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## **Report on the technical assessment of the proposed forest reference emission level of Colombia submitted in 2014**

### *Summary*

This report covers the technical assessment of the submission of Colombia, on a voluntary basis, of 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 activity “reducing emissions from deforestation”, which is one of the activities included in decision 1/CP.16, paragraph 70. In its submission, Colombia has developed a subnational FREL for its Amazonia biome with the aim of transitioning to a national FREL/forest reference level in the future. The assessment team notes that the data and information used by Colombia in constructing its FREL are transparent and complete, and are in overall accordance with the guidelines contained in the annex to decision 12/CP.17. This report contains the assessed FREL and a few areas identified for further technical improvement by the assessment team, according to the scope of the technical assessment in the annex to decision 13/CP.19.

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## I. Introduction and summary

### A. Overview

1. This report covers the technical assessment (TA) of the submission of Colombia of its proposed forest reference emission level (FREL),<sup>1</sup> submitted on 8 December 2014 in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place as a centralized activity from 16 to 21 February 2015 in Bonn, Germany, and the TA was coordinated by the secretariat.<sup>2</sup> The TA was conducted by two land use, land-use change and forestry experts from the UNFCCC roster of experts<sup>3</sup> (hereinafter referred to as the assessment team (AT)): Mr. Ghislain Hippolyte Sabin Guendehou (Benin) and Mr. James Penman (United Kingdom of Great Britain and Northern Ireland). In accordance with decision 13/CP.19, annex, paragraph 9, the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention (CGE) was invited to participate in the TA as an observer. However, no representative of the CGE was able to participate at this TA session.

2. In response to the invitation by the Conference of the Parties (COP) in accordance with the provisions of decision 12/CP.17, paragraphs 7–15, and its annex, Colombia submitted its proposed FREL on a voluntary basis. This proposed FREL is one of the elements<sup>4</sup> to be developed in the implementation of the activities referred to in decision 1/CP.16, paragraph 70. The COP decided that each submission of a proposed FREL and/or forest reference level (FRL), as referred to in decision 12/CP.17, paragraph 13, shall be subject to a TA in the context of results-based payments, pursuant to decisions 13/CP.19, paragraphs 1 and 2, and 14/CP.19, paragraphs 7 and 8.

3. Colombia provided its submission in two languages: Spanish and English. The submission is supported by three annexes (in Spanish), covering digital image processing (annex A), estimation of activity data and emission factors (annex B) and deforestation simulation (annex C), which enhance transparency. During the TA, Colombia provided the AT with provisional English translations of the three annexes.

4. The objective of this TA was to assess the degree to which information provided by Colombia was in accordance with the guidelines for submissions of information on FRELS,<sup>5</sup> 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 for the construction and future improvement of FRELS, as appropriate.<sup>6</sup>

5. 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 as contained in the annex to decision 13/CP.19. This report on the TA was prepared by the AT following the guidelines and procedures in the same decision.

6. Following the process contained in the guidelines and procedures of the same decision, 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 information that were considered by the AT in the preparation of this report.<sup>7</sup> As a result of

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<sup>1</sup> The submission of Colombia is available at <<http://unfccc.int/8414>>.

<sup>2</sup> Decision 13/CP.19, annex, paragraph 7.

<sup>3</sup> Decision 13/CP.19, annex, paragraphs 7 and 9.

<sup>4</sup> Decision 1/CP.16, paragraph 71(b).

<sup>5</sup> Decision 12/CP.17, annex.

<sup>6</sup> Decision 13/CP.19, annex, paragraph 1(a) and (b).

<sup>7</sup> Decision 13/CP.19, annex, paragraphs 1(b), 13 and 14.

the facilitative interactions with the AT during the TA session, Colombia submitted a modified version on 20 May 2015, which took into consideration the technical input by the AT. Colombia also provided an additional annex on the analysis underlying the adjustment for national circumstances proposed by Colombia (annex D). The modifications improved the clarity and transparency of the submitted FREL. This TA report was prepared based on the context of the modified FREL submission. The modified submission, which contains the assessed FREL, and the original submission are available on the UNFCCC website.<sup>8</sup>

