88,334.87
18	0	0	0	88,334.87	-88,334.87
19	0	0	0	88,334.87	-88,334.87
20	0	0	0	88,334.87	-88,334.87

[3] As for the project tree species of brich and pinus, there are no allometric equation applied in the project area, the average annual growth is adopted for the estimated calculation of carbon stock change.

3.4.4 Uncertainty for the Baseline Scenario

According to the methodology, the uncertainty in the baseline scenario is associated with parameters and coefficients including estimates of area, carbon stocks, regrowth and expansion factors, the calculation process follows the two rules below:

Rule A: Where uncertainties are to be combined by addition, the standard deviation of the sum will be the square root of the sum of the squares of the standard deviations of the quantities that are added with the standard deviations all expressed in absolute terms (this rule is exact for uncorrelated variables).

Using this interpretation, a simple equation can be derived for the uncertainty of the sum, that when expressed in percentage terms becomes:

$$U_{total} = \frac{\sqrt{(U_1 * E_1)^2 + (U_2 * E_2)^2 + \ldots + (U_n * E_n)^2}}{E_1 + E_2 + \ldots + E_n} \qquad (32)$$

Where:

U_{total} is the percentage uncertainty in the sum of the quantities (half the 95% confidence interval divided by the total (i.e. mean) and expressed as a percentage);

Ei and Ui are the uncertain quantities and the percentage uncertainties associated with them, respectively.

Rule B: Where uncertain quantities are to be combined by multiplication, the same rule applies except that the standard deviations must all be expressed as fractions of the appropriate mean values (this rule is approximate for all random variables).

A simple equation can also be derived for the uncertainty of the product, expressed in percentage terms:

$$U_{total} = \sqrt{U_1^2 + U_2^2 + \ldots + U_n^2} \qquad (33)$$

Where:

U_{total} is the percentage uncertainty in the product of the quantities (half the 95% confidence interval divided by the total and expressed as a percentage);

Ui are the percentage uncertainties associated with each of the quantities.

The uncertainty are calculated per stratum by dividing the 95% confidence interval by the mean value of the uncertainty quantities. The corresponding standard deviation is calculated over the measured plot values of the uncertainty quantities. The 95% confidence interval is calculated based on the standard deviation and the t-value for n-1 degree of freedom of plots per stratum.

As the uncertainty in the baseline scenario is associated with parameters and coefficients including estimates of area, carbon stocks, regrowth and expansion factors, the calculation of the 4 parameters and coefficients are shown below:

1) Uncertainty of Area:

In the baseline scenario, the area of every stratum are quoted from the second class forestry investigation and forest right certificate, so no data are from measurement and monitoring. Therefore, it is deemed as 0 in the period of validation. It will be monitored in the period of verification.

2) Uncertainty of expansion factors:

The Sample size, Sample mean and Standard error of expansion factors are quoted from Forestry Part of China's greenhouse gas emissions list divided as tree species, and the details is listed in the following table.

For brich

Parameters	Sample size	Stand deviation	Stand error	Mean	U
BEF	39	0.337	0.054	1.586	6.89%
D	189	0.013	0.001	0.443	0.45%
BCEF					6.91%

For Pinus

Parameters	Sample size	Stand deviation	Stand error	Mean	U
BEF	321	0.408	0.023	1.416	3.16%
D	13	0.039	0.011	0.49	4.81%
BCEF					5.76%

3) Uncertainty of carbon stock:

The calculation of uncertainty of carbon stock is based on the uncertainty of volume in every stratum multiply by the uncertainty of expansion factors.

Parameters	Species	Sample Size	Stand deviation	Stand Error	t	Mean	U
BEF	Brich	39	0.337	0.054	2.024	1.586	6.89%
	Pinus	321	0.408	0.023	1.967	1.416	3.16%
D(tdm/m^3)	Brich	189	0.013	0.001	1.973	0.443	0.45%
	Pinus	13	0.039	0.011	2.179	0.490	4.81%
BCEF	Brich					0.703	6.91%
	Pinus					0.694	5.76%
Volume (m^3/ha)	Brich	117	38.03	3.516	1.981	56.997	12.22%
	Pinus	795	30.52	1.082	1.963	83.882	2.53%
Carbon Stock (tc/ha)	Brich						14.03%
	Pinus						6.29%
RGR (m^3/ha/yr)	Brich					2.55	30%
	Pinus					3.75	30%

4) Uncertainty of regrowth

The uncertainty of regrowth is only associated with the parameter RGR_i, as for the value quoted from IPCC Guidelines for National Greenhouse Gas Inventories (2006), Table 4.9, the uncertainty for non-industrialized countries of 30% is regulated therefore the uncertainty of RGR_i regrowth is 30%. And this uncertainty is adopted for the project for conservative.

