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

Summary

This report covers the technical assessment of the voluntary submission of Colombia 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 Colombia 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, Colombia developed a national FREL. The FREL presented in the original submission, based on the reference period 2013–2022, corresponds to 142,207,224 tonnes of carbon dioxide equivalent (t CO_2 eq) for 2023, 145,802,995 t CO_2 eq for 2024, 149,163,350 t CO_2 eq for 2025, 152,254,995 t CO_2 eq for 2026 and 155,049,811 t CO_2 eq for 2027. As a result of the facilitative process during the technical assessment, the FREL was modified to 143,661,671 t CO_2 eq for 2023, 146,771,749 t CO_2 eq for 2024, 149,652,232 t CO_2 eq for 2025, 152,277,653 t CO_2 eq for 2026 and 154,625,265 t CO_2 eq for 2027.

The assessment team notes that the data and information used by Colombia 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*
AD	activity data
AT	assessment team
BUR	biennial update report
C	carbon
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
COP	Conference of the Parties
DOM	dead organic matter
EF	emission factor
FREL	forest reference emission level
FRL	forest reference level
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
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 Colombia on its proposed FREL,[1] submitted on 6 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] Thomas Brandeis (United States of America) and Thelma Krug (Brazil). The Consultative Group of Experts was invited to participate in the TA as an observer[4] but no representative was available. 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, Colombia 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. Colombia provided its submission in Spanish. The submission is supported by four annexes in Spanish, covering estimation of EFs (annex A.1), data from the NFI (annex A.2), reference emission level (annex B) and national circumstances (annex C), as well as a calculation spreadsheet, which enhance the transparency of the FREL. The additional information and documentation were shared with the AT only.

4. In the submission, Colombia highlighted that the submission of the FREL and its technical annexes is voluntary and has the exclusive purpose of generating the reference level for estimating the results of implementing two of the activities referred to in paragraph 70 of decision 1/CP.16 and obtaining results-based payments for actions under the Warsaw Framework for REDD+ in accordance with decisions 9/CP.19, 13/CP.19 and 14/CP.19, among others, and Article 5 of the Paris Agreement.

5. The objective of the TA is to assess the degree to which the information provided by Colombia 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 Colombia to construct and improve its FREL in the future, as appropriate.[7]

6. The TA of the FREL submitted by Colombia 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.

7. Following the process set out in those guidelines and procedures, a draft version of this report was communicated to the Government of Colombia. The facilitative exchange during the TA allowed Colombia 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, Colombia provided a modified version of its submission on 28 May 2024, which took into consideration the technical input of the AT. The modifications

[1] The submission of Colombia is available at https://redd.unfccc.int/submissions.html?country=COL.
[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.

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

8. 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, 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 Colombia, 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. The FREL includes the emissions from deforestation and forest degradation of natural forest, assumes that the entire carbon stock is lost at the time of clear-cutting and excludes any subsequent post-deforestation CO_2 emissions or removals from the new land-use category. For its submission, Colombia 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 Colombia in the modified submission corresponds to 143,661,671 t CO_2 eq for 2023, 146,771,749 t CO_2 eq for 2024, 149,652,232 t CO_2 eq for 2025, 152,277,653 t CO_2 eq for 2026 and 154,625,265 t CO_2 eq for 2027.[10] It results from the application of an adjustment for national circumstances to the average gross emissions during the reference period 2013–2022. 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, Colombia used the 2006 IPCC Guidelines. The FREL is based on historical gross emissions from deforestation in the reference period 2013–2022, the expected increase in the area of deforestation projected using a logistic model and the estimated losses of carbon from forest degradation in the vicinity of forest edges.

11. The AD used in constructing the FREL were obtained from biennial maps of changes in forest cover, resulting from biennial monitoring of forest cover from 2000 to 2012 and annual monitoring from 2013 to 2022. These maps were constructed using images from the Landsat satellite programme, downloaded free of charge from the Earth Resources Observation and Science Center server of the United States Geological Survey, owing to the historical and continued availability of and ease of access to data, and the temporal and spatial resolutions used for monitoring forest cover. Under the Party's Forest and Carbon Monitoring System, a protocol for digital image processing for generating information on the distribution, extension and changes in forest cover in Colombia was developed, which sets out four phases in the processing of satellite data to generate AD: digital preprocessing of satellite images, digital image processing, data validation and reporting of AD. This process was presented in the FREL submission as 13 methodological steps.

