

GHG mitigation and carbon removals summary for Project 2 and programme¹

For the 7-year GCF programme implementation period (2020-2027), the ex-ante estimate of reduced emissions and increased removals is 11.7 million tCO₂e (an estimated average of close to 1.7 million tCO₂/year). This is comprised of 7.3 million tCO₂e emission reductions (due to reduced deforestation and forest degradation), which is equivalent to a reduction of 62% compared to the Forest Carbon Partnership Facility (FCPF) Reference Level; and an increase in removals equivalent to 4.3 million tCO₂e, which is an increase of 37% compared to the removals in the Reference Level (Table 1). Projections of emission reductions and removals beyond the programme implementation period are not calculated as impacts are calculated against a RL.²

For the programme implementation period 2020-2027: This results in an estimated cost per tCO₂e of 10.04 Euro per tCO₂e) and estimated cost GHG mitigation cost to GCF equivalent to (3.21 Euro/tCO₂eq).

Table 1: Summary of GCF programme GHG mitigation impact

GHG emission / removal source	Reference Level (tCO ₂ e/year)	Annual <u>net</u> programme impact (2020-2027) 7 years (tCO ₂ e/year)	<u>Net</u> GCF programme GHG mitigation benefit (tCO ₂ e/year)	Est. <u>net</u> emission reduction Total 2020 – 2029 (tCO ₂ e/year)
Deforestation	3,748,646	32,242	3,716,403	225,696
Forest degradation	6,748,827	1,014,829	5,733,998	7,103,804
Restoration	(1,418,502)	19,107	(1,437,608)	133,746
Reforestation	(545,904)	600,386	(1,146,290)	4,202,699
Total	8,533,067	1,666,563	6,866,503	11,665,944

Table 2: Key efficiency and effectiveness indicators – Programme

	Estimated cost per tCO ₂ eq, defined as total investment cost / expected lifetime emission reductions (mitigation only) ³	
<i>GCF core indicators</i>	(a) Total programme financing	€ 117.46 million
	(b) Requested GCF amount	€ 37.56 million
	(c) Expected lifetime emission reductions over-time	11.7 million tCO ₂ eq
	(d) Estimated cost per tCO ₂ eq (d = a / c)	€ 10.04 / tCO ₂ eq
	(e) Estimated GCF cost per tCO ₂ eq removed (e = b / c)	€ 3.21 / tCO ₂ eq

¹ This document will be included in the feasibility study.

² This is a key difference with the approach utilized to calculate ERs during the development of the feasibility for the programme and hence why there is a discrepancy with the ex-ante estimates provided at that state.

³ Calculations are based on budget allocations for investment and do not consider budget allocations for PMC, M&E and incidentals

Table 3: Key efficiency and effectiveness indicators – Project 2

<i>GCF core indicators</i>	Estimated cost per tCO ₂ eq, defined as total investment cost / expected lifetime emission reductions (mitigation only) ⁴	
	(a) Total project financing	€ 56.36 (mitigation)
	(b) Requested GCF amount	€ 23.36 million (mitigation)
	(c) Expected lifetime emission reductions over-time	4.6 million tCO ₂ eq
	(d) Estimated cost per tCO₂eq (d = a / c)	€ 12.25 / tCO₂eq
	(e) Estimated GCF cost per tCO₂eq removed (e = b / c)	€ 5.08 / tCO₂eq

All key assumptions are further described in the subsequent sections. Detailed GHG calculations are provided in an Excel workbook.

Methodology used for calculating GHG mitigation benefits

The methodological approach is based on the methodology used for the preparation of the Reference Level (RL) of the Lao PDR Emissions Reduction Programme (ER-P), which was submitted and approved (in June 2018) by the FCPF Carbon Fund and is compliant with the Carbon Fund Methodological Framework⁵ and the Lao PDR's Forest Reference Emission Level and Forest Reference Level for the REDD+ Results Payment under the UNFCCC (submitted in January 2018⁶). The approach equals a Tier 3 approach under the IPCC terminology. The ER-P Reference Level accounting area covers precisely the same 6 provinces (Bokeo, Houaphan, Luang Namtha, Luang Prabang, Oudomxay and Sayaboury) as are covered by the GCF programme: the geographical footprints of the ER-P Reference Level and the GCF programme are identical.