Baseline Emission Uncertainty calculation

Based on the calculation of the 4 parameters and coefficients above, the U_{total} is 4.328%, the detailed calculation is listed as follows:

Stratum	Parameter	Area(ha)	$V_{EX,j,I,BSL}$(m3/ha)	BEF	D(tdm/m3)	BCEF(tdm/m3)	CF(tc/tdm)	$C_{HB,J,I,BSL}$(tc/ha)	$C_{EX,j,I,BSL}$(tc/ha)	$C_{DW,slash,I,p,BSL}$(tc/ha)
		a	b	c	d	e=c*d	f	g=b*e*f	h=b*d*f	i=g-h
								$U_g = \sqrt{U_b^2 + U_e^2}$	$U_h = \sqrt{U_b^2 + U_d^2}$	$U_i = \frac{\sqrt{(E_g * U_g)^2 + (E_h * U_h)^2}}{(E_g + E_h)}$
Brich	E	1,313	26.800	1.586	0.443	0.703	0.5	9.415	5.936	3.479
	U	0	12.22%	6.893%	0.445%	6.907%	0	14.035%	12.226%	9.820%
Pinus	E	9,697	65.830	1.416	0.490	0.694	0.5	22.838	16.128	6.709
	U	0	2.74%	3.164%	4.810%	5.757%	0	6.377%	5.537%	4.384%

Stratum	Parameter	WW_k	SLF_k	$C_{WP,0,l,BSL}$(tc/ha)	$C_{WP,l,BSL}$(tc/ha)	OF_k	$C_{WP,100,BSL}$(tc/ha)	$A_{i,p}$(ha)	△$C_{NET,BSL(1)}$(tc)
		j	k	l=h*(j+k)	m=h-l	n	o=m*n	p	q=(i/10+l+o/20)*p
				$U_l=U_h$	$U_m = \frac{\sqrt{(E_h * U_h)^2 + (E_l * U_l)^2}}{(E_h + E_l)}$		$U_o=U_m$	$U_p=0$	$U_q = \frac{\sqrt{(U_l * E_l)^2 + (U_m * E_m)^2 + (U_o * E_o)^2}}{(E_l + E_m + E_o)}$
Brich	E	24%	0.12	2.137	3.799	0.62	2.355	150.000	390.400
	U			12.226%	9.554%		9.554%		6.089%
Pinus	E	24%	0.12	5.806	10.322	0.62	6.400	700.000	4,757.992
	U			5.537%	4.327%		4.327%		2.730%

Stratum	△$C_{NET,BSL(2-10)}$(tc)	△$C_{NET,BSL(11-20)}$(tc)	regrowth amount(tdm/ha/year)	△$C_{NET,BSL(1+)}$(tc)	△CNET,BSL,t,BSL(tc)
	r=(i/10+o/20)*p	s=o/20*p	t	v=e*f*p*t	w=q+r+s-v
	$U_r = \frac{\sqrt{(U_m * E_m)^2 + (U_o * E_o)^2}}{(E_m + E_o)}$	$U_s=U_o$	U_t=30%	$U_v=U_t$	$U_w = \frac{\sqrt{(U_q * E_q)^2 + (U_r * E_r)^2 + (U_s * E_s)^2 + (U_v * E_v)^2}}{(E_q + E_r + E_s + E_v)}$
Brich	69.845	17.666	2.55	134.372	343.540
	7.012%	9.554%	30%	30%	7.690%
Pinus	693.648	223.991	3.75	910.665	4,764.966
	3.082%	4.327%	30%	30%	4.607%

U_{BSL} 4.328%

3.4.5 Project Emission Uncertainty

The VCUs adjusted for the project emission uncertainty will be calculated and determined during the verification period, therefore, the ex-ante U_{PRJ}=0.

Therefore, $U_{total} = \sqrt{{U_{BSL}}^2 + {U_{PRJ}}^2} = \sqrt{4.328\%^2 + 0\%^2} = 4.328\%$

According to the methodology, if $U_{total,LtPF} \leqslant 0.15$ then no deduction will result for uncertainty, therefore, it is unnecessary for the project to deduct for the uncertainty.

3.4.6 Calculation of verified carbon units

The amount of greenhouse gas credits estimated at section 3.4.2 above shall be adjusted to account for risk.

They shall be subject to deductions based on application of the most recent version of the VCS Tool for AFOLU Non-Permanence Risk Analysis and Buffer Determination.

Therefore, the amount of VCUs that can be issued at time $t=t_2$ (the date of verification) for monitoring period $T=t_2-t_1$, is calculated as:

$$VCU_{net,\,LtPF} = (\mathrm{Credits}_{\mathrm{total,\,t\,2,\,LtPF}} - \mathrm{Credits}_{\mathrm{total,\,t\,1,\,LtPF}}) - \mathrm{Bu}_{\mathrm{IFM-VCS}} \quad (34)$$

Where:

$VCU_{net,LtPF}$	number of verified carbon units; dimensionless;
$Credits_{total.t1,LtPF}$	net anthroprogenic greenhouse gas removals by sinks, as estimated for $t^*=t_1$ in tCO_2e;
$Credits_{total.t2,LtPF}$	net anthroprogenic greenhouse gas removals by sinks, as estimated for $t^*=t_2$ in tCO_2e; and
$Bu_{IFM-VCS}$	total number of credits withheld in VCS buffer account.

Based on the analysis in NON-PERMANENCE RISK REPORT, the overall risk rating is 23, then

23% of the total emission reductions shall be deducted .