12. EFs were obtained from the units of land sampled for the purpose of the NFI, which totalled 953 clusters of forest subplots that represented more than 64 per cent of the total clusters established throughout the national territory as part of the current NFI cycle. For the next FREL, an additional refinement will be made in relation to the EFs used for the current FREL, because all of the sample units assessed as part of the current NFI cycle will have been processed.

[10] In its original submission Colombia proposed a FREL of 148,895,675 t CO_2 eq/year on average for 2023–2027. The difference between the original and the modified submission is due mostly to changes to the estimates of AD for deforestation and forest degradation throughout the reference period, the combination of the AD with EFs at the national level rather than by natural region to reduce EF uncertainty, and changes to the SOC EFs for deforestation.

13. The FREL proposed by Colombia is its third FREL submitted in the context of applying the stepwise approach. The previous FREL was submitted on 6 January 2020 and was subject to a TA in 2020; it covered the activity reducing emissions from deforestation based on the reference period 2008–2017 and corresponded to 120,770,431.44 t CO_2 eq for 2018, 127,011,963.18 t CO_2 eq for 2019, 132,520,275.34 t CO_2 eq for 2020, 137,130,393.50 t CO_2 eq for 2021 and 140,732,334.73 t CO_2 eq for 2022. It was therefore lower than the FREL proposed in the most recent submission (see the table below for differences between the most recent and the previous FREL).

14. Uncertainty estimates for AD and EFs were combined using Monte Carlo simulation to estimate emission uncertainty over the reference period, while the uncertainty of the adjustment for national circumstances was estimated by propagation of error. The uncertainty reported by Colombia for emissions from deforestation is 9.79 per cent on average for the reference period 2013–2022, and 19.17 per cent when incorporating the uncertainty applied to adjust emissions for national circumstances derived from the logistic model, while the uncertainty reported for emissions from forest degradation is 25.30 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, Colombia 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 third BUR. For the BUR, changes in carbon stock were estimated using the gain–loss method, while for the FREL only gross emissions from deforestation were considered (without accounting for carbon stock in the subsequent land-use category). Another difference was identified in relation to the carbon stock in the DOM pool, which was estimated for the third BUR using the default value from the 2006 IPCC Guidelines and considering only litter, whereas for the FREL the carbon stocks for wood debris (or deadwood) for edge forest and core forest were obtained from the updated NFI. In addition, the carbon stocks for biomass and soils for the FREL were obtained from the latest updated data from the NFI for up to 2023, whereas for the third BUR the data came from the preliminarily updated NFI that incorporated data for up to 2018 only. During the TA, Colombia explained that it strived to use the most accurate data available at the time of constructing the FREL, and that the refinements introduced for the FREL submission will be reflected in its next GHG inventory. Most of the inconsistencies between the FREL submission and the latest GHG inventory (in the third BUR) result from the use of additional data that became available from the NFI. The AT commends Colombia for the improvements introduced for the FREL submission relative to its latest GHG inventory, which increased the accuracy of the estimates, and notes that reflecting those improvements in the next GHG inventory would help to achieve consistency with the FREL submission.	See finding ID# 11
2	2(b) How historical data have been taken into account	Colombia provided estimates of annual emissions from deforestation (core and edge forest) and forest degradation during the reference period 2013–2022 for each of the five natural regions in the country using aggregated EFs at the national scale. These historical data were used to generate an aggregated estimate of emissions from deforestation (core), deforestation (edge) and forest degradation. During the TA, Colombia explained that the aggregation was carried out using the methodological approach outlined in Birigazzi et al. (2018), which ensures that the aggregated historical estimates are unbiased. In its modified FREL submission Colombia also added clarification to the aggregation of EFs by providing statistical reasoning and supporting literature.	

