VERIFICATION REPORT

Results-Based Payments under the Central African Forest Initiative – Gabon Partnership

Gabon National Results Report (2016-2017)

Document prepared by AENOR INTERNACIONAL S.A.U.

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1. INTRODUCTION

1.1. Objective

The objective of the verification was the independent evaluation of the results in reducing emissions from deforestation and forest degradation Gabon at national level for the period 2016-2017 in comparison to the results-based payment (RBP) baseline (period 2006-2015), reported in the document *Gabon National Results Report - Results-Based Payments under the Central African Forest Initiative – Gabon partnership.*

1.2. Scope

The scope of the verification was limited to the following indicators:

- Emissions from deforestation and forest degradation at the national level 2006-2015 and 2016-2017.
- Emission reductions measured as tones CO_2, including all sources of emissions within the scope of the RBP, for the results years 2016-2017.

Additionally, a technical assessment of the removals at a national level during the period 2006-2015 and 2016-2017 is be provided (see Annex 4).

1.3. Criteria

The criteria for assessing the reported results were the correct application of the methodology used for the definition of the *Gabon's Proposed National REDD+ Forest Reference Level* (FREL) of December 2020, applied to the periods 2006-2015 and 2016-2017. Both Parties of the Gabon-CAFI Partnership agreed that the verification of the first RBP would be based on the same principles outlined by the MRV Protocol of bilateral agreements of the Indonesia-Norway partnership. These criteria are specified in the following documents:

- Gabon's Proposed National REDD+ Forest Reference Level (December 2020).
- MRV protocol for the Indonesia-Norway partnership on climate, forests and peat.

Additionally, the following documents were used as guidance:

- 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
- 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands.
- 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories
- Accounting and reporting requirements and agreed format for accounting and reporting, as agreed in the LOI between Gabon and CAFI, and minutes of the meeting October 13th, 2020.
- Architecture for REDD+ Transactions REDD+ Environmental Excellence Standard (ART-TREES) 1.0.
- Good Practice Guidance for Land Use Land-Use Change and Forestry (2003).

- Good Practice Guidance and Uncertainty Management in National GHG Inventories. (2000).
- Global Observation of Forest and Land Cover Dynamics (GOFC-GOLD) REDD+ Sourcebook (2016).
- GFOI Methods and Guidance Documents (2013&2016) and supplementary modules.
- ISO 14064-3:2019 Part 3: Specification with guidance for the verification and validation of greenhouse gas statements (2019).

1.4. Level of assurance and materiality

The assessment was conducted to provide a reasonable level of assurance of conformance against the defined audit criteria within the audit scope. Based on the audit findings, a positive evaluation statement reasonably assures that the greenhouse gas (GHG) assertion is materially correct and credible.

The threshold for materiality with respect to the aggregate of errors, omissions, and misrepresentations relative to the total reported GHG emission reductions was five percent.

2. AUDIT PROCESS

2.1. Audit team

The audit team consisted of the following members:

Role	Name
Project Manager and Verifier 2	Jose Luis Fuentes
Verifier Team Leader	Juan Carlos Gómez
Verifier 1	Miguel López
Technical Reviewer	Elena Llorente

José Luis Fuentes is the manager of the Climate Change Unit of AENOR. He is a Forestry Engineer and has a Master's in Business Administration and a Post-Graduate in Environmental Management. He has more than 15 years of experience in auditing, consulting, and training activities related to environmental and carbon management projects. Jose Luis has actively participated in the audit of international sustainable development projects in several carbon schemes, such as the Clean Development Mechanisms (CDM), Verified Carbon Standard (VCS), Climate, Community and Biodiversity Standards (CCB), Gold Standard (GS) and carbon footprints (ISO 14067 and ISO 14064). Jose Luis has extensive technical knowledge about the regulatory framework, policies and technical provisions emanating from the Paris Agreement, the Kyoto Protocol and the Conferences of the Parties.

Juan Carlos Gómez is a Forestry Engineer and holds a Master in Sustainable Development and Corporate Responsibility. He has more than 6 years of experience in climate change mitigation, adaptation and MRV of LULUCF and REDD+. He has worked in LATAM countries, Africa and Asia, auditing REDD+ under VCS and CCB, and forestry projects under the CDM and JI. He has also audit national REDD+ programs for results-based payments and the Jurisdictional and Nested REDD+ (JNR).

Miguel López is a Forestry Engineer with more than 7 years of experience working in and with developing countries in fields related to community development; natural resources conservation-use; forest management, monitoring and reporting. He has large experience developing and managing programs for rural/indigenous development. He has worked and lived for 4 years in between Claveria in Northern Mindanao at the Philippines, Leticia in the Colombian Amazon, or the rural Gujarat in India.

Elena Llorente has a degree in Environmental Sciences and more than 14 years of professional experience in climate change and sustainability projects. She has worked for the UNFCCC, specifically in the management of carbon and climate change as an auditor and technical reviewer of projects and programs of mitigation activities under different types of carbon standards such as CDM and JI of the UNFCCC, VCS and Gold Standard.

Annex 11 contains the certificates of qualification of the members of the audit team for the verification and technical review of the *Results-Based Payments under the Central African Forest Initiative – Gabon Partnership. Gabon National Results Report (2016-2017)*.

2.2. Method and considerations

The verification was performed through a combination of document review, interviews, and communications with relevant personnel. The conformity of the determination of emission reductions was evaluated against the criteria set forth in Section 1.3. As described below, findings were issued to ensure that all requirements were met.

A specific sampling plan was developed to guide the verification auditing process to ensure efficiency and effectiveness. The purpose of the sampling plan was to present a risk assessment for determining the nature and extent of the verification procedures necessary to ensure the risk of auditing error was reduced to a reasonable level. The validation sampling plan methodology was derived from all items of auditing process stated above. Specifically, the sampling plan utilized ISO 14064-3:2019 as guidance. The risk assessment was based on:

- The inherent risks of discrepancies for each variable used to estimate emission source and the GHG reporting system.
- The risk that controls are insufficient to detect and prevent each inherent risk from causing a discrepancy in the GHG assertion.
- The potential magnitude of each inherent and control risk described above resulting from the contribution of the associated emission source.

This information was used to develop an appropriate verification procedure for each identified risk. Each procedure was designed to reduce the probability that the verification would not detect a discrepancy that has not been corrected by the technical team responsible for the control. Any modifications applied to the verification sampling plan were made based upon the conditions observed in order to detect the processes with highest risk of material discrepancy.

The following elements included in the *Gabon National Results Report - Results-Based Payments under the Central African Forest Initiative – Gabon partnership* constitute a risk classified as low, where it is not expected to have further findings or discrepancies regarding the procedures followed since these simply must comply with the pre-set definition:

- Area and geographical boundaries.
- Carbon pools and types of GHG included.
- Forest, deforestation, forest degradation, and logging definitions.

Although the methodology for activity data collection, emission factors development and emissions calculation are compiled and described in *Gabon's Proposed National REDD+ FREL*, this proposal has not been yet submitted to the UNFCCC and has not been subjected to a technical analysis (TA). Thus, and considering there may be a level of risk inherently related to remote estimation processes, the next aspects were considered of medium risk by the audit team. Therefore, they were assessed more thoroughly:

- Emission factors.
- Land use and land use change analysis.
- Gross deforestation calculation.
- Gross forest degradation calculation.
- Emissions from deforestation and forest degradation calculation.
- Logging emissions calculation.

In AENOR's opinion, the verification has turned out to be of medium risk taking into account that: 1) the methodology used for the determination of the FREL and the RBP baseline and reduction results has not yet been subjected to a TA from UNFCCC, and 2) that there has not been prior elaboration of national inventories, national communications (NC) nor biennial update reports (BUR) using the proposed methodology that would have allowed the learning and improvement of the processes, protocols, etc. Therefore, the risk of errors, discrepancies or omissions was considered medium.

The audit team focused its activity during the verification process on ensuring that the procedures carried out for the calculation of deforestation and forest degradation and the reduction of deforestation and forest degradation emissions have been carried out following the same methodology as the used in *Gabon's Proposed National REDD+ FREL*. Simultaneously, the appropriateness of the methodology and its adherence with the principles set by the MRV Protocol of bilateral agreements of the Indonesia-Norway partnership were assessed, as agreed by the parties of the CAFI-Gabon partnership for the first RBP.

AENOR reproduced and verified 100% of the calculations in the calculation spreadsheets *Gabon_NRR_Workbook_V4* and *Gabon_FRL_MASTER_Workbook_18.12.20* for the estimation of emissions from deforestation and forest degradation for the period 2006-2015 and 2016-2017 and emissions reductions for the period 2016-2017. It was verified that the data necessary to calculate GHG reductions were adequately provided and reproducible.

The geographical boundaries and the deforested and degraded areas during the monitoring period were verified using the subnational land allocation shapefiles, land use change matrices and the data provided by SIRS (2020) for the period 1990-2018.

Carbon pools, forest classes and emission factors were 100% verified and checked against *Gabon's Proposed National REDD+ FREL* and the source literature.

Some errors were identified and subsequently corrected. These findings are detailed in Annex 9. All non-conformities have been successfully closed.

Due to the exceptional situation caused by the COVID-19 crisis and the travel restrictions established by governments for safety reasons, an in-country visit was not possible as part of the verification process. Instead, on December 17th, 2020, a remote technical session was carried out, in which members of the audit team interviewed relevant staff responsible for the monitoring and reporting of the reduced emissions from deforestation and forest degradation.

Based on the assessment carried out, AENOR confirms with a reasonable level of assurance that the claimed GHG emission for the period 2006-2015 and 2016-2017 and the claimed GHG emissions reductions for the period 2016-2017 are free from material errors, omissions, or misstatements.

In addition, AENOR confirms that sufficient evidence was presented and that there is a clear audit trail that contains the evidence and records that validate the stated figures in this Verification Report since:

- The evidence available and presented to AENOR is sufficient. 100% of the data used in the calculations have been provided to achieve the final amount of GHG emissions and GHG emissions reduction reported.
- The nature of the evidence is adequate. The raw data were collected from reliable sources. They are detailed in the *Gabon National Results Report* and have been provided to the verification team. The complete list is detailed in Annex 6.
- Evidence were cross-checked. AENOR verified the information provided and reproduced the calculations.

Hence, AENOR confirms that the stated figures in the *Gabon National Results Report* are correct and confirms that is able to certify the deforestation and forest degradation emissions reductions based on verifiable and reliable evidence.

2.3. Document review

AENOR carried out a thorough review of the documentation provided by the Conseil National Climat (CNC), to verify compliance with the verification criteria. The reviewed documentation includes, among others:

- *Gabon National Results Report - Results-Based Payments under the Central African Forest Initiative – Gabon partnership* (December 2020).
- *Gabon's Proposed National REDD+ Forest Reference Level* (December 2020).
- Lee and SIRS 2020 subnational land allocation maps.
- National and subnational land use change matrices.
- Estimation of forest sector activity data in Gabon between 1990 and 2018 from SIRS 2020.
- Timber production FRM 2020 raw data.
- Emissions calculation spreadsheet *Gabon_FRL_MASTER_Workbook_18.12.20* and *Gabon_NRR_Workbook_V4*.

Annex 6 contains the complete list of the documentation reviewed during the verification process.