Therefore, the emission reduction detail is listed:

Year	$GHG_{NET,BSL,t}$	$GHG_{NET,PRJ,t}$	$GHG_{LK,LtPF,t}$	$GHG_{CREDITS,LtPF,t}$	$U_{total,LtPF}$	$Credits_{total,LtPF}$	Risk Scroe	$VCU_{net,IFM,}$
1	15,045.26	-88,334.87	0	103,380.13	4.328%	103,380.13	23	79,602.00
2	14,012.88	-88,334.87	0	102,347.75	4.328%	102,347.75	23	78,807.00
3	12,980.50	-88,334.87	0	101,315.37	4.328%	101,315.37	23	78,012.00
4	11,948.11	-88,334.87	0	100,282.99	4.328%	100,282.99	23	77,217.00
5	10,915.73	-88,334.87	0	99,250.61	4.328%	99,250.61	23	76,422.00
6	9,883.35	-88,334.87	0	98,218.22	4.328%	98,218.22	23	75,628.00
7	8,850.97	-88,334.87	0	97,185.84	4.328%	97,185.84	23	74,833.00
8	7,818.59	-88,334.87	0	96,153.46	4.328%	96,153.46	23	74,038.00
9	6,786.21	-88,334.87	0	95,121.08	4.328%	95,121.08	23	73,243.00
10	40,240.04	-88,334.87	0	128,574.92	4.328%	128,574.92	23	99,002.00
11	2,808.08	-88,334.87	0	91,142.95	4.328%	91,142.95	23	70,180.00
12	-137.66	-88,334.87	0	88,197.21	4.328%	88,197.21	23	67,911.00
13	-3,083.41	-88,334.87	0	85,251.46	4.328%	85,251.46	23	65,643.00
14	-6,029.15	-88,334.87	0	82,305.72	4.328%	82,305.72	23	63,375.00
15	-8,974.90	-88,334.87	0	79,359.97	4.328%	79,359.97	23	61,107.00
16	-11,920.64	-88,334.87	0	76,414.23	4.328%	76,414.23	23	58,838.00
17	-14,866.39	-88,334.87	0	73,468.48	4.328%	73,468.48	23	56,570.00
18	-17,812.13	-88,334.87	0	70,522.74	4.328%	70,522.74	23	54,302.00
19	-20,757.88	-88,334.87	0	67,576.99	4.328%	67,576.99	23	52,034.00
20	-23,703.63	-88,334.87	0	64,631.25	4.328%	64,631.25	23	49,766.00
Total	34,003.93	-1,766,697.43		1,800,701.36		1,800,701.36		1,386,530.00
Average				90,035.07				69,326.00

4 MONITORING

4.1 Data and Parameters Available at Validation

Data / Parameter	$V_{l,j,i,sp}$
Data unit	m^3
Description	Merchantable volume for tree *l* of species *j* in sample plot *sp* in stratum *i*
Source of data	Calculated from volume tables or equations linking diameter at breast height (DBH, at typically 1.3 m aboveground level), and/or merchantable height (MH), to commercial (merchantable) volume of trees in the sample plots above the minimum DBH set in the timber production plan. If locally derived equations or yield tables are not available use relevant regional, national or default equations from IPCC literature, national inventory reports or published peer-reviewed studies– such as those provided in Tables 4.A.1 to 4.A.3 of the GPG-LULUCF (IPCC 2003).
Value applied:	Referred to the spreadsheet
Justification of choice of data or description of measurement methods and procedures applied	It is necessary to verify the applicability of equations used. Allometric equations can be verified by both: 1. Verification of equation conditions Justification should be provided for the applicability of the equation to the project locations. Such justification should include identification of climatic, edaphic, geographical and taxonomic similarities between the project location and the location in which the equation was derived. Any equation used should have an r2 value of greater than 0.5 (50%) and a p value that is significant (<0.05 at the 95% confidence level). 2. Additional field verification The following limited measures method must be used for field verification: • select at least 10 trees per species distributed across the age range (but excluding trees less than 15 years old for which there is rarely a great relative inaccuracy in equations) ; • measure DBH, and height to a 10 cm diameter top or to the first branch; • calculate stem volume from measurements; and • plot the estimated volume of all the measured trees along with the curve of volume against diameter as predicted by the allometric equation. If the estimated volume of the measured trees are distributed both above and below the curve (as predicted by the allometric equation) the equation may be used. The equation may also be used if the measured individuals have a volume consistently higher than predicted by the equation. The equation may not be used if >75% of the measured trees have a volume lower than the predicted curve. In this instance another equation must be

