United Nations

FCCC/TAR/2024/COG

Framework Convention on Climate Change

Distr.: General
20 June 2025

English only

Report on the technical assessment of the proposed forest reference emission level of the Congo submitted in 2024

Summary

This report covers the technical assessment of the voluntary submission of the Congo on its proposed forest reference emission level (FREL) in accordance with decision 13/CP.19 and in the context of results-based payments. The FREL proposed by the Congo covers the activities reducing emissions from deforestation and reducing emissions from forest degradation, which are among the activities included in paragraph 70 of decision 1/CP.16.

For its submission, the Congo developed a national FREL. The FREL presented in the original submission, based on the reference period 2017–2021, corresponds to 32,529,037 tonnes of carbon dioxide equivalent per year for 2017–2021. As a result of the facilitative process during the technical assessment, the FREL was modified to 31,656,549 tonnes of carbon dioxide equivalent per year for 2017–2021.

The assessment team notes that the data and information used by the Congo in constructing its FREL are mostly transparent, mostly complete and in overall accordance with the guidelines contained in the annex to decision 12/CP.17. This report contains information on the assessed FREL and a few areas identified by the assessment team for future technical improvement in accordance with the provisions on the scope of the technical assessment contained in the annex to decision 13/CP.19.

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
2019 Refinement to the 2006 IPCC Guidelines	*2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AD	activity data
AT	assessment team
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
COP	Conference of the Parties
dm	dry matter
DOM	dead organic matter
EF	emission factor
eSBAE	ensemble sample-based area estimation
FREL	forest reference emission level
FRL	forest reference level
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
N_2O	nitrous oxide
NC	national communication
NFI	national forest inventory
REDD+	reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks (decision 1/CP.16, para. 70)
SOC	soil organic carbon
TA	technical assessment

I. Introduction and summary

A. Overview

1. This report covers the TA of the submission of the Congo on its proposed FREL,[1] submitted on 15 January 2024, in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place from 18 to 22 March 2024 and was coordinated by the secretariat.[2] The TA was conducted by the AT, consisting of two land use, land-use change and forestry experts from the UNFCCC roster of experts:[3] Beatriz Sánchez Jiménez (Spain) and Lucio Santos (Colombia). The Consultative Group of Experts was invited to participate in the TA as an observer[4] but no representative was able to participate. The TA was coordinated by Pierre Brender (secretariat).

2. In response to the invitation of the COP and in accordance with the provisions of paragraphs 7–15 of and the annex to decision 12/CP.17, the Congo submitted its proposed FREL on a voluntary basis. The proposed FREL is one of the elements[5] to be developed in implementing the activities referred to in paragraph 70 of decision 1/CP.16. Pursuant to paragraphs 1–2 of decision 13/CP.19 and paragraphs 7–8 of decision 14/CP.19, the COP decided that each submission of a proposed FREL, as referred to in paragraph 13 of decision 12/CP.17, shall be subject to a TA in the context of results-based payments.

3. The Congo provided its submission in French. The submission is supported by three annexes in French, covering soil types (annex 1), the workflow for the production of AD using the eSBAE approach (annex 2) and the harmonization of the national land-use classification with IPCC land-use classes (annex 3), which enhance the transparency of the FREL.

4. The objective of the TA is to assess the degree to which the information provided by the Congo is in accordance with the guidelines for submissions of information on reference levels[6] and to offer a facilitative, non-intrusive, technical exchange of information on the construction of the FREL with a view to supporting the capacity of the Congo to construct and improve its FREL in the future, as appropriate.[7]

5. The TA of the FREL submitted by the Congo was undertaken in accordance with the guidelines and procedures for the TA of submissions from Parties on proposed FRELs and/or FRLs.[8] This report on the TA was prepared by the AT following the same guidelines and procedures.

6. Following the process set out in those guidelines and procedures, a draft version of this report was communicated to the Government of the Congo. The facilitative exchange during the TA allowed the Congo to provide clarifications and additional information, which were considered by the AT in preparing this report.[9] As a result of the facilitative interactions with the AT during the TA, the Congo provided a modified version of its submission on 25 December 2024, which took into consideration the technical input of the AT. The modifications improved the clarity and transparency of the submitted FREL. This TA report was prepared in the context of the modified FREL submission.

B. Proposed forest reference emission level

7. In paragraph 70 of decision 1/CP.16, the COP encouraged developing country Parties to contribute to mitigation actions in the forest sector by undertaking a number of activities,

[1] The submission of the Congo is available at https://redd.unfccc.int/submissions.html?country=cog.
[2] As per decision 13/CP.19, annex, para. 7.
[3] As per decision 13/CP.19, annex, paras. 7 and 9.
[4] As per decision 13/CP.19, annex, para. 9.
[5] See decision 1/CP.16, para. 71(b).
[6] Decision 12/CP.17, annex.
[7] Decision 13/CP.19, annex, para. 1(a–b).
[8] Decision 13/CP.19, annex.
[9] As per decision 13/CP.19, annex, paras. 1(b), 13 and 14.

as deemed appropriate by each Party and in accordance with their respective capabilities and national circumstances, in the context of providing adequate and predictable support. The FREL proposed by the Congo, on a voluntary basis for a TA in the context of results-based payments, covers the activities reducing emissions from deforestation and reducing emissions from forest degradation, which are two of the five activities referred to in paragraph 70 of decision 1/CP.16. Pursuant to paragraph 71(b) of the same decision, the Congo has developed a national FREL that covers its entire territory. The FREL includes net CO_2 emissions from deforestation associated with changes in carbon stock in the above- and below-ground biomass, litter, deadwood and SOC pools. For emissions from forest degradation, changes in carbon stock in the above- and below-ground biomass, litter and deadwood pools are assumed to correspond to those of a forest undergoing a reduction in canopy cover from 75 to 30 per cent over a two-year period.