2.4.Remote technical session

The remote technical session was conducted on December 17th, 2020. The main objectives of the session were to:

- Understand in practice the processes for gathering activity data of deforestation, degradation, logging, and removals (remote sensing analysis, national timber production volume, auxiliary historical data on administrative areas and any other source used).
- Understand the methodological steps for the determination of emissions from deforestation, from forest degradation and from logging, the removals from forest lands, the emissions reductions and the results reported under the RBP system.
- Understand the uncertainty estimation methods and the QA/QC procedures used.
- Understand the institutional arrangements put in place for the monitoring and reporting of the reduced emissions.

During the technical session, the audit team had the opportunity to listen and raise their questions to the technical team responsible for gathering and processing the activity data and for the calculation of emissions and emissions reductions.

The audit team was able to follow in an exhaustive manner, together with the responsible technicians, the process of data monitoring, emissions estimation, and results reporting. AENOR considers that the personnel responsible for the *Gabon National Results Report* are fully trained and that the quality control and quality assurance procedures to identify, review and manage the inconsistencies found are comprehensive and properly implemented.

Annex 8 contains the lists of the attendants to the meetings held during the technical session.

2.5.Resolution of non-conformities

As a result of the verification process, the audit team identified a several findings, raised as non-conformities (NC). NC can be issued due to:

- Failure to comply with the criteria established in Section 1.3.
- Insufficient evidence provided to prove compliance.
- Errors when applying assumptions, data or calculations that would affect the estimation of emission reductions.

The findings raised during the verification process, and the responses for their closure, are described in Annex 9.

All findings issued by the AENOR audit team during the verification process have been closed.

2.6.Internal quality control

The Verification Report has undergone an internal quality control process through a technical review, once the assigned verification team issued its final opinion. The technical reviewer is a qualified member of AENOR, independent of the team that carried out the verification. The technical reviewer or the team assigned for such review are qualified in the relevant technical areas.

3. VERIFICATION FINDINGS

3.1. Area and geographical boundaries

The geographical boundary and area covered by RBP under the CAFI-Gabon partnership is defined in the *Gabon National Results Report* as the land area within the political borders recognized by Gabon. Thus, deforestation, forest degradation, logging and removals are monitored and reported at a national level. The accounting area comprises a total of 26,766,700 ha.

The audit team verified that the definition of boundaries is consistent with *Gabon's Proposed National REDD+ FREL* and the CAFI-Gabon partnership agreements. AENOR verified, through the GIS data, that boundaries and areas considered for the determination of the RBP baseline and the emissions reductions are correct.

3.2. Emission sources, pools and GHG

The emission sources considered for the RBP of the CAFI-Gabon Partnership were those from deforestation, from forest degradation and from logging (selective timber harvesting). Emissions from deforestation and forest degradation are accounted for all the land area except for logging concessions areas. Emissions from logging, on the contrary, are considered to be sourced from logging concessions areas exclusively. The activity data (AD) used for the estimation of logging emissions (timber production data) is not spatially specific, but it is assumed that, due to Gabonese forest management legislation, all commercial timber is extracted solely from logging concessions areas. For more detail regarding subnational land allocations, see section 3.4.

The carbon pools included as part of the RBP baseline and reductions are aboveground living tree biomass (AGB) and belowground living tree biomass (BGB). No other carbon pool is included.

The only GHG considered is carbon dioxide from changes in carbon stocks, reported as CO_2.

AENOR verified that the emission sources, carbon pools and GHG considered are in accordance with *Gabon's Proposed National REDD+ FREL*.

3.3. Definitions

The AENOR team verified that the definitions are consistent with those used in *Gabon's Proposed National REDD+ FREL*. The definitions of deforestation and forest degradation are in line with the guidance and recommendations provided by the GOFC-GOLD REDD+ Sourcebook (2016).

Forest

Tree formation covering at least 30% of the soil over more than 1 ha and more than 20 m wide with trees at least 5 meters high, but not subject to any agricultural practice. It does not include land that is predominantly under agricultural or urban land-use.

Four forest subdivisions or stratifications are used at a national level, derived from remote sensing. These subdivisions are further subdivided according to current ecological understanding. The forest classes are aggregated or divided depending on the GHG sources considered and the emission factors used for the estimation of emissions, as summarized in the table below.

National level subdivision (remote sensing forest classes)	Forest types according to ecological understanding	Forest types aggregation for estimation of emissions from deforestation and degradation
Dense Forest	Old Growth Forest	Old Growth Forest, Old Secondary Forest, and Older logged Forest (mixed category, single average EF1)
	Old Secondary Forest	
	Older logged Forest	
Flooded Forest	Flooded Forest	
Secondary Forest	Young Secondary Forest	Secondary Forest (EF2)
	Degraded	
	Logged Forest	
	Colonising forest	
Mangrove Forest	Mangrove Forest	NA[1]

EF: Emission factor

Deforestation

Human-induced conversion of forest land to a 'permanent' non-forest land-use category (i.e. a change in forest cover and/or land-use which has been observed for at least 10 years and is considered permanent).

Forest degradation

The reduction in biomass when a change in forest cover and/or land-use is not considered as permanent. This includes shifting agriculture and other unknown forms of degradation.

Logging

Logging includes loss of forest carbon stocks caused by felling of trees, creation of haul roads, skid trails and log yards as part of selective timber harvesting activities.

3.3.1. Deforestation and forest degradation classification criteria

The remote sensing coding criteria for deforestation and degradation is in accordance with the criteria used by SIRS in the source document *Estimation des données d'activités du secteur forestier au Gabon entre 1990 et 2018*. The coding criteria is presented in Annex 19.2 of the *Gabon National Results Report*. As a general basis, a "period" approach is used, in which 5 years differences are considered:

Deforestation: the change in land cover/use is classified as deforestation when a polygon is coded as forest (any class) for assessment year *y* and as non-forest for the two consecutive assessment years (*y*+5, *y*+10).

[1] Mangrove forest were included in the analysis for the estimation of deforestation and forest degradation. However, no deforestation nor forest degradation were detected and reported for mangrove forests for the periods 2006-2015 and 2016-2017.

Forest degradation: the change in land cover/use is classified as degradation either when:

i. a polygon is coded as Dense Forest for assessment year *y* and as Secondary Forest for the consecutive assessment year (*y*+5); or
ii. a polygon is coded as forest (any class) for assessment year *y*, non-forest for the following assessment year (*y*+5), and forest for the subsequent assessment year (*y*+10).

The document elaborated by SIRS indicates that satellite imagery from 2000, 2005, 2010, 2015, 2018 and 2019 were used for the assessment periods 2000-2005, 2005-2010, 2010-2015 and 2015-2018. The criteria of considering the assessment year y+5 and y+10 was used for the periods 2000-2005 and 2005-2010. The following table summarizes the interpretation criteria as used in the *Gabon's Proposed National REDD+ FREL*:

Assessment year				Interpretation
Y	Y+5	Y+10	Y+15	
Dense forest/ Secondary Forest	Non-forest	Non-forest	Secondary Forest	Deforestation over the period Y−Y+5, stable over Y+5−Y+10, regeneration over Y+10−Y+15.
Dense forest	Secondary Forest	Secondary Forest	Secondary Forest	Degradation over period Y−Y+5, then stable between the following periods,
Dense forest	Non-forest	Secondary Forest	Secondary Forest	Degradation over period Y−Y+5, regeneration over Y+5−Y+10, stable over Y+10−Y+15.
Dense forest/ Secondary Forest	Dense forest/ Secondary Forest	Dense forest/ Secondary Forest	Non-forest	Stable over the periods Y−Y+5 and Y+5−Y+10. Not knowing what happens between Y+15−Y +20, the event is considered as deforestation if the surface is in an area classified as *Other Land Allocation – Agricultural Areas,* and degradation in the rest of the cases.
Non-forest	Secondary Forest	Secondary Forest	Secondary Forest	Regeneration over the period Y−Y+5, stable over Y+5−Y+10 and Y+10−Y+15.
Dense forest/ Secondary Forest	Non-forest	Non-forest	Non-forest	Deforestation over the period Y−Y+5, stable over Y+5−Y+10 and Y+10−Y+15.

Using the same criteria for the periods 2010-2015 and 2015-2018 would require waiting for the satellite imagery of 2020 and 2025 to be available. Instead, analysis of satellite imagery from 2018 and 2019 were used and the following criteria were applied to interpret changes for the period 2015-2018:

Assessment year 2015	2018	2019	Interpretation
Dense forest	Secondary Forest	Secondary Forest	Degradation over period the period 2015−2018.
Dense forest/ Secondary Forest	Non-forest	Non-forest	Deforestation over period the period 2015−2018.
Dense forest	Non-forest	Secondary Forest	Degradation over period the period 2015−2018.
Non-forest	Secondary Forest	Secondary Forest	Regeneration over the period 2015−2018.
Class A	Class A	Class A	Stable over the period 2015−2018.

Finally, to classify the land use/cover changes for the period 2010-2015, the criteria below is followed. Since there are no imagines available for 2020, the interpretation of the period 2015-2018 (previous table) is required in some cases to interpret the land use/cover change for the period 2010-2015. Thus, the same land use/cover change from 2010 to 2015 could have different interpretations depending on what is the interpretation of the specific polygon for 2015-2018 (i.e., using the assessment years 2015, 2018 and 2019).

Assessment year 2010	2015	Interpretation 2015-2018	Interpretation 2010-2015
Dense forest	Secondary Forest	Deforestation	Deforestation over period the period 2010−2015.
Dense forest	Secondary Forest	Degradation	Degradation over period the period 2010−2015.
Dense forest/ Secondary Forest	Non-forest	Deforestation	Deforestation over period the period 2010−2015.
Dense forest	Non-forest	Degradation	Degradation over period the period 2010−2015.
Non-forest	Secondary Forest	Secondary Forest	Regeneration over the period 2010−2015.
Class A	Class A	Class A	Stable over the period 2010−2015.

The audit teams considered this method to be appropriate for estimating deforestation and forest degradation of the periods 2010-2015 and 2015-2018 without the data from 2020 and 2025. The method is considered to be conservative, since the only risk is to overestimate deforestation to the detriment of degradation over the period 2015-2018, which is the results period (2016-2017) of the RBP.

3.4.Land classification based on subnational land allocation categories

Following Gabon's National Land Allocation Plan, which considers 6 subnational land allocation categories (plus a seventh category *unallocated land*), the whole territory of Gabon is divided in 4 subnational allocation categories as follow:

- Logging Concessions: concessions allocated for industrial permits for selective timber harvesting (production zones). It also includes Community Forests (forests allocated to a village community with a view to carrying out sustainable activities under a management plan).

- Protected Areas: areas that have national protection status and that do not overlap with active production zones.

- Rural Areas: areas in a 3 km radius around villages (excluding the rest of categories).

- Other Land Allocation: includes Agricultural Areas (industrial agriculture concessions, ranches, and agricultural set-aside zones in logging concessions), Conservation set-aside zones (conservation and protection set-aside zones inside agricultural concessions and logging concessions) and Unallocated land.

This land classification is based on a combination of land use and administrative criteria and is overlayed to the IPCC land-use categories, i.e., any IPCC land use category (forest land, cropland, grassland, wetland, settlement, and other land) can be located in any of the 4 subnational allocation categories in which the country is divided.