	selected.
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	CF_j
Data unit	tC/t d.m.
Description	Carbon fraction of dry matter for species j
Source of data	Either the default value 0.5 tC·t d.m.$^{-1}$ or species specific values from the literature must be used. The same value, however, must be used in all instances where this parameter is used.
Value applied:	0.5
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	D_j
Data unit	t d.m./m^3
Description	Basic wood density of species *j* in t d.m. m^{-3}
Source of data	Must be chosen with priority from higher to lower preference as follows: a) National species-specific or group of species-specific values (eg, from National GHG inventory); b) Species-specific or group of species-specific values from neighbouring countries with similar conditions. When species-specific data from neighbouring countries is of higher quality, being more representative of the species in the project scenario, it may be preferable to use these values than lower quality national data; c) Global species-specific or group of species-specific (eg, IPCC 2006 INV GLs AFOLU Chapter 4 Tables 4.13 and 4.14). Species-specific wood densities may not always be available, and may be difficult to apply with certainty in the typically species rich forests of the humid tropics, hence it is acceptable practice to use wood densities developed for forest types or plant families or species groups
Value applied:	Referred to the spreadsheet
Justification of choice of data or description of	N/A

measurement methods and procedures applied	
Purpose of Data	Calculation of baseline emissions
Comments	Default values must be updated whenever new guidelines are produced by the IPCC

Data / Parameter	$f_j(X,Y)$
Data unit	t d.m./tree
Description	Allometric equation(s) for species *j* linking measured tree variable(s) to aboveground biomass of living trees
Source of data	Equations must have been derived using a wide range of measured variables (eg, DBH, Height, etc.) based on datasets that comprise at least 30 trees. Equations must be based on statistically significant regressions and must have an r2 that is ≥ 0.8. The source of equation(s) must be chosen with priority from higher to lower preference, as available, as follows: a) National species-, genus-, family-specific; b) Species-, genus-, family-specific from neighbouring countries with similar conditions (ie, broad continental regions); c) National forest-type specific; d) Forest-type specific from neighbouring countries with similar conditions (ie, broad continental regions); e) Forest type-specific such as those provided Tables 4.A.1 to 4.A.3 of the GPG-LULUCF (IPCC 2003); or in Pearson, T., Walker, S. and Brown, S. 2005. Sourcebook for Land Use, Land-Use Change and Forestry Projects. Winrock International and the World Bank Biocarbon Fund. 57pp.; or in Chave, J., C. Andalo, S. Brown, M. A. Cairns, J. Q. Chambers, D. Eamus, H. Folster, F. Fromard, N. Higuchi, T. Kira, J.-P. Lescure, B. W. Nelson, H. Ogawa, H. Puig, B. Riera, T. Yamakura. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. Oecologia 145: 87-99. Species-, genus- and family-specific allometric equations may not always be available, and may be difficult to apply with certainty in the typically species rich forests of the humid tropics. Hence it is acceptable practice to use equations developed for regional forest types, provided that their accuracy has been validated with direct site-specific data following guidance given below. If a forest-type specific equation is used, it should not be used in combination with species-specific equation(s) (ie, it must be used for all tree species).
Value applied:	Referred to the spreadsheet
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	Calculation of baseline emissions

Comments	It is necessary to validate the applicability of equations used. Source data from which equation(s) was derived should be reviewed and confirmed to be representative of the forest type/species and conditions in the project and covering the range of potential independent variable values. Allometric equations can be validated either by: 1. Limited Measurements • select at least 30 trees (if validating forest type-specific equation, selection should be representative of the species composition in the project area, ie, species representation in roughly in proportion to relative basal area). Minimum diameter of measured trees must be 20cm and maximum diameter must reflect the largest trees present or potentially present in the future in the project area (and/or leakage belt); • measure DBH, and height to a 10 cm diameter top or to the first branch; • calculate stem volume from measurements and multiplying by species-specific density to gain biomass of bole; • apply a biomass expansion factor to estimate total aboveground biomass from stem biomass[40]; and • plot the estimated biomass of all the measured trees along with the curve of biomass against diameter as predicted by the allometric equation. If the estimated volume of the measured trees are distributed both above and below the curve (as predicted by the allometric equation) the equation may be used. The equation may also be used if the measured individuals have a biomass consistently higher than predicted by the equation. If >75% of the measured trees have a biomass lower than the predicted curve, destructive sampling must be undertaken or another equation must be selected. 2. Destructive Sampling • select at least 5 trees (if validating forest type-specific equation, selection should be representative of the species composition in the project area, ie, species representation in roughly in proportion to relative basal area) at the upper end of the range of independent variable values existing in the project area; • measure DBH and commercial height and calculate volume using the same procedures/equations used to generate commercial volumes to which BCEFs will be applied; • fell and weigh the aboveground biomass to determine the total (wet) mass • of the stem, branch, twig, leaves, etc. Extract and immediately weigh subsamples from each of the wet stem and branch components, followed by oven drying at 70 degrees C to determine dry biomass; • determine the total dry weight of each tree from the wet weights and the averaged ratios of wet and dry weights of the stem and branch components; and • plot the estimated biomass of all the measured trees along with the curve of biomass against diameter as predicted by the allometric equation. If the estimated volume of the measured trees are distributed both above and below the curve (as predicted by the allometric

	equation) the equation may be used. The equation may also be used if the measured individuals have a biomass consistently higher than predicted by the equation. If >75% of the measured trees have a biomass lower than the predicted curve another equation must be selected. Details of destructive sampling measurements are given in: Brown, S. 1997. Estimating biomass and biomass change of tropical forests: a primer. FAO Forestry Paper 134, Rome, Italy. Available at http://www.fao.org/docrep/W4095E/W4095E00.htm If using species-specific equations, and new species are encountered in the course of monitoring, new allometric equations must be sourced from the literature and validated, if necessary, as per requirements and procedures above. Default values must be updated whenever new guidelines are produced by the IPCC