For a detailed description of the Reference Level (RL) methodology, please refer to the ER-PD (Chapters 8 and 11) and respective Annexes (activity data, emission factors and forest degradation assessment)⁷. The same methodology will be replicated for the ex-post assessment of the achieved GHG emission reductions and removals within GCF programme, project 1, Activity 1.6 with support from JICA.⁸ This will be also use for the determination of results-based payments by the Carbon Fund for the period 2019 – 2024 for which the RL is valid. The validity beyond 2024 is subject to further international guidance by UNFCCC.

Projection of the reference level without the implementation of the GCF programme (for 6 provinces)

To ensure full consistency with the RL methodology, first, the reference level 2005 – 2015 was projected for the duration of the GCF programme (2020-2027).

⁴ Calculations are based on budget allocations for investment and do not consider budget allocations for PMC, M&E and incidentals

⁵ FCPF, 2016 available at: <https://www.forestcarbonpartnership.org/sites/fcp/files/2016/July/FCPF%20Carbon%20Fund%20Methodological%20Framework%20revised%202016.pdf>

⁶ https://redd.unfccc.int/files/2018_frel_submission_laopdr.pdf

⁷ <https://www.forestcarbonpartnership.org/lao-people%E2%80%99s-democratic-republic>

⁸ The new JICA project F-REDD will support FIPD/DoF to undertake the MRV as well as implement the National Forest Monitoring System. The methodology used will be the same and hence, we will be able to report on ex-post ERs respectively.

Table 4 Projection of the Reference Level

Category	FREL tCO ₂ e/a	Projection for programme duration 2020-2027 tCO ₂ e
Deforestation	3.748.646	26.240.519
Degradation	6.748.827	47.241.790
Reforestation	- 1.418.502	- 9.929.511
Restoration	- 545.904	- 3.821.330

Project activities were then assigned to a specific activity category and associated land use change strata. Consistent with the RL methodology and IPCC guidance, carbon removals were spread over time (20 years).⁹ Thus, if reforestation has taken place in the Reference Level, accounting of removals is spread over a period of 20 years. This recognizes that in forest ecosystems, forest biomass increase slowly over time to reach their full biomass and removal uptake takes time if there a change from lower carbon stock (non-forest land) to a higher carbon stock land use (e.g. regenerated natural forest) (IPCC 2006)¹⁰. The same approach applies to the GCF programme implementation period (restoration and reforestation are partly accounted for depending on the start date of Project 1 (7/20) and Project 2 (4/20)). The removals that may happen after programme implementation are not accounted for.

Direct emission reductions and removals

The RL is used as a basis to develop the programme scenario. Using the RL and land use change matrix, the GCF programme interventions is linked with the respective activity data. Thus, each land-based intervention of the GCF programme (Component 2 and 3 interventions)¹¹ is attributed to a specific land use class and land use change.

For example, the implementation of village forest management (Activity 3.1.1), will help protect forests from deforestation and degradation and will support regeneration of degraded forest. On average, approximately 75% of village forest management will be implemented on Current Forest/high-carbon-stock forest (EG/MD/CF/MCB) and 25% on Potential Forest (low-carbon-stock forest (P/B/RV). This is translated into a reduction of the change from MD/CF/MCB to P/B/RV (i.e. reduced forest degradation in the case of high-carbon-stock forest) and into a reduction of deforestation (P/B/RV to NF) in the case of degraded forest area.

Table 5 below summarizes the GCF programme interventions and their impacts on emission reductions and carbon removals in the land use change matrix. Considering that

⁹ For the expected removals for each five-year period, 25% for that period and for each of the next three five-year periods was accounted for. Note that, by using this methodology, removals from activities during the reference period also generate removals in the accounting period of 2020-2028.

¹⁰ IPCC (2006, Volume 4, Chapter 4.3: Land Converted to Forest Land) suggests default period of 20 year time interval for forest ecosystems to be established. See also Lao PDR ER-PD, Section 8.3.5, Step 4, available at https://www.forestcarbonpartner-ship.org/sites/fcp/files/2018/May/LaoPDR_ERPD_FinalDraftMay.2018-Clean.pdf

¹¹ Note: Project 1 used the term 'outputs' instead of components. In order to ensure alignment with the GCF Integrated Results Management Framework and new Funding Proposal Template, the term 'component' is applied under Project 2. Outputs under GCF's IRMF are "Changes delivered as a result of project/programme activities that contribute to the achievement of outcomes." – GCF. 2022. [Guidance Note to support the completion of the IRMF elements of the revised funding proposal template for PAP and SAP, p. ii.](#)

implementation of the GCF interventions is not likely to be 100% effective, adjustment factors were applied to account for imperfect effectiveness of GCF programme interventions.