8. For its submission, the Congo applied a stepwise approach to developing its FREL in accordance with paragraph 10 of decision 12/CP.17, which enables Parties to improve their FREL or FRL by incorporating better data, improved methodologies and, where appropriate, additional pools.

9. The FREL submitted by the Congo in the modified submission corresponds to 31,656,549 t CO_2 eq/year based on the reference period 2017–2021, 43 per cent (13,762,103 t CO_2 eq/year) of which relates to the adjustment to take into consideration its national circumstances, in particular its historically low deforestation rate and the medium- and long-term projections for its socioeconomic development.[10] The table contained in annex I summarizes the main features of the FREL presented in the modified submission, with the aim of accessing results-based payments for REDD+ activities, including reference period, territorial coverage, and pools and gases included.

10. For constructing its FREL, the Congo used the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, the 2006 IPCC Guidelines and the 2019 Refinement to the 2006 IPCC Guidelines.

11. The AD used in constructing the FREL were derived from a nationwide supervised classification, systematic stratified sampling and visual interpretation of the sampling points. Compared with its previous approach, the Party included denser sampling, as well as additional methods such as time-series analysis and change-detection algorithms. A random forest algorithm was used for the supervised classification, creating a change probability model that stratified forest land by forest type (as "no change", "potential change" or "high probability of change") using an enhanced k-means clustering algorithm (the eSBAE approach). These samples were then visually interpreted and validated using the Collect Earth tool.

12. The EFs were obtained from the Congo's NFI for 2009–2014 and from the 2006 IPCC Guidelines and the 2019 Refinement to the 2006 IPCC Guidelines.

13. The FREL proposed by the Congo is its second FREL submitted in the context of applying the stepwise approach. The previous FREL was submitted on 4 January 2016 and was subject to a TA in 2016; it covered the activities reducing emissions from deforestation and reducing emissions from forest degradation based on the reference period 2000–2012 and corresponded to 35,475,652 t CO_2 eq/year. It was therefore higher than the FREL proposed in the most recent submission (see the table below, finding ID# 18, for differences between the most recent FREL and the previous FREL).

14. The Congo used a simple error propagation methodology to calculate the uncertainties for the EFs and AD in accordance with the 2006 IPCC Guidelines and the 2019 Refinement to the 2006 IPCC Guidelines. The Party did not estimate the overall uncertainty in the original

[10] In its original submission, the Congo proposed a FREL of 32,529,037 t CO_2 eq/year. The difference between the original and the modified submission is due mostly to an increase in the sampling density (the updated estimates of deforestation and forest degradation areas were smaller in the modified submission compared with the original submission) and to the carbon stock change values for living biomass, as well as the recalculation of the adjustment to the FREL using carbon stock values by stratum, consistent with those used for calculating historical emissions.

submission. In the modified submission, the Party estimated that the overall uncertainty for the adjusted FREL was 30.5 per cent.

II. Technical assessment of the proposed forest reference emission level

15. The table below describes the findings from the TA of the data, methodologies and procedures used by the developing country Party under assessment in constructing its FREL within the scope of the TA in accordance with decision 13/CP.19 and its annex.

Findings from the technical assessment of the data, methodologies and procedures used by the developing country Party under assessment in constructing its forest reference emission level and/or forest reference level

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
1	2(a) Consistency with the national GHG inventories	The AT noted that, overall, the Congo did not maintain consistency, in terms of sources of AD and EFs used for its FREL, with those used for the GHG inventory included in its NC2. The AT compared the deforestation-related emissions used by the Party to calculate the FREL with the emissions related to the conversion of forest land and grassland reported by the Congo in its most recent GHG inventory, in line with the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, which at the time of the TA was the GHG inventory included in the Party's NC2, submitted in 2009. In the GHG inventory, CO_2 emissions from the conversion of forest land and grassland were reported as a combined total and are more than 20 per cent higher than the historical deforestation-related emissions included in the FREL. Given the lack of disaggregation between the emissions from the conversion of forest land and grassland reported in the GHG inventory, the AT was not able to assess their consistency with the FREL. The AT also noted that non-CO_2 emissions from fires associated with deforestation and forest degradation activities were not reported in the NC2. With regard to forest degradation, the AT found insufficient information on forest carbon stock loss in the NC2 to assess its consistency with the FREL. During the TA, the Congo informed the AT that the GHG inventory for the NC3 is being developed and it is considering ways to ensure consistency between the GHG inventory and the FREL. The AT commends the Congo for its efforts to ensure consistency between the FREL and the corresponding anthropogenic forest-related GHG emissions reported in the GHG inventories.	The AT notes that ensuring consistency between the GHG inventory and the FREL is an area for future technical improvement of the FREL.
2	2(b) How historical data have been taken into account	The average historical emissions used for constructing the proposed adjusted FREL of the Congo were derived from a combination of remote sensing products developed by applying the eSBAE approach for the AD (based on a survey of land-use change between 2016 and 2022) and EFs from the Congo's NFI for 2009–2014 and the 2006 IPCC Guidelines. The AT noted that two time periods are reported in the FREL submission (2016–2021 and 2016–2022), raising an issue of consistency regarding the information used to construct the FREL. During the TA, the Congo explained that the historical reference period is from 31 December 2016 to 31 December 2021, with 2016 as a base year, and that the FREL was constructed by considering estimated emissions over the subsequent five consecutive years (2017–2021) in order to meet the requirements for accessing results-based financing. The Congo also explained that the AD were actually collected over a six-year period (for the survey of land-use change between the base year 2016 and 2022, as mentioned in the previous paragraph), and that average	The AT notes that estimates of AD on land cover and land-use change over a period of analysis consistent with the reported historical reference period is an area for future technical improvement.