## **B. Proposed forest reference emission level**

7. The FREL proposed by Colombia is subnational, covers the Colombian Amazonia biome and is to be applied for the years 2013–2017, with updates anticipated every five years thereafter. The FREL is based on the mean of historical carbon dioxide (CO<sub>2</sub>) emissions from above- and below-ground biomass carbon pools associated with gross deforestation (defined as loss of forest cover) for the period 2000–2012. It does not include other gases and pools or REDD-plus<sup>9</sup> activities. In line with the step-wise approach referred to in decision 12/CP.17, paragraph 10, Colombia intends to transition to a national FREL in the future, which would incorporate all forests in the country, focusing first on regions with high forest cover. Under the provisions contained in paragraph 9 of decision 12/CP.17, Colombia has adjusted its proposed FREL upward by 10 per cent compared with the historical average emissions for the period 2000–2012. This is intended to take into consideration the results of the qualitative analysis of national circumstances that affect deforestation trends, particularly the prospect of a successful outcome of negotiations to end the armed conflict.

8. According to the FREL submission of Colombia, the Colombian Amazonia biome covers an area of 459,000 km<sup>2</sup>, corresponding to 40 per cent of the national territory and 67 per cent of the national forest area. The estimated CO<sub>2</sub> emissions due to deforestation averaged over the period 2000–2012 for estimating the FREL are, before adjustment, equivalent to approximately 26 per cent of the total greenhouse gas (GHG) emissions as quantified in the national GHG inventory for 2004, published in the second national communication of Colombia (2010).<sup>10</sup> The AT understands that the percentage estimated for 2004 will be somewhat lower than this 26 per cent when an updated GHG inventory consistent with the data used to estimate the FREL is published in association with Colombia's first biennial update report (BUR) and third national communication, which are under development.

9. Colombia indicated in its submission that the progress on the development of methodologies for the detection and monitoring of forest degradation does not allow the inclusion of information on “reducing emissions from forest degradation” in the current FREL, but that this activity is under consideration for future inclusion.

10. Colombia is applying a step-wise approach to its development of the FREL, in accordance with decision 12/CP.17, paragraph 10. The step-wise approach enables Parties to improve the FREL and/or FRL by incorporating better data, improved methodologies and, where appropriate, additional pools. Colombia explained in the submission that insufficient information is currently available to support the inclusion of the “litter”, “dead

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<sup>8</sup> <<http://unfccc.int/8414>>.

<sup>9</sup> In decision 1/CP.16, paragraph 70, the COP encourages developing country Parties to contribute to mitigation actions in the forest sector by undertaking the following activities: reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks.

<sup>10</sup> <<http://unfccc.int/2979>>.

wood” and “soil organic carbon” pools in the FREL. The modified submission clarifies that a national forest inventory (NFI), intended to be implemented during the period 2015–2017, will generate local emission factors for the above-ground biomass carbon pool and data to support the inclusion of soils and woody debris in the next FREL submission.

11. The subnational FREL submitted by Colombia is 51,599,618.7 tonnes of carbon dioxide equivalent (t CO<sub>2</sub> eq) per year for the period 2013–2017, including the 10 per cent adjustment mentioned in paragraph 7 above.

## **II. Data, methodologies and procedures used in the construction of the proposed forest reference emission level**

### **How each element in the annex to decision 12/CP.17 was taken into account in the construction of the forest reference emission level**

#### **1. Information that was used by the Party in construction of the forest reference emission level**

12. The methods used by Colombia are consistent with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) and the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines), as applied to the construction of the FREL, and as discussed further below.

13. Colombia’s proposed FREL is for gross deforestation (defined as loss of tree cover below a certain threshold) and is constructed using data collated by Colombia’s Forest and Carbon Monitoring System (SMBByC). SMBByC is operated by the Institute of Hydrology, Meteorology and Environmental Studies under the guidance of the Ministry of Environment and Sustainable Development. For construction of the FREL, activity data were estimated using Landsat images and emission factors corresponding to carbon densities in above- and below-ground biomass carbon pools estimated from forest sampling plots using allometry. The Colombian Amazonia biome covered by the FREL lies within the nine administrative departments of Putumayo, Caqueta, Amazonas, Guainia, Guaviare, Vaupes, Meta, Vichada and Cauca.