Data / Parameter	$BCEF_R$
Data unit	t d.m./m^3
Description	Biomass conversion and expansion factor applicable to wood removals in the project area
Source of data	The source of data must be chosen with priority from higher to lower preference as follows: a) Existing local forest type-specific; b) National forest type-specific or eco-region-specific (eg, from national GHG inventory); c) Forest type-specific or eco-region-specific from neighbouring countries with similar conditions. Sometimes (c) might be preferable to (b); d) Global forest type or eco-region-specific (eg, IPCC 2006 INV GLs AFOLU Chapter 4 Table 4.5). Alternatively: BCEFR = BEFR * D Where BCEF values are not directly available, they can be calculated as Biomass Expansion Factor (BEF)* basic wood density (D). Application of this equation requires caution because basic wood density and biomass expansion factors tend to be correlated. If the same sample of trees was used to determine D, BEF or BCEF, conversion will not introduce error, therefore, it is acceptable to use this equation. If, however, basic wood density is not known with certainty, transforming one into the other might introduce error, as BCEF implies a specific but unknown basic wood density, therefore, all conversion and expansion factors must be derived or their applicability checked locally.
Value applied:	Referred to the spreadsheet
Justification of choice of data or description of measurement methods and procedures applied	N/A

Purpose of Data	Calculation of baseline emissions
Comments	The combustion factor is a measure of the proportion of the fuel that is actually combusted, which varies as a function of the size and architecture of the fuel load (ie, a smaller proportion of large, coarse fuel such as tree stems will be burnt compared to fine fuels, such as grass leaves), the moisture content of the fuel and the type of fire (ie, intensity and rate of spread). Default values must be updated whenever new guidelines are produced by the IPCC

Data / Parameter	G_{gi}
Data unit	g/kg dry matter burnt
Description	Emission factor for stratum *i* for gas *g*
Source of data	Defaults can be found in Volume 4, Chapter 2, of the IPCC 2006 Inventory Guidelines in table 2.5
Value applied:	Referred to the spreadsheet
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	Calculation of baseline emissions
Comments	Default values must be updated whenever new guidelines are produced by the IPCC

Data / Parameter	RGR_i
Data unit	tC/ha yr
Description	Forest regrowth rate post timber harvest for stratum *i*
Source of data	Regrowth rate must be calculated from either a) data generated in a reference area using measurements of timber volume in a chronosequence of replicated sample plots; or b) published data on forest growth after timber harvest of the same forest type within the same region as the project; or c) the IPCC default values for aboveground net biomass growth in natural forests.
Value applied:	Referred to the spreadsheet
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	Calculation of baseline emissions
Comments	Default values must be updated whenever new guidelines are produced by the IPCC

Data / Parameter	$V_{EX,j,i,BSL}$
Data unit	m^3/ha
Description	Mean volume of extracted timber per unit area for species *j* in stratum *i*
Source of data	The timber production plan sets the allowable mean extracted volume from the merchantable volume of timber in the forest second class investigation ($V_{j,i\|BSL}$), based on legal limits
Value applied:	Referred to the spreadsheet
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	Calculation of baseline emissions
Comments	

Data / Parameter	$A_{i,p}$
Data unit	Ha
Description	Area covered by stratum *i* over land parcel *p*
Source of data	Geodetic coordinates and/or Remote Sensing data and/or legal parcel records
Value applied:	Referred to the spreadsheet
Justification of choice of data or description of measurement methods and procedures applied	N/A
Purpose of Data	Calculation of baseline emissions
Comments	It must be assumed ex-ante that land parcel boundaries and strata areas must not change through time

4.2 Data and Parameters Monitored

Data / Parameter	Illegal Logging PRA Results
Data unit	/
Description	A participatory rural appraisal (PRA) of the communities surrounding the project area must be completed to determine if there is the potential for illegal extraction of trees from the project area.
Source of data	PRA

Description of measurement methods and procedures to be applied	The PRA must evaluate whether timber harvest may be occurring in the project area and must consist of semi-structured interviews / questionnaires. If ≥ 10% of those interviewed/surveyed believe that illegal logging may be occurring within the project boundary then the limited on-the-ground illegal logging survey must be triggered An additional output of the PRA must be a depth of penetration of illegal logging pressure. A maximum distance must be recorded for penetration into the forest from access points (such as roads, rivers, already cleared areas) for the purpose of harvesting timber.
Frequency of monitoring/recording	Every two years
Value applied:	No illegal logging occurs during the monitoring period within the project boundary.
Monitoring equipment	Not applicable.
QA/QC procedures to be applied	Not applicable.
Purpose of data	For the calculation of project emissions.
Calculation method	Interview/Survey.
Comments	Ex ante estimation must be made of illegal logging in the with-project case. If the belief is that zero illegal logging will occur within the project boundaries then this parameter may be set to zero if clear infrastructure, hiring and policies are in place to prevent illegal logging.