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		annual emissions were then estimated by dividing the total emissions by the six years considered in calculating the AD. The FREL was then calculated for a five-year period (2017–2021) on the basis of the average of the six-year period. The Congo also mentioned that data were collected over a six-year period to ensure that they reflected the most recent year for which data were available and with a view to subsequently including the data for 2022 in the monitoring period over which results will be assessed against the FREL. In the modified submission, the Congo further explained that considering data for 2022 ensures consistency with the future monitoring period, and that the approach will allow it to take into account data for 2022 to assess results against the submitted baseline even if the sampling adopted does not allow annualized estimates. The AT noted that the average annual emissions were estimated by dividing the total emissions associated with the changes in land use between the maps for 2016 and 2022 by six, and therefore noted that it would be more accurate to indicate that a reference period of six years was used. The AT further noted that this is also the case for the modified submission, where emissions from SOC associated with deforestation are assumed to change over time, but the six-year average was used to estimate the FREL.	
3	2(c) Consistency – stratification	The AT noted that the Congo used an area-weighted average approach based on national forest classes for estimating emissions for the FREL adjustment in the original submission, while an area-weighted average approach based on ecological zones was used for estimating average historical emissions. The AT further noted that the use of a different stratification for estimating emissions for the FREL adjustment and for the average historical emissions could lead to an issue of inconsistency in the proposed FREL. During the TA, the Congo explained that, in the light of the findings of the AT, the estimates of historical and adjusted emissions were harmonized in the modified submission using the EFs in tables 25–27 of the NFI (vol. 2). These EFs are available by forest stratum, rather than by ecological zone, owing to the disaggregation of AD by forest stratum. The AT commends the Congo for the changes made in the modified submission to ensure the consistency of the stratification used for estimating emissions both for the adjustment and for the average historical emissions.	
4	2(c) Accuracy – EFs	The AT noted that EFs from the NFI (vol. 3) were used for the living biomass and DOM pools (reported in tables 3 and 5 of the original FREL submission respectively) to estimate emissions from deforestation. The AT also noted that the values for the living biomass and DOM pools used in the original FREL submission (in t dm/ha) are a weighted average for all forest in the Congo, but that tables 25 and 27 of the NFI (vol. 2) include values for the above-ground biomass and	

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		deadwood pools for different forest types, while table 5 of the NFI (vol. 3) includes the average used in the original FREL submission as well as values for different ecological zones. During the TA, the Congo explained that average EFs for the living biomass and DOM pools for all forest were used owing to the insufficient number of sampling points subject to deforestation in the original submission for allocating areas of deforestation by forest type or stratum. In its modified submission (table III), the increased sampling density allowed the Congo to use specific EFs for each identified forest type. The AT commends the Congo for applying specific EFs for each forest type instead of an average EF for all forest types.	
5	2(c) Consistency – EFs	The AT noted that, for estimating emissions from deforestation, the Congo used a value of 0.37 for the ratio of below-ground to above-ground biomass (R), which is the same value used in the Congo's NFI. The AT also noted that this value, which is provided in the 2006 IPCC Guidelines, originates from a study specific to the Amazon (Fittkau and Klinge, 1973). The AT also noted that, for estimating emissions from forest degradation, the Congo used ratios of below-ground biomass to above-ground biomass values from the 2019 Refinement to the 2006 IPCC Guidelines (vol. 4, table 4.4) for tropical rainforest in Africa, namely 0.532 for primary forest (based on the IPCC default value for African tropical rainforest with more than 125 t/ha) and 0.825 for secondary/degraded forest (based on the IPCC default value for African tropical rainforest with less than 125 t/ha), as explained in the original FREL submission (table 9). The AT therefore noted the R values used for estimating emissions from deforestation and forest degradation are inconsistent. In its modified submission, the Congo used a harmonized ratio for calculating emissions from deforestation and forest degradation, as recommended in the 2019 Refinement to the 2006 IPCC Guidelines (vol. 4, table 4.4) (i.e. 0.532 or 0.825 depending on the above-ground biomass stock). The AT commends the Congo for applying a consistent ratio of below-ground to above-ground biomass for both deforestation and forest degradation in its modified submission.	
6	2(c) Accuracy – EFs	The AT noted that the Congo used EFs from the NFI (vols. 2–3), which covers 2009–2014, but that the FREL covers the reference period 2017–2021. The AT therefore noted that there appears to be no overlap between the estimates of carbon stock changes reported for 2009–2014 in the NFI and for the reference period of the FREL. During the TA, the Congo explained that the latest data from the NFI (vol. 3) were published in 2020 and that this is the most recently available national information.	