14. The activity data consist of estimated areas deforested in six successive two year periods between 2000 and 2012. Areas that do not have data in either or both of the years of the two year period under consideration were excluded from the analysis.<sup>11</sup>

15. As described in the submission (section 2.d and annex A), digitally preprocessed Landsat image pairs covering successive two year periods are compared automatically to directly produce a change map with five classes: stable forest, stable non-forest, deforestation, regeneration and no information. The minimum mapping unit used for this work was 1 ha. Consistent with the definition being used for gross deforestation, the area regenerating is not subtracted from the area deforested.

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<sup>11</sup> Areas excluded are shown in table 1 of the submission as percentages of the Amazonia biome without information in successive biennial assessment periods. Percentages excluded vary from 0.07 per cent to 0.27 per cent. The original submission omits the percentage signs in the column entries, which therefore are much smaller than apparent at first sight. The modified submission includes the percentage signs.

16. Misclassifications were corrected by visual inspection, with cross-validation, as part of the quality assurance/quality control procedures described in section 4.3.3 of annex A to the submission.

17. Reference data, consisting of an independent sample, will be used in the future to evaluate the overall accuracy of area estimates. This is currently being implemented as part of a sampling approach covering the whole country, as far as national capacities permit, according to the protocol set out in annex A to the submission. The AT commends Colombia for this development and notes that the use of reference data for this purpose addresses decision 4/CP.15, paragraph 1(d)(ii), which requests Parties to provide estimates that are transparent, consistent, as far as possible accurate, and that reduce uncertainties, taking into account national capabilities and capacities.

## 2. Transparency, completeness, consistency and accuracy of the information used in the construction of the forest reference emission level

### Methodological information, including description of data sets, approaches and methods

18. The gross area deforested over the period 2000–2012 was found, by averaging the six successive periods, to be 82,883 ha, or approximately 0.18 per cent of the area covered by the FREL. The AT notes that this is of the same order as the rate of deforestation derived from data in the 2010 Global Forest Resources Assessment (GFRA) database<sup>12</sup> for the period 2000–2010, which is approximately 0.17 per cent per year. Exact agreement would not be expected because the GFRA estimate is based on the total national forest area and the forest definition differs, as set out in paragraph 41 below. Although there may be considerable differences between global analyses and national estimates, the TA also notes that the estimate in the submission is close to the average annual gross deforestation derived by the AT for the nine departments in question from the analysis undertaken by the University of Maryland (UMD) for the same period,<sup>13</sup> which is approximately 0.20 per cent of the FREL area, using 30 per cent crown cover as the forest definition. Both the national and the UMD data show that the deforestation trend over the period has remained constant, although rates derived from the UMD data have greater variance.

19. The AT understands that historical deforestation was estimated over successive two year periods rather than annually because of cost considerations. In future, deforestation rates will be updated annually, according to the clarification provided by Colombia during the TA. The AT noted that historical activity data could have been estimated relative to a single base map, presumably for 2000, rather than by treating each successive two year period independently. Colombia acknowledges that this would be possible and underscored that the more flexible approach adopted helped to minimize the areas excluded because of missing information. The AT suggests that, because the use of a base map could help to identify areas of regeneration, the relative advantages of the two approaches could be further considered by Colombia. The modified FREL submission contains a series of maps covering the successive two year periods.

20. The AT noted that the same methods used to obtain activity data for the area covered by the FREL could be used outside the Amazonia biome, and that this could be used for monitoring displacement as envisaged in the case of subnational reference levels,<sup>14</sup> or for extending the FREL to the national level. The modified submission says that SMByC generates wall-to-wall historical data on deforestation that could be used for monitoring

<sup>12</sup> <<http://countrystat.org/home.aspx?c=FOR>>.

<sup>13</sup> Hansen MC, Potapov PV, Moore R, Hancher M, Turubanova SA, Tuykavina A, Thau D, Stehman SV, Goetz SJ, Loveland TR, Kommareddy A, Egorov A, Chini L, Justice CO and Townshen JRG. 2013. High-resolution global maps of 21st-century forest cover change. *Science*. 342: pp.850–853.

<sup>14</sup> Decision 1/CP.16, paragraph 71(c), footnote 7.

displacement, and that Colombia intends to continue developing subnational FRELs by focusing first on regions with high forest cover. The intention is to develop, with support from international partners such as the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, a methodological framework to nest the subnational FRELs within a national FREL. The AT notes that nesting and displacement issues are, in principle, related, and that when a national level has been achieved, there is no longer a need to monitor displacement. Consequently, it could be simpler methodologically to move to a national FREL, although the AT understands that Colombia has not yet decided upon a timescale for making this transition.