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3	2(c) Approaches – transparency and accuracy	Colombia used a logistic model to predict future deforestation trends for each of the five natural regions in the country. The results were aggregated to derive total deforestation at the national scale for each year of the reference period (2013–2022) and the years for which the FREL is to be applied (2023–2027). The AT commends the Party for having incorporated the improvements identified during the TA of the previous FREL for 2018–2022 (e.g. avoiding use of the lower end of the logistic model's confidence interval as the basis for the FREL and increasing the number of years used to parametrize the model). In addition, during the TA, Colombia provided additional clarification regarding the rationale for using the logistic model and error statistics by natural region and for the entire country that helped to justify the use of the model. The AT notes that it would enhance transparency in a future FREL submission if Colombia could provide information regarding the assumptions made to support the adjustment made in the FREL to take into account national circumstances – the occurrence of El Niño; the peace agreement with the FARC, the People's Alternative Revolutionary Force; and the most recent territorial dynamics, including the period post peace agreement with the FARC-EP, the Revolutionary Armed Forces of Colombia – People's Army (see finding ID# 22). In the light of this, the AT notes that Colombia could test models in addition to the logistic one to explore other methodological options that might be considered by the country to reflect its national circumstances better, considering the recent inclusion of new activities such as degradation and guided by relevant reporting guidelines under the Convention, particularly those relating to the accuracy and transparency of adjustments to FRELs and/or FRLs.	The AT notes testing of other models besides the logistic model (with a view to potentially increasing accuracy) as an area for future technical improvement of the FREL.
4	2(c) Accuracy – EFs	The AT noted that Colombia provided the SOC stock for the different natural regions used for estimating changes in carbon stock in the SOC pool, but did not provide estimates of the changes in carbon stock for post-deforestation land use following the methodology presented in the 2006 IPCC Guidelines (vol. 4, chap. 2, equation 2.25). During the TA, Colombia explained that, while SOC emissions are distributed equally over a 20-year period following a deforestation event as in the IPCC default approach, no information was available on SOC for post-deforestation land use. Colombia assumed the carbon stock in post-deforestation SOC to be zero after 20 years. This assumption was also made for the previous FREL, and using the appropriate equation to estimate SOC changes was considered an area for future technical improvement of the FREL by the previous AT (FCCC/TAR/2020/COL, para. 56(g)). The current AT noted that, in the GHG inventory, Colombia identified the land-use categories occurring after conversion of forest land until 2018, and that this	The AT notes taking into account the post-deforestation carbon stock in the SOC pool as an area for future technical improvement of the FREL.

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		information could be used when estimating emissions from SOC in the FREL together with the methodological approaches provided in the 2006 IPCC Guidelines (vol. 1, chap. 2, gaps in data sets) and, if necessary, be subject to expert judgment, for which the 2006 IPCC Guidelines provide a protocol (vol. 1, chap. 2, protocol for expert elicitation). The AT concludes that, by not considering the remaining carbon stock of SOC for post-deforestation land uses and rather assuming depletion to zero after 20 years, the Party is overestimating emissions from deforestation due to SOC depletion, and the accuracy of the FREL is reduced and not consistent with good practice. However, it should be noted that the Party has presented this FREL based on gross emissions from deforestation to monitor carbon emissions in all pools other than SOC because accurate information about post-deforestation land use is unavailable.	
5	2(c) Transparency and accuracy – EFs	The AT noted that the estimates of SOC stocks have been updated since the previous FREL submission to reflect additional data from NFI plot clusters. The AT also noted the substantial decreases in estimated SOC values for the Amazonia natural region (from 73.76 t C/ha in the previous FREL submission to 21.53 t C/ha in the original 2024 FREL submission) and for the Caribe natural region (from 101.34 t C/ha in the previous FREL submission to 42.17 t C/ha in the original 2024 FREL submission). The AT further noted that some SOC values provided in the original FREL submission fall outside the default reference range for wet and moist tropical regions in the *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories* (vol. 4, chap. 2, table 2.3). In particular, the SOC estimate for Amazonia (21.53 t C/ha) falls outside the default range for wet tropical climate zones and low-activity clay soils (52 (±6 per cent) t C/ha). In response to the request of the AT for clarification of the difference in SOC values between FREL submissions, Colombia explained that it had identified a calculation error. The AT notes that the SOC estimate for Amazonia in the modified submission (48.35 t C/ha) falls within the uncertainty range of the default value mentioned above. The AT commends Colombia for its efforts to generate additional data and information for SOC stocks in order to check the accuracy of its estimates.	The AT notes providing information on noticeable differences in SOC estimates between submissions as an area for future technical improvement of the FREL.
6	2(c) Transparency and accuracy – EFs	Colombia applied allometric equations to estimate above-ground biomass for trees (Chave et al., 2014), palms (Sierra et al., 2007) and tree ferns (Weaver, 2000). During the TA, the AT asked for clarification of whether these equations have been tested for adequacy under Colombian forest conditions in all five natural regions.	The AT considers testing the adequacy of global allometric equations under Colombian forest conditions as an area for future technical improvement of the FREL, taking into account its national circumstances and possibilities.