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		The Party also indicated that an update of the EFs for degraded forests in the Congo is planned for 2024, but that this data-collection exercise, like any other inventory component, is dependent on the resources available within the institutions in charge of the project. The AT concludes that the Congo is using the data collected for the time period closest to the FREL reference period and commends the Congo for the planned improvements to the EFs.	
7	2(c) Accuracy – EFs	The AT noted that, to estimate the densities of above-ground living biomass, the Congo applied a single allometric equation developed by Chave et al. (2014) using diameter at breast height, wood density and environmental stress as variables, as used in the NFI and in the previous FREL submitted in 2016. The AT further noted that the testing of the validity of generic allometric equations before their application to assess their reliability and associated uncertainty, or the development of country-specific allometric equations, was identified by the previous AT as an area for future technical improvement in the report on the TA of the proposed FREL of the Congo submitted in 2016. The AT also noted that further information on the validity of the generic allometric equation applied by the Party was not presented in the original and modified FREL submissions. During the TA, the Congo explained that it is one of the countries benefiting from support provided by the Central African Forest Commission for developing allometric equations specific to the forests of the Congo Basin. The Congo explained that it will use these equations when revising the EFs in 2025 or when preparing future NFIs. The AT commends the Congo for its efforts to develop allometric equations that better represent its forest and its plans to use them in future NFIs.	The AT reiterates the finding of the previous AT that testing the validity of generic allometric equations before their application in order to assess their reliability and associated uncertainty, or developing country-specific allometric equations, is an area for future technical improvement of the FREL.
8	2(c) Accuracy – EFs	The AT noted that the Congo considered all areas of deforestation and forest degradation as being on mineral soils. The AT also noted the explanation provided by the Congo that swamp forest is not yet impacted by deforestation or forest degradation. During the TA, the Congo explained that estimates of losses in the SOC pool on organic soil were not included because information was gathered for all forest strata, including swamp forest, but that an insufficient number of change samples detected for each stratum did not allow it to assess deforestation by forest stratum. The Congo also explained that no deforestation in swamp forest was identified among the sample plots analysed. The Congo clarified that, for the purposes of simplification and applying a conservative approach, it used the hypothesis that all deforestation took place on mineral soils, which was validated by expert judgment. The Party also informed the AT that work on mapping organic soils is	The AT notes that stratifying areas of deforestation and forest degradation by soil type (mineral or organic) and using EFs specific to each of those two soil types is an area for future technical improvement that would increase the accuracy of the FREL.

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		currently under way in the Congo, and that it will shortly be using the results of this work with a view to improving the emission estimates for organic soils. The AT commends the Congo for its efforts to improve the accuracy of the emission estimates.	
9	2(c) Transparency – EFs	The AT noted that the Congo reported in the original FREL submission (table 10) that carbon stock changes in deadwood due to forest degradation are based on the difference between the carbon stock values of deadwood in primary forest and in secondary/degraded forest, and that the assumed carbon stock value for primary forest is an average of all forest types (including degraded forest), in line with the values reported in the NFI (vol. 2, table 25), while the assumed carbon stock value for degraded forest is the value for young secondary dense forest reported in the NFI (vol. 2, table 25). Therefore, the AT noted that there is an overlap between the forest strata used to characterize the carbon stocks before and after degradation. The AT further noted that, in the spreadsheet accompanying the modified submission, the Congo estimated the loss of carbon as the difference between the total carbon stock (above- and below-ground biomass, litter and deadwood) in primary dense forest compared with secondary dense forest, primary riverine forest compared with secondary riverine forest, primary swamp forest compared with young secondary swamp forest and secondary dense forest compared with young secondary dense forest. The carbon stock of secondary dense forest, based on the information included in the NFI (vol. 2, table 25), includes adult secondary forest and young secondary forest. The AT noted that there is still an overlap between the forest strata used to characterize the carbon stocks before and after forest degradation for secondary dense forest. The AT commends the Congo for revising the EFs used for forest degradation in different forest types in the modified submission, which better represents the characteristics of the Congo's forest land compared with the use of an average carbon stock value for all forest types in the country and partly resolves the overlap between the forest strata used to characterize the carbon stocks before and after degradation. However, the AT noted that it is not clear in the modified FREL submission (table III) how the EFs for forest degradation were calculated (i.e. which forest types were compared) and that this information is more transparent in the spreadsheet accompanying the modified submission.	The AT notes that including information on which forest types were compared for calculating the EFs for forest degradation is an area for future technical improvement that would increase the transparency of the FREL.
10	2(c) Accuracy – EFs	The AT noted that emissions from SOC associated with forest degradation and from DOM (litter and deadwood pools) associated with the degradation of secondary forests were assumed to be zero in the original submission. During the TA, the Congo explained that the corresponding changes in carbon were not estimated because EFs were not available either in the NFI or using IPCC	

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		default values. The Congo also explained that the dynamics of carbon between forest pools is highly complex in forested areas that remain forested, especially in relation to DOM. In the modified submission, the Congo used assumptions for estimating the carbon stock changes for DOM, applying a tier 2 approach for estimating changes in deadwood and assuming a decrease in litter proportional to that of above-ground biomass, but for SOC the tier 1 assumption of no change continued to be used. The Congo also acknowledged that establishing country-specific and more accurate EFs for forest degradation is an area for improvement and explained that various initiatives are being planned over the coming months in this respect. The AT commends the Congo for including estimates of emissions from carbon stock changes in DOM due to forest degradation and for its efforts to improve the EFs for this activity.	
11	2(c) Transparency – EFs	The AT noted that the Congo defines forest degradation as a process in which the forest defined as any natural or artificial vegetation formation with a minimum area of 0.5 ha, with trees greater than 3 m high and a canopy cover of more than 30 per cent, undergoes a modification of its structure through a decrease in forest cover of between 75 and 30 per cent over a two-year period and that this definition was used to identify areas of forest degradation. However, the AT noted that it is not sufficiently clear from the information provided in the modified submission how the EF applied (as reported table III and in the accompanying spreadsheet) is consistent with this definition.	The AT notes that including further information on the representativeness of the EF used for forest degradation in relation to the definition of forest degradation is an area for future technical improvement that would increase the transparency of the FREL.
12	2(c) Accuracy – AD	The AT noted that 8 out of 81 sample points categorized as being subject to deforestation classified as dense forest in 2016 remained classified as dense forest in 2022 in the spreadsheet shared with the AT during the TA to support the original submission. These points were also included in the estimate of primary forest areas in 2016 that were subject to degradation over the reference period. During the TA, the Congo explained that, during data processing, land cover is analysed to classify transitions. When the record regarding changes in land use does not align with the information contained in the land-use records for the different years, the sample points are revised. The Party also noted that inconsistencies in information on forest loss and land use often result from misinterpretation. In the modified submission, the Congo provided an adjusted estimate of the areas subject to forest degradation, which was reduced from 293,994 to 246,791 ha. However, the updated spreadsheet shared with the AT during the TA to support the modified submission still contains some potential inconsistencies regarding the information included in the column that indicates type of change and the one that indicates how the corresponding record of land use was finally processed. The Congo also shared	The AT notes that enhancing quality assurance/quality control procedures for the AD database to ensure consistency across the calculation spreadsheet is an area for future technical improvement of the FREL.