21. For the purpose of calculation of biomass densities, the stratification of the area covered by the FREL followed the bioclimatic classification of Holdridge et al. (1971),<sup>15</sup> indicating that 99.2 per cent of the area is classified as tropical rainforest.<sup>16</sup> The biomass densities (and hence emission factors) of this stratum are assumed to apply to the FREL as a whole.

22. Biomass densities for tropical rainforest were estimated using ground data from 721 plots established between 1990 and 2014. Data from 70 plots were excluded from the estimation because either the distribution of diameters of individuals within the sample was anomalous (possibly indicating harvesting, although other causes are possible, including errors in data collection; 52 plots excluded) or because there was a difference of more than 100 m between reported and interpolated altitudes (possibly indicating erroneous data collection; 18 plots excluded). After exclusion, 651 plots remained. The distribution of plots includes two national park areas, as well as the area of highest deforestation historically, and is determined mainly by accessibility, often via rivers. The AT noted that this distribution would not necessarily be statistically representative as a probability sample. Colombia explained that the NFI to be implemented between 2015 and 2017 will provide statistically representative data, which could be stratified according to accessibility or deforestation risk.

23. Above-ground biomass density for the 651 plots was estimated using a single allometric equation developed by Álvarez et al. (2012)<sup>17</sup> by sampling 631 trees in Colombia. Below-ground biomass was related to above-ground biomass using the equation developed by Cairns et al. (1997),<sup>18</sup> which has previously been tested for applicability to Colombian conditions.

24. The total area sampled was approximately 133 ha. Plot sizes ranged between 0.1 and 1.5 ha. Plot data were grouped by plot size and forest type, and the contribution of each group to the overall biomass density was inversely weighted by the variance within the group. The total biomass density established by this process was  $328 \pm 11.7$  t/ha. The AT notes that the above-ground component ( $273 \pm 9.8$  t/ha) of the total biomass reported by Colombia is within the default range (120–400 t/ha; central estimate 300 t/ha) from the

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<sup>15</sup> Holdridge LR, Grenke W, Hatheway WH, Liang T and Tosi JA. 1971. *Forest Environments in Tropical Life Zones: A Pilot Study*. Oxford: Pergamon Press.

<sup>16</sup> Stratification shows the occurrence of three forest types in the FREL area: tropical rainforest (99.2 per cent of the area), wet tropical forest (0.7 per cent) and wet premontane forest (0.1 per cent).

<sup>17</sup> Álvarez E, Duque A, Saldarriaga JG, Cabrera K, De las Salas G, Del Valle JI, Moreno F, Orrego SA and Rodríguez L. 2012. Tree above-ground biomass allometries for carbon stocks estimation in the natural forests of Colombia. *Forest Ecology and Management*. 267: pp.297–308.

<sup>18</sup> Cairns MA, Brown S, Helmer EH and Baumgardner GA. 1997. Root biomass allocation in the 766 world's upland forests. *Oecologia*. 111: pp.1–11.

2006 IPCC Guidelines<sup>19</sup> and also within the range reported by Langner et al. (2014),<sup>20</sup> which is  $242 \pm 43$  t/ha for above-ground biomass in tropical rainforests in America. By applying the root-to-shoot ratio (0.37) from the 2006 IPCC Guidelines<sup>21</sup> to the IPCC and the Langner et al. (2014) ranges above, the AT also finds that the total biomass reported by Colombia is consistent with internationally published data. Using the default value of carbon content of 0.47 tonnes of carbon per tonne of biomass suggested by the 2006 IPCC Guidelines together with the conversion factor of 3.67, the biomass density is converted to 566.1 t CO<sub>2</sub> eq/ha.<sup>22</sup> This is the value applied to the gross area deforested in the FREL calculation.

25. The AT agrees that above-ground biomass and below-ground biomass are likely to be the most significant pools associated with deforestation, and understands that the NFI will enable the inclusion of other potentially significant pools such as soils and woody debris.