The subnational allocation categories are used in *Gabon National Results Report* to determine the activity data used for the estimation of GHG emissions and removals. Emissions from deforestation and forest degradation are determined using activity data (land use/cover change) collected through remote sensing in the areas classified as Protected Areas, Rural Areas and Other Land Allocation. The land use/cover changes detected using remote sensing in areas classified as Logging Concessions are not used to determine emissions. Instead, timber volume production data is used to determine logging emissions. The use of different methodological approaches could lead to methodological inconsistences. However, it is the opinion of the audit team that enforcement of Gabon's forest laws removes this risk.

The areas and boundaries of the subnational land allocations in which Gabon is divided have changed in each remote sensing assessment year due to administrative (changes on logging concessions, new protected areas, etc.) and land use changes. The following table summarizes the evolution of total area of each subnational land allocation.

Assessment year	Rural Area (ha)	Logging Concession (ha)	Protected Area (ha)	Other Land Allocation (ha)	Total Land (ha)
2005	2,409,083	14,383,136	1,924,292	8,050,190	26,766,700
2010	2,383,918	13,478,967	3,710,728	7,193,087	26,766,700
2015	2,038,646	14,447,663	3,818,044	6,462,348	26,766,700
2018	1,771,902	15,752,606	3,817,903	5,424,289	26,766,700

The audit team verified the reported total areas of the subnational land allocations by crosschecking them with the GIS data and the land use change matrices. Both the criteria for subnational allocation classification and the total areas are consistent with *Gabon's Proposed National REDD+ FREL*.

3.5. Reference period

AENOR verified that the reference period considered for the elaboration of the RBP baseline was 2006-2015, as agreed in the meeting Gabon-CAFI on October 13th, 2020 (meeting minute).

3.6.Deforestation and forest degradation activity data

AENOR verified that the methodology used for the quantification of the deforestation and forest degradation for the periods 2006-2015 and 2016-2017 was consistent with the methodology used in *Gabon's Proposed National REDD+ FREL*. The methodology and main data are derived from the document *Estimation des données d'activités du secteur forestier au Gabon entre 1990 et 2018* (SIRS, 2020).

Deforestation and degradation activity data is collected form remote sensing analysis and processing. A semi-random sampling method is used, dividing the study area (whole area of Gabon) into vector blocks of 20km × 20km, then randomly selecting Primary Sampling Units (PSUs) of 2 km × 2 km in each of these blocks. A two-stage sampling approach was implemented by selecting Secondary Sampling Units (SSUs) of 30mx30m within the PSUs. A total of 665 PSUs were analysed for Gabon. The same 665 PSUs were analysed for each assessment year (2000, 2005, 2015, 2018 and 2019).

Landsat 7/8 images (2000 to 2015), SPOT7 (2015) and Sentinel2 (2015 to 2019) were used for the analyses. Digitization was done using GIS software. The shapefile containing the 665 PSUs was updated with the analyses for each assessment year. An attribute field was added for each of these years so that a final single attribute field per year was created containing the corresponding land cover and land use code. These codes are a subdivision of IPCC land use categories, as presented in Table 2 of the *Gabon National Results Report and* are independent of the land classification based on subnational land allocations described in section 3.4 of this report.

The estimates are based on the direct expansion method (Sannier et al., 2014) which produces forest cover and forest cover change estimates based on samples alone. Land use and land use change area estimates are derived directly from the sample data of the PSUs using the following equations:

$$\bar{y}_c = \frac{1}{n} y_i$$

Where:

- $\bar{y}_c$ proportion of class *c,*
- y_i proportion of segment *i* covered by class *c*,
- n number of segments in the sample.

And:

$$\hat{Z}_c = D * \bar{y}_c$$

Where:

- $\hat{Z}_c$ estimate area of class *c*,
- D study area.

The application of the direct expansion method, which is dependant to the study area considered, entails that land use and land use are changes vary depending whether the method is applied at a nation level (without any other subdivision), as in SIRS (2020), or is applied considering the subnational land allocation categories. As it is stated on *Gabon's Proposed REDD+ FREL:*

- At the national level, proportions are derived from all PSUs, and are multiplied by the area of Gabon.
- At the sub-national level, the proportions change since only the areas of the PSUs involved in a layer are considered to derive these proportions, which are then multiplied by the area of the layer concerned.

The following tables from *Gabon's Proposed REDD+ FREL* summarises the difference in the estimation of forest cover between the sub-national level (used for the RBP) and the national level analysis:

Assessment year	Forest cover – Subnational level (ha)	Forest cover – National level (ha)	Difference (ha)	95% CI
2005	23,717,107	23,663,312	+53,795	532,580
2010	23,757,101	23,619,984	+137,117	529,886
2015	23,746,349	23,607,573	+138,776	529,896
2018	23,724,074	23,600,088	+123,987	530,179

Assessment period	Deforestation (ha)			Degradation (ha)		
	Subnational level	National level	Difference	Subnational level	National level	Difference
2005-2010	38,530	38,121	+409	47,447	49,463	-2,016
2010-2015	60,956	63,082	-2,126	44,454	46,041	-1,587
2015-2018	69,017	70,384	-1,367	28,090	27,956	+134
Total	168,503	171,587	-3,084	119,991	123,460	-3,469

The *Gabon's Proposed REDD+ FREL* stated that all observed differences between the sub-national and national level analyses are small and fall within the 95% CI of the national level estimates.

The audit team cross-checked the land cover and land used change data contained in the calculation spreadsheets *Gabon_NRR_Workbook_V4* and *Gabon_FRL_MASTER_Workbook_18.12.20* with the activity data (forest cover, deforested and degraded areas) reported in the *Gabon's Proposed REDD+ FREL,* the report *Estimation des données d'activités du secteur forestier au Gabon entre 1990 et 2018* and the land use change matrices. No discrepancy was found.

The following table summarizes the monitored deforestation and degradation activity data used for the estimation of emissions for the RBP baseline period (2006-2015) and the results period (2016-2017) per subnational allocation category and forest class.

Deforestation (Forest land to other land uses) (ha)						
Year	Protected Areas		Rural Areas		Other Land Allocation	
	Old growth, old secondary, older logged	Young secondary and degraded	Old growth, old secondary, older logged	Young secondary and degraded	Old growth, old secondary, older logged	Young secondary and degraded
2006	0	0	646	852	1,044	95
2007	0	0	646	852	1,044	95
2008	0	0	646	852	1,044	95
2009	0	0	646	852	1,044	95
2010	0	0	646	852	1,044	95
2011	108	49	946	978	6,360	1,794
2012	108	49	946	978	6,360	1,794
2013	108	49	946	978	6,360	1,794
2014	108	49	946	978	6,360	1,794
2015	108	49	946	978	6,360	1,794
2016	12	24	2,307	3,453	5,138	1,948
2017	12	24	2,307	3,453	5,138	1,948

Year	Degradation (Forest land remaining Forest land) (ha)			Degradation (Forest land to other land uses) (ha)					
	Protected Areas	Rural Areas	Other Land Allocation	Protected Areas		Rural Areas		Other Land Allocation	
	Old growth, old secondary, older logged to Young secondary and degraded			Old growth, old secondary, older logged	Young secondary and degraded	Old growth, old secondary, older logged	Young secondary and degraded	Old growth, old secondary, older logged	Young secondary and degraded
2006	2,592	0	16	14	8	1,719	1,742	500	379
2007	2,592	0	16	14	8	1,719	1,742	500	379
2008	2,592	0	16	14	8	1,719	1,742	500	379
2009	2,592	0	16	14	8	1,719	1,742	500	379
2010	2,592	0	16	14	8	1,719	1,742	500	379
2011	0	0	276	9	0	371	2,229	1,325	1,431
2012	0	0	276	9	0	371	2,229	1,325	1,431
2013	0	0	276	9	0	371	2,229	1,325	1,431
2014	0	0	276	9	0	371	2,229	1,325	1,431
2015	0	0	276	9	0	371	2,229	1,325	1,431
2016	47	0	321	42	64	216	836	1,292	451
2017	47	0	321	42	64	216	836	1,292	451

As mentioned before, deforestation and forest degradation activity data from areas classified as Logging Concessions under the subnational land allocation categorization were not used for emissions estimations.

3.7. Logging activity data

The activity data for logging emissions are a compilation of multiple sources of declared timber production. According to *Gabon's Proposed National REDD+ Forest Reference Level*, a study was conducted with the aims of analysing all existing declared timber production volume data from different sources to produce a single time-series composed of the most reliable data, and comparing the declared production volumes to exported volumes (FRM Ingenierie, 2020) to examine data discrepancies and potentially identify any unregistered or undeclared timber in the production volume data.

Thus, declared production volume data were compiled from all known sources. Based on expert knowledge of the country and sources, the data were cleaned and filtered to produce a single dataset timber volume data from various sources. Exported timber weight data from the official national data set (*Tableau de Bord de l'Economie* - TBE) were used to validate the timber production data. Existing discrepancies between the two data sets were addressed by the conservative approach of creating a single data set with maximum extracted volume per year. This approach was taken considering that discrepancies among declared timber production volume and export volume illustrates that 'illegal logging' is captured as part of that information (FRM Ingenierie, 2020). Illegal logging can include a variety of elements such as logging in the wrong area, logging smaller diameters, logging the wrong species, logging beyond the authorised volume etc.

The following table shows the two original data sets and the consolidated logging activity data set.

Year	Registered Production Volume (m^3)	Exported Volume (m^3)	Logging activity data (consolidated volume data) (m^3)
2006	3,220,000	2,821,130	3,220,000
2007	3,433,000	3,357,642	3,433,000
2008	3,169,000	2,915,471	3,169,000
2009	2,666,000	2,286,193	2,666,000
2010	1,841,000	1,897,406	1,897,406
2011	1,590,000	1,244,336	1,590,000
2012	1,221,000	1,393,027	1,393,027
2013	1,613,000	1,269,707	1,613,000
2014	1,625,000	1,339,128	1,625,000
2015	1,450,000	1,481,377	1,481,377
2016	1,523,163	1,515,835	1,523,163
2017	1,867,755	1,663,306	1,867,755

The audit team crosschecked the declared timber volume production and exported timber volume data sets used for the compilation of the logging activity data set in the *Gabon_NRR_Workbook_V4* and *Gabon_FRL_MASTER_Workbook_18.12.20* with the original data source of FRM Ingenierie, finding no discrepancy. The procedure for compiling the data was reproduced by AENOR, achieving the same results.

3.8.Gross emissions for the periods 2006-2015 and 2016-2017

Emissions were calculated using the same methodology used in *Gabon's Proposed REDD+ FREL*. Activity data is multiplied by the pertinent emissions factor. In accordance with IPCC literature, the simplest and most conservative method was used to calculate the emissions, which involves the oxidation of 100% of the carbon stock immediately after deforestation/degradation/logging.

The equation used, as expressed in *Gabon National Results Report* was:

$$E = AD\ x\ EF$$

Where:

E emissions; tCO_2/yr.

AD activity data; ha/yr or m^3/yr.

EF emission factor; tCO_2/ha or tCO_2/m^3.

Specific emission factors were used for deforestation, forest degradation, and logging emissions estimation, which were collected from various sources. The audit team verified that the emission factors used in the *Gabon National Result Report* were coherent with those used in *Gabon's Proposed REDD+ FREL.* The following table summarizes the emission factors used, their sources and the assessment of the audit team.