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		with the AT the computing script documenting the approach taken when any inconsistency was identified during the processing of AD. The AT notes that the inconsistencies identified in the original submission were corrected for the modified submission and commends the Congo for its efforts to increase the accuracy of the estimates of AD for forest degradation in the modified submission.	
13	2(c) Transparency, completeness and accuracy – AD	The AT noted that, in the original submission, emissions from forest degradation were estimated by analysing changes from non-degraded primary forest to secondary forest, and in secondary forest that remains secondary forest. However, it is unclear how degradation is identified in the secondary forest stratum that remains secondary forest and why the same fraction of biomass lost in disturbance was used for the degradation of both primary and secondary forests. During the TA, the Congo explained that degradation means a change in forest structure within a sample unit, but not necessarily a change in the initial forest class; therefore, a secondary forest in 2016 that becomes a degraded secondary forest in 2022 is a secondary forest that remains a secondary forest, but in which forest loss has occurred. This means that the classification of forest as degraded refers to a state and not a stratum. In the modified submission, including in the Excel spreadsheet provided together with the estimates, the Party re-estimated emissions from forest degradation for six strata of AD (primary forest remaining primary forest, primary forest converted to secondary forest, gallery forest converted to secondary forest, gallery forest remaining gallery forest, swamp forest converted to secondary swamp forest and secondary forest remaining secondary forest), three of which refer to forest strata remaining the same strata. The same EF was used for degradation of primary forest remaining primary forest and primary forest converted to secondary forest. This was also the case for degradation of gallery forest remaining gallery forest and gallery forest converted to secondary forest. The AT therefore considers that the Congo may be overestimating emissions from forest degradation by assigning the same biomass loss to plots remaining in the same strata as to those transitioning from primary to secondary strata.	The AT notes that including detailed information on the methods used for interpreting changes in forest structure and elements to support the estimates of carbon stock changes within a sample unit that remains in the same stratum is an area for future technical improvement of the FREL.
14	2(c) Transparency – AD	The AT noted that in the FREL submission the Party does not distinguish between managed and unmanaged land, and therefore it is not clear to the AT how area burned refers only to managed land, and how the Congo distinguishes between emissions from fires associated with deforestation and forest degradation and those due to natural disturbances. In response to a question raised by the AT during the TA, the Congo explained that data were collected only for managed land (as defined by the IPCC), as deforestation and forest degradation in the Congo are by definition the result of	The AT notes that providing clarification on the application of the managed land proxy to distinguish between emissions from fires associated with deforestation and forest degradation and those due to natural disturbances is an area for future technical improvement that

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		anthropogenic activities and that natural disturbances were not included in the FREL. The Congo further explained during the TA that the probability of natural fires occurring in its forests is very low and that no natural disturbances were observed in the samples analysed. It also explained that the biomass burned on managed land is confirmed by analysis of the surrounding area, the expertise of the interpreters conducting the analysis and the available data on land use (e.g. covering the road network, settlements, areas of forestry, and mining and agricultural concessions) and that the driver of forest fire was also identified, taking into account these elements. The AT commends the Congo for the responses provided during the TA that anthropogenic activities are the driver of forest fires and that the occurrence of natural fires in forest areas is very unlikely.	would increase the transparency of the FREL.
15	2(c) Accuracy – EFs	The AT noted that in its modified submission the Party used updated values for some of the variables used to estimate EFs compared with the values used in the original submission. For example, the Congo used an updated carbon fraction value of 0.456 (Martin et al., 2018). The AT commends the Congo for improving the accuracy of the EFs.	
16	2(c) Accuracy – AD and EFs	The AT noted that the Party reported information on the uncertainties of the AD and EFs in the FREL submission, but not on the uncertainty of the results of the FREL itself. During the TA, the Congo explained that, owing to technical and logistical constraints, it was not able to conduct a combined analysis of the uncertainties of the AD and EFs. Uncertainties were therefore estimated separately for the AD and EFs by calculating the relative standard error for carbon stock changes (based on the NFI) and applying a 90 per cent confidence interval and a 10 per cent margin of error for the AD for forest area, non-forest area and forest change. In its modified submission (table 13), the Congo estimated the overall uncertainty of the FREL, using the propagation of error method, and combining uncertainties using equations 3.2, 3.2B and 3.0B of the 2019 Refinement to the 2006 IPCC Guidelines, as detailed in section III.6 (Evaluation of uncertainties) of the submission. The AT commends the Congo for reporting overall uncertainty for the FREL, which increased the accuracy of the submission. The AT noted that the equation used to combine uncertainty estimates for emissions from deforestation and forest degradation assumed that those estimates were uncorrelated, but the AT also noted that they could be correlated as they are derived from the same source of EFs.	The AT notes that taking into account correlation in the estimation of uncertainties, for instance using a Monte Carlo analysis, is an area for future technical improvement of the FREL.