For each programme and project activity (outlined in the project description) a different adjustment factor is applied. The quantitative values of the adjustment factors are based on consideration of the total implementation area and the observed deforestation/forest degradation and removals area. Further, the estimates are based on expert judgement and consultation with experts who have experience with programme implementation in Lao PDR, similar to the approach in the ER-PD development to estimate the ex-ante GHG emissions reduction potential and approval by the Technical Assessment Panel (TAP).

In total, the land-based activities of Components 2 and 3 (forestry and agricultural interventions) are expected to occur on an area of 1.6 million hectares within the selected 28 districts (30% of total district area; 5.41 million ha, or 20%, of the total 6-province area of 8.1 million ha). The interventions will be targeted towards deforestation/forest degradation hotspots¹².

¹² Please refer to programme area selection section in the feasibility study.

Table 5: Key GCF programme interventions, linkage to RL activity data and assumptions on effectiveness of interventions

Project activity	Activity 3.1. Implementation of village for- est management		Activity 3.2 National conservation forest management (NPAs)		2.1 Promotion of private sector investments in community-based agroforestry	Activity 2.1-2.4. PSAP ¹³	Activity 2.1-2.4. PSAP ⁸
REDD+ activity	3.1. Reduced forest degradation	3.1. Restoration and avoided deforesta- tion	3.2 Reduced forest deg- radation	3.2 Restoration and avoided deforestation	2.4. Reforestation	2.1-2.4. Re- duced for- est degra- dation	2.1-2.4. Reduced deforesta- tion
Intervention area Project 1	150,000	50,000	502,500	167,500	10,000	14,400	14,400
Intervention area Project 2	195,000	65,000	297,750	99,250	-	17,100	17,100
Total Intervention area	345,000	115,000	800,250	266,750	10,000	31,500	31,500
Effectiveness Fac- tor ¹⁴	2%	15%	2%	15%	80%	15%	15%
Reduced area due to effectiveness factor Project 1	3,000	7,500	10,050	25,125	8,000	2,160	2,160
Reduced area due to effectiveness factor Project 2	3,900	9,750	5,955	14,888	-	2,565	2,565
Reduced area due to effectiveness factor reduction (use of new change matrix)	6,900	17,250	16,005	40,013	8,000	4,725	4,725
LUC matrix from:	MD/CF/MCB	P/B/RV	MD/CF/MCB	P/B/RV	NF	MD/CF/MC B	P/B/RV

¹³ Promotion of sustainable, climate resilient and deforestation free agricultural practices and technologies

¹⁴ Factor that reduces deforestation / forest degradation compared to Reference level

LUC matrix to:	P/B/RV	MD/CF/MCB	P/B/RV	MD/CF/MCB	P/B/RV	P/B/RV	NF
Emission factor	257	(257)	257	(257)	(48)	257	48
Impact category	Degradation	Restoration	De-gradation	Restoration	Reforestation	De-gradation	Deforestation

Result of activity data on direct and indirect emission reduction and removals

As a result of the implementation programme activities the GCF programme will achieve:

- A reduction of deforestation and forest degradation of 32,355 ha
- An increase of restoration equivalent to 57,000 ha and 8,000 ha reforestation.

	impact area Pro- ject 1	impact area Pro- ject 2	programme im- pact area
	ha	ha	ha
Deforestation	2.160	2.565	4.725
Degradation	15.210	12.420	27.630
Reforestation	8.000	-	8.000
Restoration	32.625	24.638	57.263
Total	57.995	39.623	97.618

To maintain conservative assumptions in the overall programme impact most activities addressing deforestation are accounted for as degradation.

Emission/Removal factors (E/R factors)

For all calculations, the following emission and removal factors were used, fully consistent with the RL methodology (see ER-PD Chapter 8 and Emission and Removal Factor Report¹⁵). The emission factors are Tier 3 factors according to the IPCC definition. The following Table summarizes the carbon stock and the carbon stock changes for land use changes.