Emission Factor	Total value (AGB+BGB)	Emission source	Source	Verification means and assessment
EF1: Secondary forest	432.7 tCO2e/ha	Deforestation and forest degradation (Young secondary and degraded class to No-forest)	Poulsen et al. (2020). Conversion from AGB carbon content for Secondary Forest (MgC/ha)	Original source verified and calculation reproduced. Value is calculated and inputted in spreadsheets correctly.
EF2: Forest Avg (old growth, logged, secondary)	641.8 tCO2e/ha	Deforestation and forest degradation (Old growth, old secondary, older logged class to No forest)	Poulsen et al. (2020). Conversion from AGB carbon content for Gabon (MgC/ha)	Original source verified and conversion reproduced. Value is calculated and inputted in spreadsheets correctly.
EF3: Difference (Forest Avg – Secondary Forest)	209.1 tCO2e/ha	Forest degradation (Old growth, old secondary, older logged to Young secondary and degraded)	Difference EF2 - EF1.	Calculation reproduced. Value is calculated and inputted in spreadsheets correctly.
EF4: Total Logging EF	9.4 $tCO2e/m^3$	Logging	Ellis et al. (2019); Medjibe et al. (2011,2013) Conversion from AGB+BGB carbon loss (MgC/m^3 and MgC/ha) from timber extracted, felling collateral damage, felled tree remainder, skidding, road and log yard construction, and hauling. Average value of 12 logging concessions.	Original source verified and calculation reproduced. Value is calculated and inputted in spreadsheets correctly.

Carbon stock values were converted to consider a uniform standard carbon fraction of 0.456 (Martinet al., 2018) and a shoot-rot ratio of 0.235 for stand level for moist tropical forests >125 Mg/ha (Mokany et al., 2006). All original data are country specific for Gabon.

The total uncertainty of each emission factor ranges from 8.9% to 27.8%. The audit team considers these values acceptable and within the range of the uncertainty 35% reduction buffer on the final RBP reduction results agreed by the CAFI-Gabon partnership.

AENOR reviewed the methodology for the quantification of the emissions from deforestation, forest degradation and logging for the periods 2006-2015 and 2016-2017 and found that it is used is in compliance with the criteria set in Section 1.3. AENOR reproduced all the calculations and obtained the same results, so it is considered that they are clearly and correctly represented in the spreadsheets and in the *Gabon National Results Report*.

The deforestation, forest degradation and logging gross emissions results reported in the *Gabon National Results Report* and verified by AENOR are summarized in the following table.

Year	Deforestation gross emissions (tCO_2)	Forest degradation gross emissions (tCO_2)	Logging emissions (tCO_2)	Total gross emissions (tCO_2)
2006	1,494,275	2,899,992	30,342,856	34,737,123
2007	1,494,275	2,899,992	32,350,008	36,744,275
2008	1,494,275	2,899,992	29,862,270	34,256,538
2009	1,494,275	2,899,992	25,122,377	29,516,644
2010	1,494,275	2,899,992	17,879,723	22,273,990
2011	5,979,662	2,735,773	14,982,963	23,698,399
2012	5,979,662	2,735,773	13,126,835	21,842,271
2013	5,979,662	2,735,773	15,199,698	23,915,133
2014	5,979,662	2,735,773	15,312,777	24,028,212
2015	5,979,662	2,735,773	13,959,380	22,674,816
2016	7,133,959	1,656,357	14,353,142	23,143,458
2017	7,133,959	1,656,357	17,600,315	26,390,631

AENOR reviewed the evaluation of the uncertainty of the emissions estimations. The uncertainties of deforestation (29.17%), degradation (15.07%), logging (10.08%) and total emissions (8.78%) are considered as reasonable by audit team and well within the prevision of a 35% reduction buffer applied to the final reductions of the RBP.

3.9.RBP baseline and emissions reduction

The RBP baseline under the CAFI Letter of Intent was calculated as the average yearly deforestation, forest degradation and logging emissions of the reference period 2006-2015, as agreed by the parts in the meeting Gabon-CAFI on October 13th, 2020.

AENOR reproduced the calculations to achieve the same results and deems the calculated RBP baseline of 27,368,740 tCO_2/year is correct.

The emission reduction in the period 2016-2017 were calculated by deducting the actual 2016-2017 estimated gross emission to the RBP baseline:

The reported emissions reduction for 2016-2017 and verified by the audit team are summarized in the following table.

Year	Total gross emissions (tCO_2)	Reduction results (tCO_2)
2016	23,143,458	4,225,282
2017	26,390,631	978,109
Total reductions (2016-2017)		**5,203,391**

The audit team reproduced the calculations to achieve the same results and deems they are clearly and correctly depicted in the spreadsheets and in the *Gabon National Results Report*. AENOR considers that the formula is used in compliance with the criteria defined in Section 1.3. Therefore, AENOR deems that the calculated emission reduction for the period 2016-2017 of 5,203,391 tCO_2 is correct.

AENOR verified the parameters used in the calculation and references to documents where they are used or explained, through the review, reproduction and cross-checking of the evidence provided by the CNC. AENOR checked that the values of these parameters are appropriate and are used correctly in the equations.

AENOR found no inconsistencies between the information reported in the *Gabon National Results Report* and the spreadsheets.

After a thorough and comprehensive review and replication of calculations, AENOR considers that the monitored parameters available are correct, credible, and consistent. Therefore, AENOR deems that the reported results are credible, consistent, and accurate.

4. VERIFICATION CONCLUSION

AENOR has verified that the estimation of the gross emissions from deforestation and forest degradation (including logging emissions) in Gabon at national level for the periods 2006--2015 and 2016-2017 and the emission reduction from avoided deforestation and forest degradation for the period 2016-2017 have been carried out in compliance with the criteria set in Section 1.3.

Therefore, AENOR is able to confirm that the RBP baseline and the 2016-2017 emission reduction have been determined in a consistent, transparent and reproducible way and that are correct, credible and free from material errors, omissions and/or false statements.

The verification process was carried out in the following phases: i) a documentary review of all the material provided by the CNC; ii) remote technical session with the team responsible for monitoring and reporting; iii) reproduction of the calculations; iv) the resolution of pending issues and v) the issuance of the report and final verification opinion. In the course of the verification process, non-conformities were found and properly closed.

AENOR is able to issue a positive verification opinion for the **RBP baseline of 27,368,740 tCO_2/year** and for the **2016-2017 emission reduction of 5,203,391 tCO_2**, as reported in the *Gabon National Results Report*.

VERIFICATION REPORT	Results-Based Payments under the Central African Forest Initiative – Gabon Partnership Gabon National Results Report (2016-2017)

In accordance with the agreement on the *Meeting Gabon-CAFI on the results report 2016-17* (October 13th, 2020) and the application a 35% buffer reduction of the results, to address reversal, uncertainty, etc., AENOR is able to issue a positive verification opinion with a reasonable level of assurance for the Gabon proposed eligible results of **3,382,204 tCO_2** to be awarded for the first RBP.

Madrid, February 11th, 2020.

Juan Carlos Gomez
Verifier Team Leader

Jose Luis Fuentes
Project Manager

ANNEXES

Annex 1: Recommendations for improvements in MRV system

During the verification process several improvement opportunities were identified for CAFI-Gabon RBP MRV system by the audit team. This improvement options are to be considered additional to those stated in the section Proposed stepwise improvements for MRV and NFMS of the *Gabon National Results Report.* The recommendations are listed according to the suggested implementation priority in opinion of the audit team:

1. Develop wall-to-wall land use maps. This would eliminate discrepancies between national level and subnational level analysis. Accuracy assessment should be carried to evaluate the precision in the changes from forest class to non-forest class, and primary forest class to secondary forest class.

2. Further stratify current forest categories (Dense Forest, Secondary Forest, Flooded Forest, and Mangrove) considering the different ecosystems and forest formations and develop specific emission factor for each of them. The use of ancillary ecosystem maps of the country based on bioclimatic conditions could be of use for the stratification of forest classes identified through remote sensing. The stratification would add precision to the emission estimations and would put into value the preservation of biodiversity rich forest areas with large carbon stocks.

3. Include the carbon pool of living non-tree biomass and dead organic matter (dead wood and litter). Its inclusion would increase the comprehensiveness of the deforestation and forest degradation emission estimation.

4. Develop logging emissions factors that consider different harvesting techniques. This would allow to take into account the difference between sustainable logging and other more aggressive techniques for the surrounding forests.

5. Include the analysis of carbon content in post deforestation classes as to consider only the emissions of the net carbon stock change from forest to no-forest. This would provide a more realistic estimate of emissions that take place do to forest conversion.

6. Compile and translate to English the procedures followed for the remote sensing processing and land use and land cover change estimation in a manual or SOP. Providing public access in English to the procedures and methodologies followed would facilitate future verification process and would improve transparency towards third parties.

Annex 2: Analysis of the proposed stepwise improvements for MRV and NFMS

The auditor team has analysed the proposed stepwise improvements for MRV and NFMS, included in the *Gabon National Results Report* and deems that the improvement plan is solid and well substantiated and that its progressive implementation will result in a reliable and accurate monitoring system. The audit team considers the following comments regarding the planned improvements:

- The increase of sampling plots to determine emission factors and the intensification of the sampling design to capture the land-use and change dynamics should the main priority when implementing the improvements, in order to reduce the uncertainty of both emission factors and activity data.

- Inclusion of other significant carbon pools (soil organic carbon). The audit team deems that the inclusion of other carbon pools and sources emissions is key for the development of a comprehensive MRV system for the RBP. However, the inclusion of this carbon pool should only be carried out once the monitoring system has been properly refined to have acceptable levels of uncertainty that do not compromise the accuracy of the global GHG accounting.

Annex 3: Adequation recommendations to comply with the ART TREES Standards

Below there is presented a non-exhaustive list of modifications recommended for the MRV to adhere with requirements of the Architecture for REDD+ Transactions (ART) The REDD+ Environmental Excellence Standard (TREES), on its version of February 2020 (numeration refers to the specific requirement/section of the TREES v1 February 2020 document):

- 3.1.2 National reporting requirements. It is required to demonstrate the conformance with Cancun Safeguards related requirements, including: 1) having addressed and respected the safeguards; 2) having submitted the most recent Summary of Information to the UNFCCC for any year where results-based payments under TREES are sought, and 3) having a system for providing information on safeguards.
- 3.2 Eligible activities. The current version of TREES only includes as eligible activities prevention or slowing down of deforestation and degradation emissions. Removals are not eligible for the moment.
- 4.1.1 Activity Data. SOPs for all measurements, calculations, and sample designs of activity data shall be included in TREES documents. Although the information is provided in the *Gabon National Results Report* and *Gabon's Proposed REDD+ FREL*, it would be adequate to compile all the procedures ins specific SOPs.
- 4.5 Scope of pools and gases. The standard considers soil organic matter (in organic soils and andosols) one of the primary pools that must be included, using IPCC Tier 2/3 methods for the estimation of emissions. In case that any of those soils are present in Gabon, their emissions should be included.
- 5.1 Calculation a TREES crediting level. The reference period for the crediting level shall be 5 calendar years (in opposition to the 10 years period used for the RBP baseline).
- 6.1 Monitoring plan. The standard requires the developing of a monitoring plan, including include parameters to be monitored, monitoring frequency and method of data collection including responsible parties.
- 8 Uncertainty. Uncertainty shall be quantified in terms of the half-width of the 90% confidence interval as a percentage of the estimated emissions.
- 12 Environmental, social, and governance safeguards. TREES requires participants to demonstrate they have implemented REDD+ actions defined in the REDD+ implementation plan in consistency with Cancun Safeguards ensuring activities do no harm. Series of indicators for each safeguard are presented. Gabon should have in place a safeguard information system to monitor and report the compliance with these indicators. ART has developed a specific guidance document on how Participants may demonstrate conformance with TREES safeguards requirements through application of TREES indicators, the *TREES Environmental, Social and Governance Safeguards Guidance Document*.