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
17	2(d) Description of relevant policies and plans, as appropriate	In its FREL submission, the Party provided a brief description of its national REDD+ process to demonstrate its commitment to forest conservation and climate change mitigation. The Party explained that a national REDD+ strategy has been in place since 2017 and that forests are a key element of its first nationally determined contribution (submitted in 2017) with the aim of ensuring that the sequestration potential of the forest is maintained and enhanced through both improved management and afforestation. The country's commitment has led to the provision of funding from the Central African Forest Initiative, the Green Climate Fund and the World Bank for implementing REDD+ activities, with a focus on agroforestry and reducing GHG emissions, particularly those from the land use, land-use change and forestry sector. Furthermore, the Congo stated that, in order to combat deforestation and forest degradation, it has invested in the management and certification of its forests. Currently, 16 forest concessions covering 3,467,379 ha are being managed, while 22 forest concessions, covering an area of around 8,565,850 ha, or 58 per cent of the total area allocated to production forest (forest where the primary management objective is to produce timber, pulp, fuelwood and/or non-wood forest products), already have a management plan in place. The country's commitment to sustainable forest management is consolidated by an ambitious forest certification programme, with nine forest concessions certified to date, including five concessions certified by the Forest Stewardship Council, three by the Timber Origin and Legality organization and one by LegalSource.	
18	2(e) Changes to previously submitted FREL	In its FREL submission, the Congo described the following changes from previously submitted information in accordance with paragraph (b) of the annex to decision 12/CP.17: (a) The inclusion of carbon stocks following deforestation owing to the collection of AD using the Collect Earth tool, which enabled the identification of land use before and after changes; (b) The improvement of the ratio of below-ground to above-ground biomass by applying the default value in the 2019 Refinement to the 2006 IPCC Guidelines; (c) The application of spatially explicit data using remote-sensing data to identify forest degradation; (d) The inclusion of CH_4 and N_2O emissions from biomass burned associated with deforestation and forest degradation; (e) The inclusion of emissions from carbon stock changes in litter and SOC; (f) The application of national definitions of deforestation and forest degradation;	

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		(g) The improved use of the results from the first NFI; (h) The use of more precise AD and updated sample analysis tools. The AT concludes that the FREL proposed in the modified submission differs from that in the 2016 submission previously assessed owing mainly to the use of new AD for areas of deforestation and forest degradation, new EFs for deforestation and forest degradation and the inclusion of CH_4 and N_2O emissions from forest fires and SOC in deforestation and that by doing so the Congo has addressed some of the areas for technical improvement identified during the previous TA. The AT commends the Congo for using updated AD and EFs in its modified FREL submission.	
19	2(f) Pools – SOC	Emissions from SOC in forest degradation were not included in the Congo's FREL submission. According to paragraph (c) of the annex to decision 12/CP.17, reasons for omitting a pool in constructing the FREL should be provided, noting that significant pools should not be excluded. With regard to emissions from SOC in forest degradation, the AT requested clarification of the reasons for omitting the pool. In response, the Congo explained that the pool was not included because SOC was not included in the NFI data, and that, applying a tier 1 assumption according to the 2006 IPCC Guidelines (vol. 4, chap. 4), no change in SOC in forest remaining forest was assumed. In table IX of the modified submission, the Congo also clarified that SOC in forest degradation was assumed to be 0, applying a tier 1 assumption. The AT considers that the exclusion of SOC in forest degradation was adequately justified by the Congo. The AT concludes that emissions from SOC in forest degradation are likely to be insignificant and their exclusion is therefore justified. Pursuant to paragraph 2(f) of the annex to decision 13/CP.19, in assessing the pools included in the FREL, the AT noted that the pools excluded by the Congo are likely to be insignificant in the context of the FREL. The Congo also explained that the NFI will be updated over the coming years to include other pools, such as SOC. The AT commends the Congo for its intention to obtain more complete information on the SOC pool with the aim of including it in future FREL submissions as part of the stepwise approach.	
20	2(f) Gases – CO_2, CH_4 and N_2O	The FREL includes CO_2, CH_4 and N_2O emissions. Non-CO_2 emissions (CH_4 and N_2O) are those associated with fires identified in the deforestation process and forest degradation. The Party's previous FREL submitted in 2016 did not include CH_4 and N_2O emissions. The AT commends the Congo for including CH_4 and N_2O emissions in its FREL.	
21	2(f) Activities	The activities conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks were not included in the FREL	The AT considers the treatment of emissions or removals from

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		submission. Pursuant to paragraph (c) of the annex to decision 12/CP.17, reasons for omitting an activity in constructing the FREL should be provided, noting that significant activities should not be excluded. The AT requested clarification of the reasons for omitting these activities. In response, the Congo explained that the decision not to include these three activities for the time being is a national decision, pending further development of the necessary methods and tools for collecting this information. On the basis of the information provided by the Party, the AT acknowledges that the Congo included in its FREL the most significant activities (reducing emissions from deforestation and reducing emissions from forest degradation) of the five activities identified in paragraph 70 of decision 1/CP.16, in accordance with its national capabilities and circumstances. The AT notes that other activities could also be significant, in particular enhancement of forest carbon stocks, and that the Congo did not provide information on the significance of the excluded activities.	conservation of forest carbon stocks, sustainable management of forests and enhancement of forest carbon stocks as an area for future technical improvement of the FREL.
22	2(g) Definition of forest	The Congo provided in its submission the definition of forest used in constructing its FREL. The Congo defines forest as covering a minimum area of 0.5 ha, with a minimum tree height of 3 m and a minimum crown cover of 30 per cent. This definition, which was also used in the previous FREL submission, takes into account commercial forest plantations such as cocoa, coffee and old palm plantations and excludes agricultural activities, including palm plantations in production. During the TA, the Congo explained that coffee and cocoa plantations are planted under shade using agroforestry practices that are compatible with its definition of forest. It further explained that old palm plantations (over 20 years old) are colonized by secondary species and are also included in the definition of forest. Young single-species palm plantations that are still in operation are excluded from the forest definition; in ecological terms, palms containing no cambium are not considered forest trees, but rather tall grasses (part of the genus Arecaceae).	The AT notes that further describing the reasons for including some types of agricultural land in the forest definition is an area for future technical improvement of the FREL.
23	2(g) Definition of forest	The definition of forest provided by the Congo in its FREL (i.e. covering a minimum area of 0.5 ha, with a minimum tree height of 3 m and a minimum crown cover of 30 per cent) is not the same as that used in the NFI (i.e. land with tree cover (or equivalent relative density) greater than 10 per cent and an area greater than 0.5 ha, and with trees reaching a minimum height of 5 m at maturity in situ) (NFI vol. 2, table 15). The AT therefore noted an inconsistency in the forest definition used for identifying areas of deforestation and forest degradation and that used for estimating the EFs applied to those areas. In response to a question raised by the AT during the TA, the Party explained that, when the NFI was developed, a national definition of forest had not yet been adopted. The Party acknowledged this difference and explained that the	The AT notes that ensuring consistency between the forest definition used for identifying areas of deforestation and forest degradation and that used for estimating the related EFs is an area for future technical improvement of the FREL.