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		In response, Colombia stated that the model by Chave et al. (2014) was used because there are no models specifically for the 2,660 tree species that have been taxonomically identified in the country. Of these, 541 species in Amazonia are represented by a single recorded tree. Colombia stated that it would be impossible to develop specific biomass models for all these species. Given the rarity of some of these species according to records, it would also be impossible to conduct destructive sampling to develop a biomass model for species reported to the Ministry of the Environment and Sustainable Development and the International Union for the Conservation of Nature as being highly vulnerable. The AT noted that work on this subject has been conducted by Alvarez et al. (2012), highlighting the importance of testing the adequacy of global allometric equations (including the Chave et al. (2005) allometric equation) for estimating above-ground biomass considering the different natural regions in Colombia. Colombia provided in detail in the modified FREL submission the rationale behind using the Chave et al. (2014) allometric equation instead of those presented in Chave et al. (2005) or Alvarez et al. (2012). The AT commends Colombia for including this additional information in the modified submission, but notes that it is good practice to validate existing equations with data collected in the country in the specific regions where they are applied.	
7	2(c) Completeness and transparency – EFs	The AT noted that the previous AT had identified providing tree-level data from the NFI that are necessary to reconstruct the estimated forest carbon stocks as an area for future technical improvement to enhance the completeness and transparency of the FREL submission (FCCC/TAR/2020/COL, para. 56(h)). Colombia did not provide this information in the most recent FREL submission. This information is needed for reconstructing the FREL. The AT is of the view that providing this information and the results of the application of the allometric equations to estimate tree-level biomass would also enhance transparency. During the TA, Colombia explained that the restrictions applied to sharing tree-level data because of concerns on how these data would be used outside the sampling design and to protecting the privacy rights of forest-dwelling Indigenous and minority communities. The AT appreciated these explanations and the example of tree-level information shared by the Party.	The AT notes that exploring a way of sharing the tree-level data from the NFI used as input to the allometric equations to estimate tree-level biomass in a way that protects the rights of all forest stakeholders is an area for future technical improvement of the FREL.
8	2(c) Accuracy – EFs	The AT noted that Colombia did not address the additional stratification of the five natural regions identified by the previous AT as an area for future technical improvement of the previous FREL (FCCC/TAR/2020/COL, para. 56(c)). The AT also noted that Colombia had previously indicated that it planned to conduct a further analysis of NFI data to assess if additional levels of stratification would be needed. The AT acknowledges that providing the additional core forest and edge forest stratification needed to capture forest degradation in this FREL would have	The AT notes the additional stratification of natural regions using NFI data as a desirable area for future technical improvement of the FREL, but is aware of constraints faced by the Party in trading off the accuracy of

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		reduced the sample sizes in each natural forest area and increased the uncertainty around those estimates. In order to improve the accuracy of the estimates of carbon stock, in particular for above-ground biomass, the AT is of the view that using NFI data to determine additional levels of stratification needed is worth further exploration.	estimates of forest emissions for a larger number of strata.
9	2(c) Transparency – AD	The AT noted that Colombia continued to assess deforestation as the conversion of forest cover to other types of land cover over a set time period and did not provide information in the FREL submission on how this temporal requirement is considered when identifying deforestation. This issue was also identified by the previous AT (FCCC/TAR/2020/COL, para. 56(d)) as an area for future technical improvement of the previous FREL. The Party explained that it does not include the concept of temporarily unstocked forest land in its forest definition, which therefore excluded the possibility of establishing this type of area in the report. However, it acknowledges that a temporary or permanent change in forest cover is included in degradation.	The AT reiterates providing information in the FREL submission on how temporal requirements are considered when identifying deforestation as an area for future technical improvement of the FREL, which would increase the transparency of the submission.
10	2(c) Accuracy – AD	The AT noted that identifying temporarily unstocked forest land that could be incorrectly classified as deforestation was included as an area for future technical improvement of the previous FREL (FCCC/TAR/2020/COL, para. 56(e)). During the TA, Colombia explained that it had not been possible to make this differentiation between temporarily unstocked forest land and deforested land, but efforts were being made to address the issue. Additionally, Colombia explained that it does not make a distinction between managed and unmanaged land, nor does it include the concept of temporary deforestation in its forest definition. Colombia has made efforts, however, to characterize the changes in vegetation cover after deforestation events, and those changes have been included in the emission reduction programme for the Orinoquía region of the country. The AT considers that distinguishing between areas of forest land that are temporarily unstocked and areas of forest land that are deforested would help to avoid overestimating emissions from deforestation and hence would be in line with the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*.	Noting the Party's efforts to identify temporarily unstocked forest land that could be classified as deforestation, the AT considers this to be an area for future technical improvement of the FREL.
11	2(c) Accuracy – AD	The AT noted that Colombia provided estimates for gross emissions from deforestation (see finding ID# 1) owing to the lack of a complete time series of information on the post-deforestation land-use category. However, the AT identified that, in the national inventory report contained in the third BUR, post-deforestation land use has been characterized until 2018.	The AT notes moving from estimating gross emissions from deforestation to estimating net emissions from deforestation as an area for future technical improvement of the FREL.