Data / Parameter	$A_{burn,I,t}$
Data unit	Ha
Description	Area burnt in stratum I at time t
Source of data	Geodetic coordinates and/or Remote Sensing data
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	At Least every five years
Value applied:	No fire occurs during the monitoring period within the project boundary.
Monitoring equipment	Not applicable.

QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management must be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of data	For the calculation of project emissions.
Calculation method	The common practice method for the calculation of area.
Comments	Ex ante estimations of areas burned must be based on historic incidence of fire in the Project region.

Data / Parameter	$A_{dist,i,t}$
Data unit	Ha
Description	Area disturbed in stratum i at time t
Source of data	Geodetic coordinates and/or Remote Sensing data
Description of measurement methods and procedures to be applied	N/A
Frequency of monitoring/recording	Areas disturbed must be monitored at least every five years
Value applied:	Zero, since there is no disturbance other than fire.
Monitoring equipment	Not applicable.
QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest second class investigation including field data collection and data management must be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of data	For the calculation of project emissions.
Calculation method	The common practice method for the calculation of area.
Comments	Ex ante estimations of areas disturbed must be based on historic incidence of natural disturbance in the Project region

Data / Parameter	$A_{DIST\_IL,i}$
Data unit	Ha
Description	Area potentially impacted by illegal logging in stratum *i*
Source of data	GIS delineation and ground truthing
Description of measurement methods and procedures to be applied	ADIST_IL,i must be composed of a buffer from all access points (access buffer), such as roads and rivers or previously cleared areas. The width of the buffer must be determined by the depth of degradation penetration as defined as a PRA output
Frequency of monitoring/recording	Repeated each time the PRA indicates a potential for degradation
Value applied:	Zero, as no illegal occurs during the monitoring period within the project boundary.
Monitoring equipment	Not applicable.
QA/QC procedures to be applied	Not applicable
Purpose of data	For the calculation of the project emissions.
Calculation method	Based on the results of illegal logging survey.
Comments	Ex ante a limited survey can be used to determine a likely depth of degradation penetration

Data / Parameter	$C_{DIST\_IL,t,PRJ}$
Data unit	tCO_2e
Description	biomass carbon of trees cut and removed through illegal logging in stratum i at time t
Source of data	Field measurements in sample plots
Description of measurement methods and procedures to be applied	The sampling plan must be designed using plots systematically placed over the buffer zone so that they sample at least 3% of the area of the buffer zone (ADIST_IL,i). The diameter of all tree stumps will be measured and conservatively assumed to be the same as the DBH. Where the stump is a large buttress, several individuals of the same species nearby must be located and a ratio of the diameter at DBH to the diameter of buttress at the same height above ground as the measured stumps must be determined. This ratio will be applied to the measured stumps to estimate the likely DBH of the cut tree. The aboveground carbon stock of each harvested tree will be estimated using the allometric regression equations chosen for forest growth in the project scenario. The mean aboveground

	carbon stock of the harvested trees is conservatively estimated to be the total emissions and to all enter the atmosphere
Frequency of monitoring/recording	Repeated each time limited sampling of ADIST_IL, indicates illegal logging
Value applied:	Zero, as no illegal logging occurs during the monitoring period within the project boundary.
Monitoring equipment	Not applicable.
QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest second class investigation including field data collection and data management must be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.
Purpose of data	For the calculation of the project emission.
Calculation method	Not applicable, since no illegal logging occurs during the monitoring period within the project boundary.
Comments	If species-specific equations are used and species cannot be identified from stumps then it must be assumed that the harvested species is the species most commonly harvested. A PRA must be used to determine the most commonly harvested species.

Data / Parameter	AP_i
Data unit	Ha
Description	Total area of illegal logging sample plots in stratum *i*
Source of data	Ground measurement
Description of measurement methods and procedures to be applied	A sampling plan must be designed using multiple sample plots systematically placed across the buffer zone so that they sample at least 3% of the area of the buffer zone.
Frequency of monitoring/recording	Not more than five years
Value applied:	
Monitoring equipment	
QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest second class investigation including field data collection and data management must be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the IPCC GPG LULUCF 2003, is recommended.

Purpose of data	For the calculation of the project emissions.
Calculation method	Not applicable, as no illegal logging occurs during the monitoring period within the project boundary.
Comments	Ex ante estimation should be made of area of plots. This should be set to exactly 3% of the buffer zone ADIST_IL,i