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		inconsistency in the forest definitions is unlikely to have a significant impact on the emission estimates. The AT commends the Congo for its willingness to transparently include in the FREL submission the reasons for the difference in the forest definitions used for the FREL submission and the NFI and its potential impact on the emission estimates.	
24	2(g) Definition of forest	The AT noted that the forest definition used by the Party for its FREL submission includes a minimum tree height threshold criterion of 3 m. The AT also noted that the identification of deforestation and forest degradation areas is based on the interpretation of satellite images using Collect Earth. Therefore, the AT sought clarification on how the height threshold criterion was applied when identifying deforestation and forest degradation areas. During the AT, the Congo explained that, during the data-collection process, several satellite sources available in the Collect Earth interface (including Planet, Sentinel and Bing Maps, with a spatial resolution ranging from 15 cm to 15 m) enabled experts to assess the observed forest cover with a view to classifying it in accordance with the three forest definition threshold criteria (including tree height). The Congo also informed the AT that the documentation of the height of the forest cover during data collection needs to be added to the list of areas for improvement. The AT commends the Congo for its willingness to improve the operationalization of the height threshold criterion.	The AT notes that including further details on the application of the tree height threshold criterion used in the forest definition is an area for future technical improvement of the FREL.
25	2(h) Inclusion of future changes to policies	The AT noted that the Congo did not include details of how the national circumstances were considered in developing the adjusted FREL (e.g. a description of assumptions about future changes to domestic policies). In response to a question raised by the AT during the TA, the Congo explained that the National Development Plan 2022–2026 contains several strategic pillars, some of which will have an impact on forest cover, including industrialization and the development of special economic zones. For example, the Party explained that the following measures are mentioned in pillar 2, section 4.2, of the National Development Plan 2022–2026 regarding industrial development: (1) “support for the structuring of the artisanal mining sector and the construction of production units for iron ingots, copper, gold and zinc” and (2) “support for the development of several roads, such as Ollombo–Abala, Boundji–Ewo, national road no. 3 Dolisie–Ndendé–Gabon border”, both of which have a high potential to result in forest disturbance. The Party also explained that two of the four areas identified under the pillar relating to the development of special economic zones are located in forested areas, namely in Oyo-Ollombo, which covers an area of 760,318 ha, and Ouesso, which covers 379,639 ha. The special economic zones are defined as geographical areas	The AT notes the inclusion of a detailed description of how the national circumstances were considered in developing the adjusted FREL as an area for future technical improvement.

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		dedicated to accelerating development with a view to improving the performance of sectors that facilitate economic diversification through their value chains, in particular the agriculture and industry sectors. The Congo clarified that, in accordance with paragraph 7 of decision 4/CP.15, it decided to adjust the FREL upward by 39 per cent to take into account these national circumstances in the context of the National Development Plan 2022–2026. The Congo explained in its original and modified submissions that the approach used to estimate the adjustment is based on that proposed by the World Bank Forest Carbon Partnership Facility in its Carbon Fund Methodological Framework. The Congo also explained that it meets the two eligibility requirements of this methodological framework: (1) long-term historical deforestation has been minimal throughout the country (the deforestation rate is of the order of 0.1 per cent of forest area per year) and it has a high forest cover (69 per cent of the total area of the country), and (2) its national circumstances are such that the deforestation and forest degradation rates during the historical reference period are likely to result in an underestimation of future deforestation and forest degradation rates during the period over which results will be assessed. The AT notes that the overall deforestation rates in the country in 2016–2022 are related to small-scale farming/forestry (92 per cent of samples, or 88 out of 95) and road infrastructure and urbanization/housing (6.3 per cent of samples, or 6 out of 95). The AT also understands from the discussions with the Congo during the TA that if the planned developments of special economic zones are completed, the adjustment to the current FREL would meet all eligibility criteria under the methodological framework applied by the country.	

III. Conclusions

16. The FREL presented in the submission is the Congo's second FREL.

17. The FREL presented in the modified submission, based on the reference period 2017–2021, corresponds to 31,656,549 t CO_2 eq/year.

18. The AT acknowledges that the Congo included in its FREL the most significant activities, the most important forest types and the most significant pools in terms of emissions from forests. The AT considers that, in doing so, the Congo followed paragraph 70 of decision 1/CP.16, on activities undertaken, and paragraph 10 of decision 12/CP.17, on applying the stepwise approach.

19. As a result of the facilitative interactions with the AT during the TA, the Congo provided a modified submission that took into consideration the technical input of the AT. The AT notes that the transparency and completeness of the information provided were significantly improved in the modified FREL submission and commends the Congo on its efforts. The new information provided in the modified submission, including the spreadsheet made available to the AT, increased the reproducibility of the FREL calculations.