Annex 4: Technical assessment of removals for the periods 2006-2015 and 2016-2017

The removals reported on the *Gabon National Result Reports* for the periods 2006-2015 and 2016-2017 are restricted to the same geographical boundaries, pools and GHG as the emissions. That is the land area within the political borders recognized by Gabon, the carbon pools of above and below ground tree biomass, and the removal of carbon dioxide from changes in carbon stocks, reported as CO_2.

The same definition of forest described in Section 3.3 of this report is considered. The four forest subdivisions or stratifications used at a national level, and derived from remote sensing, are further subdivided according to current ecological understanding, and depending on the sinks of removals and the removal factor, as summarized in the table below.

National level subdivision (remote sensing forest classes)	Forest types according to ecological understanding	Removals from standing forests (forest land remaining forest land)	Removals from naturally regenerating forests and naturally encroaching forests (lands converted to forest land)
Dense Forest	Old Growth Forest	Old Growth Forest, Old Secondary Forest, and Older logged Forest (mixed category, single average RF6)	-
	Old Secondary Forest		
	Older logged Forest		
Flooded Forest	Flooded Forest		
Secondary Forest	Young Secondary Forest	Young secondary and degraded (mixed category, old and young secondary average RF7)	Young secondary (forest has regenerated from Cropland, Settlement or Other land, RF3)
	Degraded		-
	Logged Forest	Logged (1-10) (RF1) Logged (11-25) (RF2)	-
	Colonising forest	-	Colonising (forest has regenerated from Grassland or Wetland, RF4)
Mangrove Forest	Mangrove Forest	Mangrove Forest (RF5)	NA[2]

RF: Removal factor

Removals are defined in the *Gabon National Results Report* as the as carbon biomass accumulation in standing forest, in naturally regenerating forests following human disturbance and in naturally encroaching forests into grasslands and wetlands.

[2] No regeneration was reported for mangrove forests for the periods 2006-2015 and 2016-2017.

According to Annex 19.2 of the *Gabon National Results*, the change in land cover/use is classified as regeneration when a polygon is coded as non-forest (any class) for assessment year *y* and as forest for the two following assessment years (*y*+5). By default, this forest is classified as Secondary Forest. Removals are accounted as well for land forest remaining land when the polygon is considered as stable, i.e., a polygon where no change from forest to non-forest or non-forest to forest was observed and where no change in forest type (e.g., dense forest to secondary forest) between assessment years was observed.

As report in section 11.1.3 of the *Gabon National Results Report*, activity data for removals include activity data were derived from a mixture of data type, including i) remote-sensing data (collected using the method described in Section 3.6), ii) auxiliary historical data on administrative areas (Lee, 2020), used to ensure that extrapolations of forest cover between assessment years reflected historical changes in administrative area over time, and iii) activity data used to calculate logging emissions (Section 3.7), used to derive estimates of recently logged forest which are not detectable by the remote-sensing method.

For each assessment year, data from the remote-sensing matrices (stable forest, regenerating forest and Dense forest degraded to Secondary Forest) were extracted and reorganised into tables. Separate tables were created for each of the four subnational land-use categories (see Section 3.4). Forest land remaining Forest Land and Non-forest converted to Forest Land were classified as presented in the table above.

To extrapolate the forest cover area data accurately between the remote-sensing assessment years, the history of administrative changes to the area of each of the sub-national land allocations was taken into account. The *Gabon National Results Report* states that these historical data were incomplete and did not exactly match the data for the remote-sensing assessment years. Thus, adjustments were required to the extrapolations so that the change in forested area reflected the administrative changes over time. Once the total forest cover for each sub-national land allocation was established for each year, extrapolations were made to each of the five forest subdivisions.

The area of logged forest was estimated from timber production volume data. Logged forest was defined as up to 25 years since logging. Logged forest was further subdivided into two categories: Logged forest (1-10) (LF10) for forests logged up to 10 years previously, and Logged forest (11-25) (LF25) for forests logged between 11 and 25 years previously. Timber production volume data (available for 1990-2018) were converted to Equivalent Harvest Areas (AEH) to determine the areas of each logged forest classes. The area of logged forest (LF10 and LF25 respectively) as calculated above replaced the remote-sensing data that were originally identified as Secondary Forest (Young secondary and Degraded forest under Forest land remaining forest land) within logging concessions and protected areas subnational land classification.

Specific removal factors are used for each of the forest subdivision considered, summarized in the table below.

Removal Factor	Total value (AGB+BGB) (tCO_2/ha·yr)	Removal sink	Source
RF1: Logged Forest (1-10)	13.10	Standing forests (Forest Land remaining Forest Land)	Medjibe (2020). Average value from 18 plots in logged forests in Gabon.
RF2: Logged Forest (11-25)	9.44	Standing forests (Forest Land remaining Forest Land)	Derived from RF1 and observed change in biomass accumulation rate in a Central African study (Gourlet-Fleury et al., 2013)
RF3: Young Secondary	15.69	Removals from naturally regenerating forests	Requena Saurez et al. (2019).

Removal Factor	Total value (AGB+BGB) (tCO_2/ha·yr)	Removal sink	Source
		(Cropland, Settlement or Other land to Forest Land)	Value for young secondary forests in African tropical rainforests (15 sampling plots).
RF4: Colonising	6.40	Removals from naturally encroaching forests (Grassland or Wetland to Forest Land)	Cuni-Sanchez et al. (2016) Value for colonizing forest in Lopé National Park, Gabon (5 sampling plots)
RF5: Mangrove	20.44	Standing forests (Forest Land remaining Forest Land)	2014 IPCC Default value for tropical wet mangroves.
RF6: Average: Old growth, Old Secondary	4.67	Standing forests (Forest Land remaining Forest Land)	Average value for secondary forests in Medjibe (2020) (8 plots) and Hubau et al. (2020) (45 plots)
RF7: Average: Old and young secondary	10.77	Standing forests (Forest Land remaining Forest Land)	Average value for secondary forests in Medjibe (2020) (8 plots) and for young secondary forests in African tropical rainforests Requena Saurez et al. (2019) (15 sampling plots).

Removals are estimated using the equation:

$$R = AD\ x\ RF$$

Where:

R removals; Mg CO_2/yr.

AD activity data; ha/yr.

RF removal factor; Mg tCO_2/ha.

The audit team has assessed the definitions and methodological procedure to estimate removals, as described in the *Gabon National Results Report*, and has the following comments:

- Definitions are in line with IPCC Guidelines and the GOFC-GOLD REDD+ Sourcebook (2016). However, it is unclear how anthropic reforestations and forest plantations are considered. No specific rules are defined for these transitions from non-forest to forest land in terms of removals accounting, including which removal emission factors are considered.

- The final activity data used for the estimation of removals are based on several assumptions and extrapolations from incomplete historical administrative records and timber logging registries. The methodology should be reviewed in order to used sources that rely less on assumptions and approximations. The feasibility of using remote sensing data to replace timber production data as source of logged forests activity data should be considered.

- Most of the removal factors are based on low number of sampling plots and on off-country studies. Efforts should be done to design and implement national forest inventories with a higher number of sampling plots to determine the removal factors based on the specific forest categories defined for removals.

Annex 5: Methodological changes, corrections, and improvements due to the audit process and impact on GHG estimations

During the audit process one methodological change and several corrections were made that impacted the GHG estimations. Specifically, these changes area associated to findings 10 and 12 (see Annex 9).

The methodological change was related to the emission factor use in degradation for Forest Land remaining Forest Land (Old growth, old secondary, older logged to Young secondary and degraded). Initially, a logging emission factor derived from Ellis et al. (2019) and Medjibe et al. (2011, 2013) and reconverted from tCO_2/m^3 to tCO_2/ha, using harvesting intensities (m^3/ha) from the original sources, was used for the estimation the emissions. During the audit process it was noticed that also using a stock-difference method for degradation of Forest land remaining Forest land would be more coherent with the rest of emissions estimations from deforestation and forest degradation. Therefore, difference in carbon stock between the class Old growth, old secondary, older logged and the class Young secondary and degraded was used as emission factor (i.e., emission factor of Old growth, old secondary, older logged subtracted by the emission factor of Young secondary and degraded). Thus, the emission factor for degradation of Forest Land remaining Forest Land shifted from an initial value of 74.9 tCO_2/ha to the final value used of 209.1 tCO_2/ha.

The corrections were related to the rectification of the following errors on the spreadsheet *Gabon_NRR_Workbook_V3*:

a) *Summary S*heet*,* there is a reference error on cells J37 and J38.

b) *Raw Data – Timber Production* sheet: Formulae in cells B77, C77 and D77 should refer to the B, C, D data from rows from 47 to 75 to account for the volume registered from 1990 to 2018.

c) *Raw Data – Sequestration rates* Sheet: Cell Y34 presents a displaced formula with empty cells (#DIV/0-ERROR)

d) Raw Data – LandUse Change:

i. Activity Data for Deforestation Emissions: Yearly change per assessment period for the 2015-2018 period is considered a three-year period in tables 1, 2 and 3 while table 4 in its cell E209 uses a four-year period for 2015-2018.

ii. Table 4, I205 to I209 -Column (% annual change – Degradation): All values are calculated for a 10-year period. Adjust calculations with actual number of years of each period.

iii. By reproducing the calculations of the % annual change in regeneration section, with following formula: % annual change = (Total Forested Area at start/ Total Reg. Area throughout assessed period)/nº years of assessed period Value in Cell M210 does not match with actual result 0,03.

iv. Table 5- Cell D 215 accounts for regeneration 95%CI (1990-2018): 1.329, while the note in the cell states "*if yearly change values are listed annually, 95% CI computes at 9816 ha for n= 29"* and *d*egradation or deforestation values presents no difference. Please clarify/justify the difference between regeneration CI presented values.

e) *Raw Data- Forest Cover* Sheet: Formulae in rows 59 and 60 for Rural area and Total Forest Area for Gabon are considering a period of 4 years (dividing by 4) instead the correct period of 3 years.