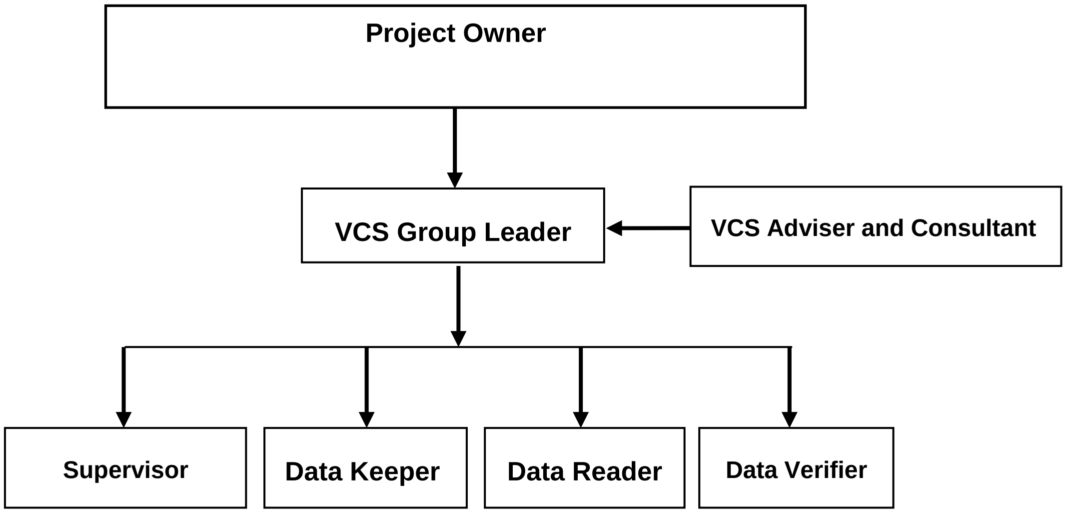
Data / Parameter	PMP_i
Data unit	%
Description	Merchantable biomass as a proportion of total aboveground tree biomass for stratum I within the project boundaries.
Source of data	Within each stratum divide the summed merchantable biomass (defined as total gross biomass of a tree 15 cm DBH or larger) by the summed total of aboveground three biomass.
Description of measurement methods and procedures to be applied	Not applicable, as the leakage factor of this project is zero, it is unnecessary to calculate PMP_i .
Frequency of monitoring/recording	Not more than five years.
Value applied:	Not applicable, as the leakage factor of this project is zero, it is unnecessary to calculate PMP_i .
Monitoring equipment	Not applicable.
QA/QC procedures to be applied	Standard quality control / quality assurance (QA/QC) procedures for forest inventory including field data collection and data management must be applied. Use or adaptation of QA/QCs already applied in national forest monitoring, or available from published handbooks, or form the *IPCC GPG LULUCF 2003*, is recommended.
Purpose of data	For the calculation of the project emissions.
Calculation method	Not applicable.
Comments	Ex-ante a time zero measurement must be made of this factor. The timber harvest plan sets the allowable mean extracted volume from the merchantable volume of timber in the forest inventory (Vj,i|BSL), based on legal limits.

Data / Parameter	A_i
Data unit	Ha
Description	Area covered by stratum *i*
Source of data	Geodetic coordinates and/or Remote Sensing data and/or legal parcel records
Description of measurement methods and procedures to be applied	The stratum is from the second class forestry inventory.
Frequency of monitoring/recording	Every ten years.
Value applied:	<table><tr><td>Species</td><td>Area(ha)</td></tr><tr><td>Brich</td><td>1,313</td></tr><tr><td>Pinus</td><td>9,697</td></tr></table>
Monitoring equipment	Tape mesure.
QA/QC procedures to be applied	
Purpose of data	For the calculation of the baseline and project emissions.
Calculation method	Not applicable, as no illegal logging occurs during the monitoring period within the project boundary.
Comments	In the baseline scenario strata areas must not change through time. In the project scenario it must be assumed *ex-ante* that stand boundaries and strata areas must not change through time. *Ex post* adjustments of the project scenario strata may be needed if unexpected disturbances occur during the project crediting period, severely affecting different parts of an originally homogenous stratum. This disturbance will be delineate as a separate stratum for the purpose of monitoring the carbon stock changes.

4.3 Monitoring Plan

4.3.1 Scope of monitoring and the monitoring plan

The Project owner will set up a team, the director of which will be assigned accordingly. The team is in charge of collecting, monitoring and verifying the data, while the team director will be assisted by the consultant company. The findings from Consult Company should be reported. Then the team director together with Consult Company can collect overall information and work out a solution. The operational and management structure is as follows:



Monitoring is required to

a) determine changes in forest carbon stocks and greenhouse gas emissions from project

activity;

b) confirm project activity; and

c) determine changes in forest carbon stocks and greenhouse gas emissions from disturbance and illegal logging.

In some cases monitoring may also be implemented to update stratification.

The monitoring plan addresses the monitoring of project implementation, the monitoring of actual carbon stock changes from project activity, and estimation of ex-post net carbon stock changes from the conversion of logged to protected forest

4.3.2 General requirements for monitoring

All data collected as part of monitoring will be archived electronically and be kept at least for 2 years after the end of the project crediting period. All measurements will be conducted according to relevant standards.

Data archiving shall take both electronic and paper forms, and copies of all data shall be provided to each project participant.

All electronic data and reports shall also be copied on durable media such as CDs and copies of the CDs are to be stored in multiple locations.

The archives shall include:

Copies of all original field measurement data, laboratory data, data analysis spreadsheets;

Estimates of the carbon stock changes in all pools and non-CO2 GHG and corresponding calculation spreadsheets;

GIS products; and

Copies of the measuring and monitoring reports.