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		The AT noted that in its GHG inventory Colombia identified land uses post conversion of forest land until 2018 and that this information could be used together with the methodological approaches provided in the 2006 IPCC Guidelines (see finding ID# 4) to estimate carbon stocks in post-deforestation land use throughout the time series.	
12	2(c) Accuracy – AD	Colombia defines forest degradation as a permanent or temporary change in forest cover that does not result in the forest falling below the thresholds of the forest definition. Colombia has explored different ways of establishing a methodology that allows emissions from forest degradation to be estimated in a cost-effective manner and with a low level of uncertainty. In doing so, Colombia assumed that degradation occurred within a 120 m wide edge forest adjacent to deforested areas. The FREL submission provides separate estimates of emissions from deforestation in core and in degraded forest (edge forest). The AT noted that this approach to estimating emissions from forest degradation is not based directly on activities associated with a permanent or temporary loss of carbon stock in forest (e.g. fire or selective logging) but nonetheless is an innovative and valid method that falls within the IPCC guidelines and that needs to be assessed against other potential causes of forest degradation.	The AT notes exploring other potential sources of forest degradation not associated with proximity to forest edges as an area for future technical improvement of the FREL.
13	2(c) Accuracy – AD	Colombia did not provide, either in the FREL submission or in the GHG inventory, the boundaries between managed and unmanaged land. Such identification is a proxy suggested in the 2006 IPCC Guidelines (vol. 4, chap. 1) to distinguish between changes in carbon stock due to anthropogenic, natural and indirect causes. All emissions and removals from managed land are regarded as being anthropogenic in nature and should therefore be reported. During the TA, in response to a request for clarification, Colombia explained that no distinction is made between managed and unmanaged land. The AT is of the view that Colombia should provide in the FREL submission information on the treatment of emissions from natural disturbance events, such as El Niño, and the implications for adjusting the FREL for national circumstances.	The AT notes providing information on the methods and definitions used to determine areas of managed and unmanaged land and their implications for the treatment of emissions from natural events as an area for future technical improvement of the FREL.
14	2(c) Subnational FREL/FRL	Pursuant to paragraph 71(b) of decision 1/CP.16, Colombia developed a national FREL that covers its entire territory. The AT commends Colombia for expanding the coverage of its FREL to include its insular territories when estimating AD for deforestation, but noted that section 9.2 of the submission could be read as meaning that insular territories were not included in the estimation of AD for forest degradation. In response to a question from the AT, Colombia clarified that, for the latest FREL submission, the insular territories of San Andrés and Providencia were included in the degradation	