The impact of this methodological change and corrections on the GHG estimations is shown on the following tables. There was no impact on gross removal estimations, only on gross emissions

Impact of changes on gross emissions estimations								
Year	Gabon NRR Nov 2020 (tCO_2)	Impact of corrections		Impact of EF change		Gabon NRR Dec 2020 (tCO_2)	Δ Gabon NRR Nov-Dec	
		Δ (tCO_2)	Δ (%)	Δ (tCO_2)	Δ (%)		(tCO_2)	(%)
2006	34,387,135	0	0.00	+349,988	+1.02	34,737,123	+349,988	+1.02
2007	36,394,287	0	0.00	+349,988	+0.96	36,744,275	+349,988	+0.96
2008	33,906,549	0	0.00	+349,989	+1.03	34,256,538	+349,989	+1.03
2009	29,166,656	0	0.00	+349,988	+1.20	29,516,644	+349,988	+1.20
2010	21,924,002	0	0.00	+349,988	+1.60	22,273,990	+349,988	+1.60
2011	23,671,722	-10,306	-0.04	+36,983	+0.16	23,698,399	+26,677	+0.11
2012	21,815,594	-10,306	-0.05	+36,983	+0.17	21,842,271	+26,677	+0.12
2013	23,888,456	-10,306	-0.04	+36,983	+0.15	23,915,133	+26,677	+0.11
2014	24,001,535	-10,306	-0.04	+36,983	+0.15	24,028,212	+26,677	+0.11
2015	22,648,139	-10,306	-0.05	+36,983	+0.16	22,674,816	+26,677	+0.12
2016	23,094,075	0	0.00	+49,383	+0.21	23,143,458	+49,383	+0.21
2017	26,341,249	0	0.00	+49,382	+0.19	26,390,631	+49,382	+0.19
RBP baseline	27,180,407	-5,153	-0.02	+193,486	+0.71	27,368,740	+188,333	+0.69
2016-2017 reductions	4,925,491	-10,306	-0.21	+288,206	+5.85	5,203,391	+277,900	+5.64

Annex 6: List of evidence provided

No.	Evidence
1	Gabon National Results Report. Results-Based Payments under the Central African Forest Initiative – Gabon partnership (December 2020).
2	Gabon's Proposed National REDD+ Forest Reference Level v7 (December 2020)
3	Calculation spreadsheet *Gabon_NRR_Workbook_V4*
4	Calculation spreadsheet *Gabon_FRL_MASTER_Workbook_18.12.20*
5	Administrative time series: *Lee 2020 Raw Data - Logging Concession Areas*
6	Carbon stocks: *Carlson et al 2016 Raw Data compiled from SI* *Kauffman and Bhomia 2017 Raw Data reorganised* *NRI_Plot_Data* *Wade 2019 Raw Data- Soil Carbon*
7	GIS: *Lee 2020 Subnational Land Allocation Shapefiles* *SIRS_Shapefiles_adjusted_for_analyses*
8	Land Use Change Matrices: *SIRS 2020-National matrices* *SIRS 2020-Subnational matrices* *SIRS_2020_Uncertainties*
9	Logging EF: *Ellis and Medjibe Raw data- Combined Logging Emissions*
10	Sequestration rates: *Hubau 2020 Raw Data - reanalysis of Gabon plots* *Medjibe 2020 Raw Data- Sequestration rates*
11	Timber production: *FRM 2020 Raw Data- Analysis of Declared Production Volumes* *FRM 2020 Raw Data- Analysis of Export Volumes*
12	Carlson et al. (2016). *Deadwood stocks increase with selective logging and large tree frequency in Gabon*.
13	Cuni-Sanchez et al. (2016). *African Savanna-Forest Boundary Dynamics: A 20-Year Study*.
14	Ellis et al. (2019). *Reduced-impact logging for climate change mitigation (RIL-C) can halve selective logging emissions from tropical forests*.
15	FRM. (2020). *Analyse des differentes sources de donnees de production de grumes au Gabon*.
16	Gourlet-Fleury et al. (2013). *Tropical forest recovery from logging: a 24 year silvicultural experiment from Central Africa*.
17	Hubau et al. (2020). *Asynchronous carbon sink saturation in African and Amazonian tropical forests.*
18	Kauffman and Bhomia (2017). *Ecosystem carbon stocks of mangroves across broad environmental gradients in West-Central Africa: Global and regional comparisons*.
19	Martin et al. (2018) *Global patterns in wood carbon concentration across the world's trees and forests.*

No.	Evidence
20	Medjibe et al. (2011). *Impacts of selective logging on above-ground forest biomass in the Monts de Cristal in Gabon.*
21	Medjibe et al. (2013). *Certified and Uncertified Logging Concessions Compared in Gabon: Changes in Stand Structure, Tree Species, and Biomass.*
22	Medjibe. (2020). *Rapport d analyse de remesure des parcelles permanentes*.
23	Pearson et al. (2014). *Carbon emissions from tropical forest degradation caused by logging*.
24	Poulsen et al. (2020). *Old growth Afrotropical forests critical for maintaining forest carbon*.
25	Requena Saurez et al. (2019). *Estimating aboveground net biomass change for tropical and subtropical forests: Refinement of IPCC default rates using forest plot data*.
26	SIRS. (2020). *Estimation des données d'activités du secteur forestier au Gabon entre 1990 et 2018.*
27	Wade et al. (2019). *Estimates and determinants of stocks of deep soil carbon in Gabon, Central Africa*.

Annex 7: Reference documentation

No.	Document
1	The REDD+ Environmental Excellence Standard (TREES). Architecture for REDD+ Transactions (ART) Program. (2020).
2	ISO 14064-3:2019 Part 3: Specification with guidance for the verification and validation of greenhouse gas statements (2019)
3	IPCC Good Practice Guidance for Land Use, Land-Use Change and Forestry (2003)
4	2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006)
5	2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands (2013)
6	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (2006)
7	IPCC Good Practice Guidance and Uncertainty Management in National GHG Inventories (2000)
8	Global Forest Observations Initiative: Methods and Guidance Document (2016)
9	GOFC-GOLD REDD Source Book (2015)
10	GFOI Integrating remote-sensing and ground-based observations for estimation of emissions and removals of greenhouse gases in forests: Methods and Guidance from the Global Forest Observations Initiative (2014)

Annex 8: Technical session attendance list

Name	Role
Alvina OWONO	Assistante à la coordination des programmes CAFI au CNC
Vincent MEDJIBE	Coordonnateur des inventaires de ressources naturelles à l'ANPN
Conan VASSILY	Expert en télédétection à l'AGEOS
Christophe SANNIER	Chercheur consultant SIRS
Ludovic Ngock	Directeur de Cabinet du Ministre des Forêts
Diana NDJOGHA	Secrétaires de Cabinet
Danae Maniatis	Consultante
Kathryn Jeffery	Consultante

Annex 9: Findings

No	Requirement	Type	Request	Response	Closed
1	NA	CL	20/10/2020: In section 3.1 Forest definition (page 12), the forest definition is: “tree formation covering at least 30% of the soil over more than 1 ha and more than 20 m wide with trees at least 5 meters high.” Clarify to what the 20 m wide refers.	30/10/2020: 20m refers to canopy/crown cover	**Yes**
2	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*: 1. General principles for measuring, reporting and verification: - Conservative accounting shall be applied; when completeness and accuracy are lacking, the risk of overestimation shall be lower than the risk of underestimation.	CL	20/10/2020: Section 5.1.2 defines forest degradation as the reduction in biomass when a change in forest cover and/or land-use is not considered as permanent, including shifting agriculture and other unknown forms of degradation. Annex 14.2 defines following rule for forest degradation (among others): “A polygon was coded as forest for assessment year, non-forest for the following assessment year (year + 5), and forest for the subsequent assessment year (y + 10). The change in land cover / use was not considered permanent and the land-use change identified as ‘degradation’.” Following this definition, a polygon classified as Dense Forest (year 0), then classified as Non-forest (year +5) and after as Secondary Forest (year +10) is considered as forest degradation. According to the definition of forest provided in section 3.1, it is a tree formation which includes trees at least 5 meters high and a 30% of crown cover.	30/10/2020: Forest cover in Gabon is known to regenerate rapidly and can reach 5m height within 5 years (field observations). A misclassification in year +5 (non-forest) is extremely unlikely because the forest biome in Gabon is almost entirely evergreen and a loss of forest cover is very unlikely to be misclassified as forest.	**Yes**

No	Requirement	Type	Request	Response	Closed
			Justify the feasibility for a non-forest land to regenerate as to qualify for the forest definition in 5 years or less. Also, clarify if the option of a misclassification in year +5 has been considered.		
3	*Addendum to the Letter of Intent between Gabon and CAFI signed in 2017:* 4.2 Accounting approach B)	CAR	20/10/2020: In section 5.1.4 it is stated: "Removals were calculated as carbon biomass accumulation in standing forest, in naturally regenerating forests following human disturbance and in naturally encroaching forests into grasslands and wetlands." Section 8.1.3 includes as activity data for removals the naturally regenerating forests following human disturbance and naturally encroaching forests into grasslands and wetlands. Also, on tab *REM* of the spreadsheet *Gabon_NRR_Workbook_V3,* removals from non-forest to forest land use changes are calculated and included as part of the total removals results. According to the *Addendum to the Letter of Intent between Gabon and CAFI signed in 2017* only removals from forest land remaining forest land were to be considered, and removals from plantations and form lands converted to forest lands were to be excluded.	30/10/2020: It was agreed with Norway that removals would not be submitted as part of the CAFI LoI Addendum RBPs in this round. However, Gabon agreed with Norway that the removals would be shared with the verification team for feedback and that these removals would follow Gabon's approach presented in the FRL.	**Yes**
4	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*: 2.1 Main principles – methodologies: - The data sets, methods, models and assumptions ensure transparency,	CAR	20/10/2020: In section 5.2, it is stated that Table 2 presents the IPCC land-use categories, national land-use subdivisions and forest types. However, the national land subdivisions do not match with those stated in section 3.3.	30/10/2020: This was clarified and corrected in the text. Section 5.2, Table 2 refers to IPCC land-use categories and national land-cover subdivisions. These are not to be confused with Gabon's	**Yes**

No	Requirement	Type	Request	Response	Closed
	completeness, consistency, accuracy and comprehensiveness.			subnational land allocations (following its National Land Allocation Plan) presented in section 3.3. The subnational land allocations can occur across IPCC land-use categories, and the national land-cover subdivisions can occur across the subnational land allocations. For example, it is possible to find wetland areas and grasslands inside logging concessions. Another example is that it is possible to find cropland and grassland inside protected areas.	
5	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*: 3.5. Description of methodologies will include: Descriptions of the methodological details of the applied steps for calculating emission reductions, in a manner that allows reproduction of the calculation of emission reductions.	CAR	20/10/2020: Section 8.1.2 Logging Emissions does not include detailed description of the methodology followed to compile the information nor how it was validated at a national level.	30/10/2020: Further detail has been included in Annex 15.3.	**Yes**
6	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*: 2.1 Main principles – methodologies: - The data sets, methods, models and assumptions ensure transparency,	CL	20/10/2020: In section 8.1.3 it is stated the following: “Secondly, to extrapolate the forest cover area data accurately between the remote-sensing assessment years, the history of administrative changes to the area of each of the sub-national land-use categories was taken into account. However, these historical data were themselves incomplete and did not exactly	30/10/2020: Further detail has been included in Annex 15.4	**Yes**

No	Requirement	Type	Request	Response	Closed
	completeness, consistency, accuracy and comprehensiveness.		match the data for the remote-sensing assessment years. Therefore, best efforts were made to make adjustments to the extrapolations so that the change in forested area reflected the administrative changes over time" Provide clarification on the adjustment realized to reflect the administrative changes over the time.		
7	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*: 3.6 Reporting on uncertainty and bias	CAR	20/10/2020: Complete section 10 with the results of the uncertainty analysis, including: - estimation of accuracy and precision of the forest and non-forest classification; - discussion of key uncertainties, their sources, and impacts; - discussion on, and implications of, potential biases in the estimations; and - description of planned and implemented improvements to the MRV and NFM system. 11/12/2020: No improvement plan has been included on the report.	30/10/2020: - Uncertainty section has been completed. - Uncertainty values for forest cover are included. Uncertainty values have been calculated for forest converted to non-forest. 17/12/2020 - The description of proposed stepwise improvements, subject to national capabilities and policies and based on the importance of adequate and predictable support as referenced by decision 1/CP.16, paragraph 71, are included in the report. - Uncertainty section has been improved, calculations have been revised	**Yes**
8	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*:	CL	20/10/2020:	30/10/2020:	**Yes**