4.1.3 Monitoring of project implementation

Information must be provided, and recorded in the VCS-PD, to establish that:

- the geographic position of the project boundary is recorded for all areas of land;
- the geographic coordinates of the project boundary (and any stratification inside the boundary) are established, recorded and archived. This will be achieved by field survey (eg, using Geodetic coordinates) or by using georeferenced spatial data (eg, maps, GIS datasets, aerial photography, or georeferenced remote sensing images);
- commonly accepted principles of forest second class investigation and management are implemented;
- standard operating procedures (SOPs) and quality control/quality assurance (QA/QC) procedures for forest second class investigation including field data collection and data management must be applied. Use or adaptation of SOPs already applied in national forest monitoring or available from published handbooks or from the IPCC GPG LULUCF 2003 is recommended; and
- the project plan, together with a record of the plan as actually implemented during the project, must be available for validation or verification as appropriate.

4.1.4 Stratification

This methodology requires that an ex ante stratification of the project area in the project scenario is described in the VCS-PD as documented in the timber production plan, or developed by project proponents through sampling in the project area.

The monitoring plan may include sampling to adjust the number and boundaries of the strata defined ex ante where an update is required because of:

a) unexpected disturbances occurring during the project crediting period affecting differently various parts of an originally homogeneous stratum and/or

b) forest management activities that are implemented in a way that affects the existing stratification in the project scenario.

Established strata may also be merged if the reasons for their establishment have disappeared.

4.1.5 Monitoring of actual carbon stock changes

Carbon stocks will be measured according to the stock assessment equations in this methodology with field sampling based on forest second class investigation methods. Various sources exist to assist with the design of a verifiable forest field inventory based on best practice for sampling, data management and analysis (Box 3).

In the project area (or areas) the inventory plan must be specified in the VCS-PD and include:

a) adequate forest stratification, sample size estimation methods and consider uncertainty; and

b) a sampling framework including sample size, plot size, plot shape and information to determine plot location.

To determine the sample size and allocation among strata, this methodology uses the most recent version of the tool for the "Calculation of the number of sample plots for measurements within A/R CDM project activities"44 approved by the CDM Executive Board.

Carbon stock changes over time must be estimated by taking measurements in plots at each monitoring event. Monitoring events must take place at intervals of 5, or preferably 3 years. For intermittent years it is good practice to use extrapolations of trends as they have occurred up till that moment. Monitoring reports can use such extrapolated parameter values for the determination of net emissions by sources and removals resulting from the project.

The design of the sampling regime will be determined by the number of strata and timber harvest the baseline case.

4.1.6 Conservative approach and uncertainty

Project proponents will also apply all relevant equations for the ex-ante calculation of net anthropogenic GHG removals by sinks with care and provide transparent estimations for the parameters that are monitored during the project crediting period. These estimates must be based on measured or existing published data where possible and project proponents should retain a conservative approach; that is, if different values for a parameter are equally plausible, a value that does not lead to over-estimation of net anthropogenic GHG removals by sinks must be selected.

An uncertainty analysis is required for all estimates from monitoring related to change in area, change in carbon stocks and emissions for both the baseline and project case.

5 ENVIRONMENTAL IMPACT

According to the latest "EIA category management list for construction projects" issued by the Ministry of Environmental Protection of People's Republic of China on Aug 15th ,[4] 2008, the forest protection project is excluded from environmental impact analysis as it is beneficial to the environmental and ecological diversity.

6 STAKEHOLDER COMMENTS

Questionnaires were distributed by the Project owner to the resident who lives in the community for the purpose of better understanding stakeholders' concerns and opinions regarding the Project. The questionnaires together with the related information of the Project were provided to the residents, including the issues on the technology applied, economic and social benefit and environmental protection etc. The content of the questionnaire includes the following information:

1. Introduction of the proposed project

2. Basic information about the interviewee

3. Questions:

1) What is your attitude towards the proposed project?

2) Whether or not the proposed project will impact to the local social/natural environmental situation?

3) What do you think the proposed project will bring to you?

4) What is your opinion and suggestion regarding the proposed project?

The Survey was conducted through distributing and collecting responses to a questionnaire. Totally 155 questionnaires returned out of 155 with 100% response rate. The following is a summary of the key findings based on returned questionnaires.

1. The level of respondents' education

The targets of this investigation are the people who will be affected by the Project. Most of them finished the middle school education, among whom 75% graduated from middle schools and 25% graduated from college or university.

2. Attitude towards the local environment

The 42% of all respondents surveyed deem that the local environmental situation is very good, 58% think it is good and general, respectively.

3. Attitude of the residents toward the Project

[4] http://www.gov.cn/flfg/2008-09/05/content_1088471.htm

The respondents generally deem that the Project will bring multiple benefits to them, particularly hoping that the Project can improve local environmental situation (95%) and increase employment opportunities (90%).

4. Conclusion

The survey shows that the Project receives very strong support from local people (97%).This is closely linked to the fact that the all respondents think the construction of the Project can bring multiple benefits to them.

In conclusion, the survey indicate that the Project has few negative impacts on local environment.

APPENDIX X: <TITLE OF APPENDIX>

Use appendices for supporting information. Delete this appendix (title and instructions) where no appendix is required.