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		estimates, amounting to an area of about 5,000 ha more than in the previous FREL submission. It further clarified that the same protocols used for deforestation and forest degradation monitoring and reporting for continental areas were used for the insular areas for all years for the FREL. During the TA, the AT requested that Colombia provide the breakdown of forest area by natural region for the previous and most recent FREL submissions for all years of the reference period. In response, Colombia provided access to those data, which the AT commends.	
15	2(d) Description of relevant policies and plans, as appropriate	Colombia provided in the FREL submission references to several forest-related national initiatives, including the national REDD+ strategy, the Comprehensive Strategy for Deforestation Control and Forest Management "Forest Territories of Life", which includes a target of reaching zero deforestation by 2030 and the aim of reducing forest degradation and deforestation through the cross-sectoral management of policies and norms for environmental and land-use planning. Another initiative is Amazon Vision, the first national REDD+ programme implemented in the Colombian Amazonia that received results-based payments from REDD+ Early Movers, an initiative of the Governments of Germany, Norway and the United Kingdom of Great Britain and Northern Ireland that contributed USD 61 million. Colombia mentioned that, in the light of the multisectoral nature of the causes of deforestation and forest degradation, in December 2020 the National Council for Economic and Social Policy issued the National Policy for the Control of Deforestation and the Sustainable Management of Forests, which has the aim of implementing cross-sectoral strategies to control deforestation and forest management to promote the sustainable use of natural capital, the forest economy and community development in the areas of greatest deforestation.	
16	2(e) Changes to previously submitted FREL	In its FREL submission, Colombia described the following changes from previously submitted information in accordance with paragraph (b) of the annex to decision 12/CP.17: (a) Insular territories have been included as part of the analysis to generate deforestation AD; (b) An additional stratification of the national forest was carried out; it was divided into two strata (intact forest (core) and degraded forest (edge)), which allowed improved biomass estimates for each stratum based on the degree of disturbance; (c) Deforestation AD for 2013–2022 were refined as a result of improvements in the quality control procedures related to the adequate classification of the	

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		pixels as forest or non-forest, thus assuring the consistency of the time series and avoiding the double counting of deforestation; (d) The number of analysed NFI clusters increased from 303 for the previous FREL submission to 953, of which 661 were used to estimate the EFs. Colombia explained that the increase helped to improve the precision of the estimates of the carbon stock for the different pools evaluated. For the previous FREL 20.5 per cent of the NFI clusters were analysed, whereas 64.4 per cent of the clusters were considered for the most recent FREL. Colombia noted that, because of the post-stratification carried out to disaggregate forest into intact forest (core) and degraded forest (edge), only 661 clusters were analysed with the purpose of specifying the estimates of aerial biomass for these two strata, which corresponds to 44.7 per cent of the total sample size; (e) The logistic model used to project the area of deforestation maintains the approach used for the previous FREL, using AD for 2013–2022. Colombia highlighted that the model performance has improved in terms of predicting deforestation in the reference period since it uses 2013 and 2022 as pivots, which implies that it is fitted over a period that allows it to capture the effects of the negotiations with the FARC and the effects of the strong El Niño phenomenon in 2015–2016; (f) The new projections of deforestation areas consider the trajectory given by the logistic growth model and using the lower limit of the confidence interval was avoided, which improves the accuracy of the adjusted FREL; (g) The definition of forest used has not changed since the previous FREL submission. The definition was also incorporated into the third BUR, thus guaranteeing consistency across reports. Additionally, the third BUR includes definitions for forest plantations and other types of tree cover; (h) EFs for fine and coarse woody debris (deadwood) pools measured as part of the NFI have now been included. During the TA, Colombia explained that the improvements introduced in the present FREL submission addressed several of the areas for future technical improvement identified by the previous AT. The AT concludes that the FREL proposed in the most recent submission differs from the previously submitted FREL mainly as a result of the additional data available from the NFI, the inclusion of an additional REDD+ activity (reducing emissions from forest degradation) and improvements identified in the previous TA being addressed. The AT commends Colombia for the changes introduced in the latest FREL submission.	