No	Requirement	Type	Request	Response	Closed
	2.1 Main principles – methodologies: - The data sets, methods, models and assumptions ensure transparency, completeness, consistency, accuracy and comprehensiveness.		In section 14.2 page 34 it is stated "All data were classified first under one of the six IPCC land-use categories and subsequently in one of the 10 national sub-categories". However, section 3.3 only describes 6 subnational land-use types (plus unallocated land) and Table 2 in section 5.2 includes 11 national land-use subdivisions. Clarify the number and types of national sub-categories.	This is clarified as in point 4 above. It refers to the six IPCC categories and one of the 11 national land-cover subdivisions referred to in Table. 10 was corrected to 11 as per Table 2.	
9	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*: 3.3. Reporting on the National forest monitoring system	CAR	20/10/2020: A detailed description of the national forest monitoring system, including how it builds on existing systems and a description of the respective roles and responsibilities of institutions included in the national forest monitoring system is missing. A description of quality control and quality assurance activities.	30/10/2020: The description of the NFMS is included in section 2.1, while the description of the QC/QA activities are included in section 12.	**Yes**
10	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*: 1. General principles for measuring, reporting and verification: - Conservative accounting shall be applied; when completeness and accuracy are lacking, the risk of overestimation shall be lower than the risk of underestimation.	CL	20/10/2020: Provide justification on the conservativeness of the use of the Logging Emission Factor (74.9 tCO_2e/ha) as degradation emission factor for Forest remaining forest instead the difference between the emission factors of Forest Average and Secondary Forest	30/10/2020: We agree that the proposed approach is more conservative. This has been changed in the calculations and document.	**Yes**
11	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*: 4.5 Access to data and further information: Methods and data material used will be made available to the verification team to	CL	20/10/2020: Provide the following documents - Draft FRL document and accompanying excel workbook to be submitted to the UNFCCC	30/10/2020: Documents will be provided	**Yes**

No	Requirement	Type	Request	Response	Closed
	allow reconstruction of FREL/results based payment baseline and emission reduction estimate reports, and publicly available at the same time if technically possible and according to confidentiality restrictions		- GIS data - National Resource Inventory 2020 - Source documents of raw data used to derive activity data for calculating emissions due to logging - Source documents of raw data for carbon stocks		
12	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*: 2.1 Main principles – methodologies: - The data sets, methods, models and assumptions ensure transparency, completeness, consistency, accuracy and comprehensiveness.	CAR	20/10/2020: The spreadsheet ***Gabon_NRR_Workbook_V3.xls*** presents the following errors: f) *Summary* Sheet, there is a reference error on cells J37 and J38. g) *Raw Data – Timber Production* sheet: Formulae in cells B77, C77 and D77 should refer to the B, C, D data from rows from 47 to 75 to account for the volume registered from 1990 to 2018. h) *Raw Data – Sequestration rates* Sheet: Cell Y34 presents a displaced formula with empty cells (#DIV/0-ERROR) *i) Raw Data – LandUse Change:* *i.* Activity Data for Deforestation Emissions: Yearly change per assessment period for the 2015-2018 period is considered a three-year period in tables 1, 2 and 3 while table 4 in its cell E209 uses a four-year period for 2015-2018. ii. Table 4, I205 to I209 -Column (% annual change – Degradation): All values are calculated for a 10-year period. Adjust calculations with actual number of year of each period. iii. By reproducing the calculations of the % annual change in regeneration section, with following formula: % annual change = (Total Forested Area at start/ Total	23/11/20 corrections made in ***Gabon_NRR_Workbook_V4.xls*** a) Error corrected b) Error corrected c) Redundant table, should not have been included- now deleted d) i. Error corrected ii. Errors corrected iii. Cell M210 has no value, unsure what error is observed here. Please check if corrections made to Table 4 (that include regeneration section) have resolved this issue	**Yes**

No	Requirement	Type	Request	Response	Closed
			Reg. Area throughout assessed period)/nº years of assessed period Value in Cell M210 does not match with actual result 0,03. iv. Table 5- Cell D 215 accounts for regeneration 95%CI (1990-2018): 1.329, while the note in the cell states "*if yearly change values are listed annually, 95% CI computes at 9816 ha for n= 29"* and *d*egradation or deforestation values presents no difference. Please clarify/justify the difference between regeneration CI presented values. j) *Raw Data- Forest Cover* Sheet: Formulae in rows 59 and 60 for Rural area and Total Forest Area for Gabon are considering a period of 4 years (dividing by 4) instead the correct period of 3 years.	iv. incorrectly computed- rows deleted- to recalculate e) Error corrected *Note that a few other errors in the Raw Data-Forest cover and Raw Data –Logged forest' sheet were found and corrected*	
13	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*: 2.1 Main principles – methodologies: - The data sets, methods, models and assumptions ensure transparency, completeness, consistency, accuracy and comprehensiveness.	CL	11/12/2020: On page 23 of the report, it is stated: "An average Emissions Factor for 'Dense and Flooded' forest (Old growth, Old secondary and Older logged forest, Figure 3) was derived: this was the arithmetic mean carbon stock value for old growth, secondary and logged forest, as reported by (Poulsen et al., 2020)." The value used in the spreadsheet, tab 'Raw Data- Carbon stocks', cell D18 (146.40) matches with the value presented in Poulsen et al., 2020 for Gabon. However, the arithmetic mean of Primary Forest (156.6), Concession Forest (178.5) and Secondary Forest (98.7) is 144.6. Confirm whether the value 146.4 is the correct average for aboveground carbon or it is an erratum in Poulsen et al., 2020 (which would affect the calculations).	17/12/2020 The raw data have been double-checked and there is no error in the publication. The individual plot AGB values have now been added in the SI folder. Because the sample sizes for each sub-category are not equal, a weighted mean would be required between the three sub-categories in order to obtain the same mean as for all plots. The arithmetic mean of the individual means of each sub-category will therefore not equal the mean of all plots combined.	**Yes**

No	Requirement	Type	Request	Response	Closed
14	*MRV protocol for the Indonesia-Norway partnership on climate, forests and peat*: 2.1 Main principles – methodologies: - The data sets, methods, models and assumptions ensure transparency, completeness, consistency, accuracy and comprehensiveness.	CL	11/12/2020: According to the FRL and the NRR (page 20): "For emissions calculations, deforestation and degradation data detected in Rural Areas, Protected Areas and Other Land Allocation were retained, but were excluded for Logging Concessions. This is because it was assumed that this type of forest cover loss was already included in the method used to estimate logging emissions and was done to avoid double-counting." The FRL report, on page 53, justifies the selection of activity data sources for logging emissions. However, the method of estimating emissions from logging based on volume of timber extracted does not seem to be coherent with the estimation method used for the rest of subnational land allocations. The considerations related to remote-sensing(RS) data on page 53 of the FRL report could be extensible to all RS data used for all the subnational land allocations. Furthermore, the IPCC guidelines consider the estimation of the AFOLU sector emission/removals based on the criteria of land use/cover and land use/cover change. Only the specific sector of Harvested Wood Products (HWP) is based on production volumes independently from land use/cover changes. Please, provide specific methodological backing to calculation of logging emissions in the scope of emission inventories (e.g., IPCC guidelines, GFOI Methods and Guidance Documents, decisions under the UNFCCC, etc.).	17/12/2020 Gabon uses volume-based activity data to estimate emissions from logging (HWP) and area-based emissions for all other activities. Gabon has thereby followed the 2006 IPCC Guidelines (Volume 4, Chapter 2) where loss of biomass and carbon from wood removal (harvesting) is based on country-specific data on roundwood removals. Gabon has therefore used its national data from the Tableau de Bord d'Économie (TBE).	**Yes**

Annex 10: Comments on the draft of the Verification Report

Gabon MINEF's comment/requirement (12/01/2021)	AENOR's response (25/01/2021)
Regarding the statement in section 3.6 of the draft verification report: "'The overall uncertainty for forest cover is not higher than 2,3 %, while uncertainty for deforestation and degradation ranges from 51.9% to 196.0%. The audit team considers that this uncertainty levels are very high and that the 35% reduction buffer on the final RBP reduction results agreed by the CAFI-Gabon partnership is justified." As reported in the National Results Report in Table 13, the overall uncertainties for Gabon's emissions for the crediting period 2006-2015 is 8.78%, while the overall uncertainties for Deforestation, Degradation and Logging respectively are 29.17%, 15.07% and 10.08%. The uncertainty range of 51.9% to 196.0% for deforestation and degradation refers to uncertainty values at their most disaggregated level. Gabon would like this to be corrected in the draft Verification report. Furthermore, Results-Based Payment mechanism requirements for REDD+ such as the GCF Results-Based Payments Pilot and ART-TREES assess the aggregate uncertainty of the emissions for scoring or application of reductions. Gabon's overall uncertainty of 8.78% for the reported emissions are therefore lower than the 35% reduction buffer that is being applied. Gabon therefore wishes this to be adequately reflected in the verification report.	The statement regarding the assessment of forest cover and deforestation and degradation activity data uncertainty has been removed from section 3.6. Also, the statement regarding the assessment of logging activity data uncertainty has been removed from section 3.7. Instead, an assessment of the deforestation, degradation and logging uncertainties and the aggregated uncertainty of the total emissions has been added in section 3.8: "AENOR reviewed the evaluation of the uncertainty of the emissions estimations. The uncertainties of deforestation (29.17%), degradation (15.07%), logging (10.08%) and total emissions (8.78%) are considered as reasonable by audit team and well within the prevision of a 35% reduction buffer applied to the final reductions of the RBP."

Norway Ministry of Climate and Environment's comment/requirement (12/01/2021)	AENOR's response (25/01/2021)
Page 11, heading deforestation: the text describes the method for coding / identifying deforestation areas as an area that is classified as forest in year y and non-forest in the consecutive assessments (y+5 and y+10). There would be merit in including an assessment on the potential for recalculations based on this method. Does this imply that areas that are classified as deforested in 2016 had to have been deforested in 2006? (because they had to be classified as non-forest in year 2016, year 2016-5, and forest in year 2016-10)? Does this imply that areas that were deforested in (for example 2014) are not included in the total estimate for deforestation areas in this year, but will only "show up" in the numbers for 2014 in 2024? (Recognizing the 5 yr intervall period, but the question remains – is there a significant delay in the classification of deforestation areas?). How does this impact the confidence of the estimates? Does this imply that recalculations are to be expected, or that there is a 10-year lag in the deforestation estimates? Further language on the verifiers assessment of this would inform the reader of the effects of the methodology described.	According to SIRS (2020) *Estimation des données d'activités du secteur forestier au Gabon entre 1990 et 2018*, source of the activity data for deforestation and degradation emissions estimations, land use change was assessed using satellite imagery from 2000, 2005, 2010, 2015, 2018 and 2019. The classification criterion described for deforestation means that a polygon was classified as deforested when the non-forest land use persists for two assessment periods (y+5 and y+10). This implies that for a polygon to be classified as deforested in the period 2005-2010, the following applies: 2005 (y) | 2010 (y+5) | 2015 (y+10) | Interpretation Forest | Non-forest | Non-forest | Deforestation in the period 2005-2010 If this criterion would to be applied for the 2016-2017, it would be necessary to wait for the satellite imagery from 2020 and 2025. Instead, analysis of Sentinel2 imagery from 2018 and 2019 was used and the following criterion were applied: 2015 | 2018 | 2019 | Interpretation Forest | Non-forest | Non-forest | Deforestation in the period 2015-2018 Dense Forest | Non-forest | Secondary forest | Degradation in the period 2015-2018 Dense Forest | Secondary forest | Secondary forest | Degradation in the period 2015-2018 Non-forest | Secondary forest | Secondary forest | Regeneration in the period 2015-2018 Class A | Class A | Any class | Stable for the period 2015-2018 That means that an area to be classified as deforested in 2016 or 2017, should be coded as Forest in 2015 and Non-forest in 2018 and 2019.