20. Pursuant to paragraph 3 of the annex to decision 13/CP.19, the AT identified areas for future technical improvement (see the table above).

21. The information used by the Congo in constructing its FREL for deforestation and forest degradation is mostly transparent (see finding ID#s 2, 9, 11, 13, 14 and 24 in the table above), mostly complete (see finding ID# 13 in the table above) and in overall accordance with the guidelines for submissions of information on reference levels (see finding ID#s 1, 7, 8, 12–14, 16, 21–23 and 25 in the table above).

22. The AT acknowledges and welcomes the Party's intention to:

(a) Develop updated and specific EFs for deforestation and forest degradation on the basis of measurements in the Congo;

(b) Apply more robust quality assurance/quality control procedures;

(c) Increase the number of soil carbon measurements in swamp forest, given that peat represents an important carbon pool.

23. The Congo identified the following capacity-building needs:

(a) Capacity-building on quality assurance/quality control procedures for AD collection and processing;

(b) Capacity-building on uncertainty estimates;

(c) Training on quantification of other REDD+ activities;

(d) Capacity-building on other adjustment methods applicable to high-forest, low-deforestation countries;

(e) Training and capacity-building for better understanding Article 6 of the Paris Agreement.

24. In conclusion, the AT commends the Congo for showing strong commitment to continuously improving its FREL estimates in line with the stepwise approach. A number of areas for the future technical improvement of the Congo's FREL have been identified in this report. At the same time, the AT acknowledges that such improvements are subject to national capabilities and policies, and notes the importance of providing adequate and predictable support.[11] The AT also acknowledges that the TA was an opportunity for a rich, open, facilitative and constructive technical exchange of information with the Congo.

[11] As per decisions 13/CP.19, annex, para. 1(b); and 12/CP.17, para. 10.

Annex I

Summary of the main features of the proposed forest reference emission level based on information provided by the Congo

Main features of the FREL		*Remarks*
Proposed FREL	31 656 549 t CO_2 eq/year	
Type and reference period of FREL	FREL = average of historical emissions in 2017–2021 and adjustment for national circumstances	See also finding ID# 2 in the table in this document
Application of adjustment for national circumstances	Yes	See also finding ID#s 3 and 25 in the table in this document
National/subnational	National	
Activities included	Reducing emissions from deforestation Reducing emissions from forest degradation	See also finding ID#s 9 and 21 in the table in this document
Pools included	Above-ground biomass Below-ground biomass Deadwood Litter SOC	See also finding ID#s 10 and 19 in the table in this document
Gases included	CO_2, CH_4, N_2O	See also finding ID# 20 in the table in this document
Forest definition	Included	See also finding ID#s 22–24 in the table in this document
Consistency with latest national GHG inventory	Methods used for estimating the FREL are not consistent with those used for the latest national GHG inventory (2009)	See also finding ID# 1 in the table in this document
Description of relevant policies and plans	Included	See also finding ID# 17 in the table in this document
Description of assumptions on future changes to domestic policy, if included in constructing the FREL	Not included	See also finding ID# 25 in the table in this document
Description of changes to previous FREL	Included	See also finding ID# 18 in the table in this document
Identification of future technical improvements	Included	Several areas for future technical improvement have been identified (see finding ID#s 1–2, 7–9, 11–14, 16 and 21–25 in the table in this document)

Annex II

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 1997. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. JL Houghton, LG Meira Filho, B Lim, et al. (eds.). Paris: IPCC/Organisation for Economic Co-operation and Development/International Energy Agency. Available at https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html.

IPCC. 2003. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. J Penman, M Gytarsky, T Hiraishi, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html.

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl.

IPCC. 2019. *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.* E Calvo Buendia, K Tanabe, A Kranjc, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html.

B. UNFCCC documents

First modified FREL submission of the Congo. Available at https://redd.unfccc.int/submissions.html?country=cog.

“Guidelines and procedures for the technical assessment of submissions from Parties on proposed forest reference emission levels and/or forest reference levels”. Decision 13/CP.19, annex. Available at https://unfccc.int/sites/default/files/resource/docs/2013/cop19/eng/10a01.pdf#page=36.

“Guidelines for submissions of information on reference levels”. Decision 12/CP.17, annex. Available at https://unfccc.int/sites/default/files/resource/docs/2011/cop17/eng/09a02.pdf#page=19.

NC1 and NC2 of the Congo. Available at https://unfccc.int/non-annex-I-NCs.

Report on the TA of the proposed FREL of the Congo submitted in 2016. FCCC/TAR/2016/COG. Available at https://unfccc.int/documents/9874.

C. Other documents

The following references may not conform to UNFCCC editorial style as some have been reproduced as received or as cited in the submission:

Chave J, Réjou-Méchain M, Búrquez A, et al. 2014. Improved allometric models to estimate the aboveground biomass of tropical trees. *Global Change Biology*. 20(10): pp.3177–3190.

Fittkau EJ and Klinge H. 1973. On Biomass and Trophic Structure of the Central Amazonian Rain Forest Ecosystem. *Biotropica*. 5(1): pp.2–14.

Martin AR, Doraisami M and Thomas SC. 2018. Global patterns in wood carbon concentration across the world’s trees and forests. *Nature Geoscience*. 11(12): pp.915–920.

The Republic of the Congo. 2020. Inventaire forestier national multiressource de la République du Congo 2009-2014. Tome 2: Étendue et potentialités des ressources forestières ligneuses.

The Republic of the Congo. 2020. Inventaire forestier national multiressource de la République du Congo 2009-2014. Tome 3: Estimation des facteurs d'émission pour le niveau d'émissions de référence pour les forêts.

The Republic of the Congo. 2022. National Development Plan 2022-2026. Available at https://gouvernement.cg/wp-content/uploads/2022/07/CSD-PND-2022-2026.pdf.