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17	2(f) Pools – DOM and SOC	For deforestation, Colombia included in the FREL changes in above- and below-ground biomass, SOC and deadwood (woody debris, standing dead trees and dead stumps), but not litter. However, for forest degradation, only changes in above- and below-ground biomass were considered in the FREL. The Party justified the exclusion of the DOM pool from the estimation of emissions from forest degradation on the assumption that it is in equilibrium (changes in carbon stock are zero) following a tier 1 approach from the 2006 IPCC Guidelines. For SOC, the default assumption according to those Guidelines is that it is not modified by management and, therefore, changes in stock are equivalent to zero. Thus, this pool is excluded from the analysis of the EF for forest degradation. 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 exclusion of the DOM pool for forest degradation is justified because it is likely not to be significant in the context of the FREL.	
18	2(f) Gases – CO_2	Colombia included only CO_2 emissions in its FREL, which is consistent with the latest GHG inventory, in the third BUR.	
19	2(f) Activities – enhancement of forest carbon stocks	Colombia mentioned in the FREL submission regeneration as a land-cover class identified during the direct and semi-automated processing of the satellite images used to estimate AD, together with other land-cover classes: stable forest, non-stable forest, deforestation and no information (corresponding to masked data due to the presence of clouds and cloud shadows). Regeneration was also considered during the visual verification of the changes in land-cover class. After the consideration of regeneration in these two steps to generate the AD for deforestation, regeneration was no longer included or mentioned in the FREL submission. During the TA and in response to a request for clarification of why regeneration was not considered in the FREL submission, either as part of the activity enhancement of forest carbon stocks or as the recovery of degraded forest land, Colombia explained that there are limited data available on the activity and that improving estimates for forest degradation was prioritized. Colombia mentioned that only data from the first cycle of the NFI are available and that results from new cycles of the NFI and continuous remeasurements of permanent plots will be relevant to developing models to better understand forest succession. The Party added that, despite the fact that regeneration is not included in the FREL, protocols for assessing ecological restoration have been developed, but sites for their application have not yet been identified.	The AT notes exploring the significance of the activity enhancement of forest carbon stocks based on the limited number of samples, even if on a preliminary basis, as 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*
20	2(f) Activities – sustainable management of forests and conservation of forest carbon stocks	The submission does not include information regarding the potential future inclusion in the FREL of the REDD+ activities sustainable management of forests and conservation of forest carbon stocks, nor on their potential significance. During the TA, the AT asked for clarification on this issue and Colombia stated that there is ongoing analysis regarding the inclusion of new activities in a future FREL. Sustainable management of forests could potentially be included in the next FREL, based on a Government development plan that includes ambitious measures for forest management in coordination with local communities. Inclusion of this new activity, however, would be dependent on the availability of data that will allow Colombia to track carbon stock changes in relevant areas. The AT considers that Colombia has included the most significant activities associated with emissions from forests in its FREL (deforestation and forest degradation), and that the inclusion of forest degradation was a significant improvement relative to the previous FREL. The AT commends Colombia for exploring the possibility of including additional REDD+ activities in a future FREL, or demonstrating that the activities are not significant.	The AT notes the treatment of sustainable management of forests and conservation of forest carbon stocks (either including the activities or providing more information justifying their omission to enhance transparency) as an area for future technical improvement of the FREL, while acknowledging the opportunities for such activities are currently limited in scope and their contribution to REDD+ activities uncertain.
21	2(g) Definition of forest	Colombia provided in its submission the definition of forest used in constructing its FREL: land occupied mainly by trees that may contain shrubs, palms, bamboos, herbs and lianas, in which tree cover predominates with a minimum canopy density of 30 per cent, a minimum canopy height (in situ) of 5 m at the moment of its identification, and a minimum area of 1 ha. The tree cover of commercial forest plantations, palm crops and trees planted for agricultural production is excluded. The definition of forest is consistent with the definition of natural forest coverage used for the estimation and reporting of the national GHG inventory included in the third BUR.	
22	2(h) Inclusion of future changes to policies	Colombia did not include assumptions about future changes to domestic policies when constructing its FREL. The projection of future deforestation was based on a 'business as usual' scenario that does not include the expected results of the emission reduction measures included in the nationally determined contribution directly related to the forestry sector, such as the development and consolidation of the productive chain of forest plantations for commercial purposes as a contribution to the capture of GHGs; the ecological restoration that seeks to accelerate the process of re-establishing forest ecosystem areas in line with the national restoration plan; and the intersectoral reduction of deforestation. In projecting changes in deforestation, Colombia applied a logistic model that incorporates expected changes due to national circumstances. Two key periods	

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		were identified as a reference for the adjustment for national circumstances of the historical average of emissions from deforestation for 2023–2027. The first, between 2013 and 2016, corresponds to the negotiation process of the peace agreement with the FARC-EP, and the occurrence in the country of the El Niño climate phenomenon (classified as strong between May 2015 and April 2016) and its influence on the reduction of rainfall and the increase in events associated with fires. Colombia explained that, under a strong El Niño scenario, the increase in maximum temperatures and the prolongation of drought periods increases the probability of thermal anomalies that lead to forest fires, which, in turn, drives deforestation, particularly in the Orinoquía and Amazonia regions. During the TA, Colombia explained that the projections are made using historical data for 2012–2022, adjusted to account for national circumstances without consideration of any future policies, and that the changes proposed by the previous AT concerning improving the performance of the logistic model have been taken into account. The AT commends Colombia for the information provided and is of the view that future FREL submissions could benefit from including projections of future deforestation based both on no changes in policy and on changes triggered, in particular, by the nationally determined contribution measures in the forest-related mitigation portfolio and the REDD+ strategy.	