Table 6: Assumed and quantified carbon stocks for forest and non-forest land cover types

Land cover classification code	Land cover classification	Above-ground and below- ground carbon stock (tCO ₂ e)
EG	Evergreen Forest	733.43
MD/CF/MCB	Mixed Deciduous Forest / Coniferous Forest / Mixed Coniferous and Broadleaved Forest	322.89

¹⁵ Lao PDR, Department of forestry, March 2018 available at: https://www.forestcarbonpartnership.org/sites/fcp/files/2018/March/Annex%2011%20-%20LaoPDR_ERPD%20EF%20%20Report_0323.pdf

DD	Dry Dipterocarp Forest	158.33
P/B/RV	Forest Plantation / Bamboo / Regenerating Vegetation	65.78
NF	Non-Forest	18.02

Table 7: E/R factors for land use changes (tCO₂e) for above-ground and below-ground biomass

	EG	MD/CF/MCB	DD	P/B/RV	NF
EG	-	-410.5	-575.1	-667.6	-715.4
MD/CF/MCB	410.5	-	-164.6	-257.1	-304.9
DD	575.1	164.6	-	-92.6	-140.3
P/B/RV	667.6	257.1	92.6	-	-47.8
NF	715.4	304.9	140.3	47.8	-

Note: Legend and color codes apply from **Error! Reference source not found.** above. Negative figures indicate GHG emissions; positive figure indicate carbon removal

In total, compared to the RL, the GCF programme will achieve emission reductions and removals of 11.7 million tCO₂e over the programme implementation period 2020-2027.

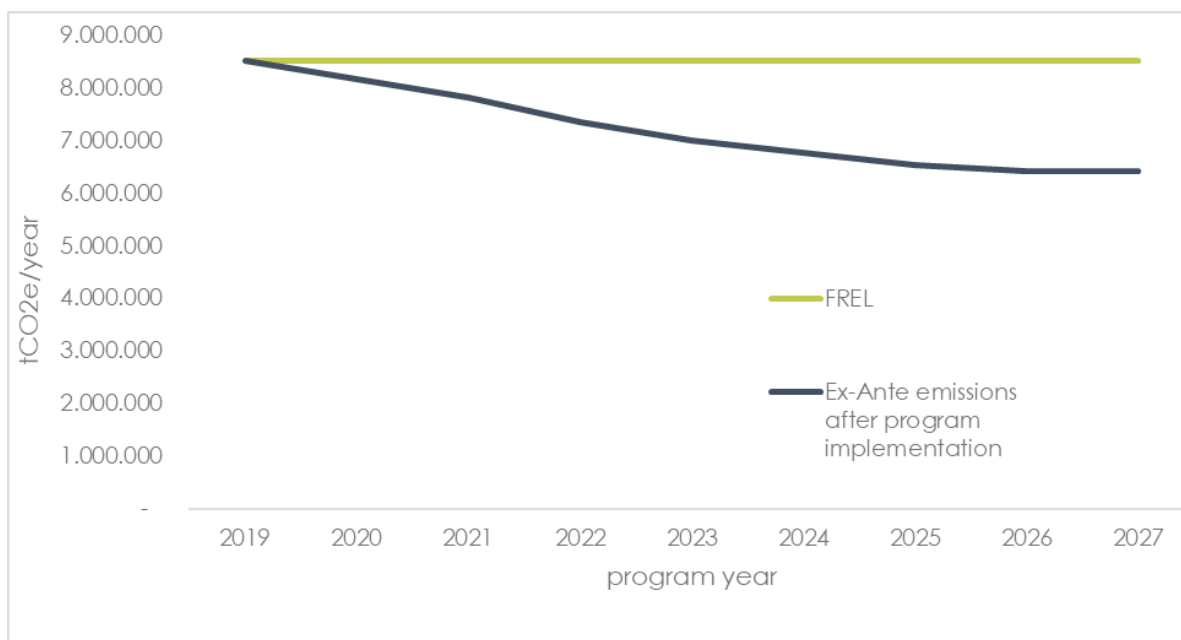


Figure 1: Indicative programme performance against RL

Based on experience in similar projects, however, it is reasonable to assume that project activities, especially those that relate to reducing deforestation, will grow in effectiveness over time as agricultural and forestry sector transformation take place in the country.