Norway Ministry of Climate and Environment's comment/requirement (12/01/2021)	AENOR's response (25/01/2021)
	Deforestation in 2014 takes place when a polygon is coded as Forest in 2010, and Non-forest in 2015 and 2018. There is no 10-year lag to show deforestation estimates. There is only one issue regarding recalculation when the assessment of year 2020 is carry out. The land use change 2015:Forest, 2018:Non-forest and 2019:Non-forest is classified as deforestation in the period 2015-2018. But, if that same polygon is coded as Secondary forest in 2020, the classification (attending to the criteria of y, y+5 and y+10) should have been degradation, not deforestation. However, since the period 2015-2018 is used to determine the emission of the results period (2016-2017) it is considered as conservative. Section 3.3 has been updated to better explain the classification criteria.
Page 11: similarly for degradation, is there a 5 yr lag (case i) and 10 yr lag (case ii) for classification of degradation areas? Some reflections on how this would affect the calculations could be beneficial to inform the reader. Are substantive recalculations to be expected? Is there a time-lag in the estimates due to the classification procedures?	As in the previous case, for an area to be classified as degraded in 2016 it should be either: a) 2015:Dense forest 2018:Secondary Forest and 2019:Secondary Forest, or b) 2015:Dense forest, 2018:Non-Forest and 2019:Secondary Forest. As for deforestation, there is no time lag nor substantive recalculations. Only that what has been currently classified as deforestation for 2015-2018 could be reclassified as degradation in the future, which is conservative in terms of the RBP.
Page 11 – logging: it is clear that haul roads, skid trails and log yards are included in the logging emissions. The verifier's assessment of the justification for these areas not being included in deforestation areas would be informative.	The estimation of logging emissions using the activity data of logged timber volume is based on the consideration that the selective timber harvesting system that is carried out in the logging concession areas is not properly detected through remote sensing in the context of a High Forest Cover/Low Deforestation country as Gabon. Since the activity data used are the logged timber volume, it is appropriate to include on the emissions factor the carbon stock changes caused by felling of trees, creation of haul roads, skid trails and log yards. These activities are inherent to the selective logging

Norway Ministry of Climate and Environment's comment/requirement (12/01/2021)	AENOR's response (25/01/2021)
	activities and in most of the cases are also hardly detected by remote sensing. The analysis of deforestation in the land allocation categories other than logging concessions is based on the assumption that Gabon's forest laws are being effectively enforced and no forest commercial harvesting is taking placed outside the logging concession and that all the logged timber volume that is recorded comes from these areas. The deforestation and degradation detected via remote sensing in the land allocation categories other than logging concessions are driven by other causes (agriculture, fuelwood collection, etc.) that do not follow the patterns of commercial timber harvesting. Thus, including emissions from haul roads, skid trails and log yards construction would cause an overestimation of emissions.
On chapter 3.7, the table: the highest figure per year from the two sources is always chosen as activity data. Does this represent a risk of overestimation?	According to *Gabon's Proposed National REDD+ Forest Reference Level*. Multiple sources of declared timber production volume data are available in Gabon. The declared production volume data were compiled from all known sources. The export volumes were calculated from the exported timber weight data from the official national data-set (*Tableau de Bord de l'Economie* - TBE) and were compared with the declared production volume data. As pointed out in *Gabon's Proposed National REDD+ Forest Reference Level,* the difference among the to data sets volume illustrates that 'illegal logging' is captured as part of that information Illegal logging can include a variety of elements such as logging in the wrong area, logging smaller diameters, logging the wrong species, logging beyond the authorised volume etc. Therefore, it is considered that using the lowest level, which in the majority of the years corresponds to the exported volume, would not properly reflect the reality of timber harvesting in the country. Section 3.7 has been updated with this information.

Norway Ministry of Climate and Environment's comment/requirement (12/01/2021)	AENOR's response (25/01/2021)
Regarding uncertainty estimates for degradation: on p 16 there are uncertainty estimates for degradation, and estimates for logging activity data further down the page. There would be merit in highlighting that the uncertainty estimate for forest degradation includes the uncertainty of the emission estimates from logging. There could be merit in including a table with the aggregated uncertainty estimates, or include this as a suggestion to Gabon's results report.	As response to the comment from the MINEF, the paragraphs regarding the uncertainty of activity data have been removed from sections 3.6 and 3.7 and an assessment of total uncertainty of GHG estimations has been added to section 3.8.
Terminology: (example) section 1.2 scope: the text speaks of "emissions from gross deforestation, forest degradation and logging at the national level…". Article 4.2 of the addendum between Gabon and CAFI speaks of "reduced emissions from deforestation and forest degradation". Whilst we recognize that logging emissions have a separate methodology in the Gabonese inventory, and the justifications for this, it is not a separate accounting category in the partnership. We would prefer that when the emissions / results are described at the general level, the language used is emissions from deforestation and forest degradation. We do not wish to give the impression that logging is an activity that is accounted for separately.	Phrasing has been updated in sections 1.1, 1.2, 2.2 and 4 to refer to "emission from deforestation and forest degradation" when speaking in general terms.
Section 3.2 emission sources, pools and GHG: the text implicitly suggests that the AD for deforestation and forest degradation is spatially explicit, perhaps there is merit is specifying this?	The land use/cover and land use/cover changes used as activity data for the estimation of deforestation and forest degradation emissions are based on the direct expansion method (Sannier et al., 2014) which produces forest cover and forest cover change estimates based on samples. Technically, only the activity data of the samples are spatially explicit. Although the land use/cover and land use/cover changes determined by this method are circumscribed to each land allocation category, the activity data is not spatially explicit for the whole categories. Thus, it is the opinion of the audit team that it would be imprecise to describe the whole set of deforestation and forest degradation activity data as spatially explicit.
Footnote 1 p 11: there could be merit in explicitly saying that mangroves are included in the basis	Footnote has been rephrased: "Mangrove forest were included in the analysis for the estimation of deforestation and forest degradation. However, no deforestation nor forest

Norway Ministry of Climate and Environment's comment/requirement (12/01/2021)	AENOR's response (25/01/2021)
for estimates, even if no deforestation nor degradation were reported.	degradation were detected and reported for mangrove forests for the periods 2006-2015 and 2016-2017".
Page 12 (paragraph 3) – some language regarding the possibility that the different method applied to logging emissions compared to deforestation emissions and other degradation emissions could lead to methodological inconsistencies, or stating that the chances for this is limited given the approach taken, could be warranted.	The following assessment has been added: "The use of different methodological approaches could lead to methodological inconsistences. However, it is the opinion of the audit team that enforcement of Gabon's forest laws removes this risk."
Page 13 paragraph 3.6: it is unclear whether there are 665 units for each year or in total – please clarify.	There are the same 665 PSUs for each assessment year. The paragraph has been updated to include the following: "The same 665 PSUs were analysed for each assessment year (2000, 2005, 2015, 2018 and 2019)."
Page 15 second table: heading: degradation (forest land to other land uses) – is there a typo here? This is not the definition of degradation?	There is no typo. The *Gabon National Results Report* and *Gabon's Proposed National REDD+ Forest Reference Level* set the definition of forest degradation as: "The reduction in biomass when a change in forest cover and/or land-use **is not considered as permanent**. This includes shifting agriculture and other unknown forms of degradation." As indicated in section 3.3.1, the land cover/use classification criteria consider as degradation either when: i. a polygon is coded as Dense Forest for assessment year y and as Secondary Forest for the consecutive assessment year (y+5); or ii. a polygon is coded as forest (any class) for assessment year y, non-forest for the following assessment year (y+5), and forest for the subsequent assessment year (y+10). A land cover/use change form Forest land to non-forest land has to be persistent in time (coded has non-forest in at least two consecutive assessment years) to be classified as deforestation. The distinction between degradation of Forest land remaining Forest land and Degradation of Forest land to other land uses is required since different emission factors are used.

VERIFICATION REPORT	Results-Based Payments under the Central African Forest Initiative – Gabon Partnership Gabon National Results Report (2016-2017)

Norway Ministry of Climate and Environment's comment/requirement (12/01/2021)	AENOR's response (25/01/2021)
Page 18, paragraph 2: the 35% reduction is not just for uncertainty, suggest to delete "uncertainty" from the phrase "the range of the uncertainty 35% reduction buffer on the final…"	The paragraph has been removed as response to the comment from the MINEF. Any mention to the buffer has been rephrased either to not mention uncertainties (section 3.8) or it has been phrased as in the minutes of the *Meeting Gabon-CAFI on the results report 2016-17*: "35% buffer reduction of the results, to address reversal, uncertainty, etc." (section 4).
Page 25, paragraph 2: the last sentence implies that the AD for recently logged forest that were detectable by remote sensing used this RS data as AD – is this understanding correct?	As indicated in previous responses, selective timber harvesting is not appropriately detected using remote sensing. Sentence has been rephrased to prevent confusion as: "activity data used to calculate logging emissions (Section 3.7), used to derive estimates of recently logged forest which **are not** detectable by the remote-sensing method."
Page 27, paragraph 2: how much did this methodological change (in EF) lead to for the estimated emissions in each year (the table on p 28 presumably includes all changes)?	The table of Annex 5 has been updated to show the disaggregated impact of the two changes carried out.

Annex 11: Competence of team members and technical reviewers

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for Gabon National Results Report (2016-2017).

Madrid, January 25th, 2021

I hereby confirm the following records of qualification for the validation, verification and certification of greenhouse gas declarations.

Name: Juan Carlos Gómez

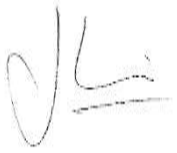
Team Leader: Yes

Verifier: Yes

Technical Reviewer: N/A

Technical Expert: Yes

Technical areas related with the project activity: REDD+



Jose Luis Fuentes Pérez
Authorised person

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for Gabon National Results Report (2016-2017).

Madrid, January 25th, 2021

I hereby confirm the following records of qualification for the validation, verification and certification of greenhouse gas declarations.

Name: Miguel López

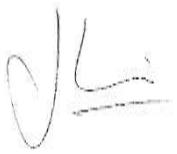
Team Leader: N/A

Verifier: Yes

Technical Reviewer: N/A

Technical Expert: Yes

Technical areas related with the project activity: REDD+



Jose Luis Fuentes Pérez
Authorised person

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for Gabon National Results Report (2016-2017).

Madrid, January 25th, 2021

I hereby confirm the following records of qualification for the validation, verification and certification of greenhouse gas declarations.

Name: Elena Llorente

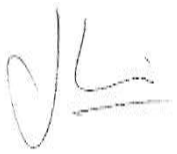
Team Leader: N/A

Verifier: N/A

Technical Reviewer: Yes

Technical Expert: Yes

Technical areas related with the project activity: REDD+



Jose Luis Fuentes Pérez
Authorised person