III. Conclusions

16. The FREL presented in the submission is Colombia's third FREL. The FREL presented in the most recent submission, based on the reference period 2013–2022, corresponds to 143,661,671 t CO_2 eq for 2023, 146,771,749 t CO_2 eq for 2024, 149,652,232 t CO_2 eq for 2025, 152,277,653 t CO_2 eq for 2026 and 154,625,265 t CO_2 eq for 2027.

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

18. As a result of the facilitative interactions with the AT during the TA, Colombia 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 Colombia on its efforts. The new information provided in the modified submission and the spreadsheets and documentation shared with the AT increased the reproducibility of the FREL calculations.

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

20. The information used by Colombia in constructing its FREL for deforestation and forest degradation is mostly transparent (see finding ID#s 5, 6, 7 and 9 in the table above), mostly complete (see finding ID# 7 in the table above) and in overall accordance with the guidelines for submissions of information on reference levels (see finding ID#s 3–8, 10–13, 19 and 20 in the table above).

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

(a) Refine the EFs for deforestation and forest degradation, using all NFI clusters;

(b) Use the results of permanent plots covering at least 3 per cent of the NFI clusters;

(c) Characterize post-deforestation land use and use this information to include net emissions from deforestation;

(d) Model the impact of national circumstances on projected emissions from forest degradation;

(e) Stratify forest area by soil type, to distinguish between mineral and organic soils in the estimation of emissions;

(f) Reflect the improvement included in this FREL submission in the GHG inventory of the country's first biennial transparency report to maintain consistency between the FREL and the latest GHG inventory.

22. In conclusion, the AT commends Colombia 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 Colombia'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 Colombia.

[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 Colombia

Main features of the FREL		*Remarks*
Proposed FREL	143 661 671 t CO_2 eq for 2023 146 771 749 t CO_2 eq for 2024 149 652 232 t CO_2 eq for 2025 152 277 653 t CO_2 eq for 2026 154 625 265 t CO_2 eq for 2027	
Type and reference period of FREL	FREL = average of historical emissions in 2013–2022 and an adjustment based on the expected increase in area of deforestation projected for 2023–2027	
Application of adjustment for national circumstances	Yes	See also finding ID# 3 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 11–12 and 19–20 in the table in this document
Pools included	Above-ground biomass Below-ground biomass Deadwood Soil organic matter	See also finding ID#s 4–5 in the table in this document
Gas included	CO_2	
Forest definition	Included	See also finding ID#s 9–10 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 (2022)	See also finding ID# 11 in the table in this document
Description of relevant policies and plans	Included	
Description of assumptions on future changes to domestic policy, if included in constructing the FREL	Not included	
Description of changes to previous FREL	Included	See also finding ID# 5 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 3–13 and 19–20 in the table in this document)

Annex II

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

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.

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B. UNFCCC documents

First, second and third BURs and national inventory reports of Colombia. Available at https://unfccc.int/BURs.

First, second and third modified FREL submissions of Colombia. Available at https://redd.unfccc.int/submissions.html?country=COL.

"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.

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Report on the TA of the proposed FREL of Colombia submitted in 2014. FCCC/TAR/2015/COL. Available at http://unfccc.int/resource/docs/2015/tar/col.pdf.

Report on the TA of the proposed FREL of Colombia submitted in 2020. FCCC/TAR/2020/COL. Available at https://unfccc.int/sites/default/files/resource/tar2020_COL.pdf.

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:

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Birigazzi L, Gamarra JGP and Gregoire TG. 2018. Unbiased emission factor estimators for large-area forest inventories: domain assessment techniques. *Environmental and Ecological Statistics*. 25(2): pp.199–219.

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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.

Sierra CA, del Valle JI, Orrego SA, et al. 2007. Total carbon stocks in a tropical forest landscape of the Porce region, Colombia. *Forest Ecology and Management.* 243(2): pp.299–309.

Weaver PL. 2000. Elfin woodland recovery 30 years after a plane wreck in Puerto Rico's Luquillo Mountains. *Caribbean Journal of Science.* 36(1/2): pp.1–9.