26. Colombia treats deforestation as removal of tree cover, and calls it gross deforestation. This means that areas where tree cover is detected as having fallen below the 30 per cent threshold used in the Colombian forest definition will be treated as deforested, until they achieve this tree cover threshold again. The AT considers that it would be useful to assess whether significant regeneration to forest is taking place and that this should, in principle, be possible using existing image analysis, because areas of regeneration are identified (see para. 15 above).

27. Colombia is working on methodologies to detect and estimate forest degradation, but the AT understands that the results are currently considered too uncertain for inclusion in the FREL. As degradation is a potentially significant activity, the AT considers that it would be useful to describe the work being undertaken and to provide preliminary results, if possible. The AT notes that the 52 plots discarded (because of anomalous tree size distribution, which could be consistent with harvesting or other human impact) from the data set used to estimate deforestation emission factors could be a source of information on degradation, especially if the possibility of degradation can be related to proxy measures such as the proximity of infrastructure.

28. Negotiations to end the long-standing armed conflict in Colombia have made substantial progress since 2012, and may conclude successfully in the near future. Colombia has undertaken a review of international literature on the relationship between forests and conflict, and hence developed a post-conflict scenario. This is used as a basis of an adjustment for national circumstances, under the provisions of paragraph 9 of decision 12/CP.17.

29. According to the scenario developed by Colombia, cessation of conflict would be followed by a five year transitional period that is characterized, in the absence of additional actions to reduce emissions, by a 10 per cent increase in emissions from gross deforestation above the historical rate. This would be followed by a period of stability with a decrease of deforestation rate. The scenario is based on international evidence that civil war decreases

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<sup>19</sup> Volume 4, table 4.7.

<sup>20</sup> Langner A, Achard F and Grassi G. 2014. Can recent pan-tropical biomass maps be used to derive alternative tier 1 values for reporting REDD+ activities under UNFCCC? *Environmental Research Letters*. 9(12), 124008.

<sup>21</sup> Volume 4, table 4.4.

<sup>22</sup> The value of 566.1 t CO<sub>2</sub> eq/ha is equivalent to 141.5 tonnes of carbon per hectare (t C/ha). This compares well with the average of 144.6 t C/ha for carbon density in above- and below-ground biomasses for humid forest types (designated Da, Db, Dm and Ds) in volume 14 of the Brazilian Carbon Map, which is adjacent to the Colombian Amazonia biome. See table 4 of Brazil's FREL submission, dated 14 September 2014, which is available at <<http://unfccc.int/8414>>.



per capita gross domestic product (GDP) and increases the number of people living in poverty. It is envisaged that during the transitional period, pressure on forests from increased economic activities, and from populations previously displaced and now seeking to return, would increase. This, it is argued, would outweigh reduced pressures from migration caused by conflict and agricultural activities (including production of illegal crops) undertaken by the armed groups themselves.

30. Annex C to the submission describes the spatial analysis undertaken with the geographical information tools IDRISI and DINAMICA, which can be used to associate deforestation with drivers and to investigate development over time. The purpose of this work is to increase the understanding of drivers and patterns of change, and hence improve the design and targeting of REDD-plus activities. Insight from the spatial analysis contributed to the estimate of the five year transition period.

31. The 10 per cent increase in emissions is due to expert judgement, and is not derived from the spatial analysis. It takes into account the social and economic factors set out in annex D, which is provided with the modified FREL submission. These factors recognize that the Colombian Amazon is one of the regions in Colombia most affected by the armed conflict and, following its cessation, there are likely to be, among other things, increased accessibility and security, the likelihood of increased oil and gas exploration, and the possibility of large-scale infrastructure and mining projects, leading to increased pressure on forests. Annex D also takes into account the reduced pressure from cultivation of illegal crops. Annex D and the submission note that the 10 per cent value is within the range of variation about the mean of the deforestation rate among the six two year periods used to establish historical emissions. The assessment by the AT indicates that although there is some indication of greater deforestation in years of higher economic growth, as a whole, deforestation rates in the Colombian Amazonia biome have remained constant over the period 2000–2012, despite a 65 per cent increase in national GDP in real terms. This suggests that the need and magnitude of any adjustment will depend on how quickly accessibility (and hence economic convergence) increases following a peace agreement, and that this should be part of the TA of any FREL submitted by Colombia in the future. The AT also understands from discussion during the TA that application of the adjustment for the current FREL would not apply in the case where an agreement to end the conflict is not reached under the current peace process.

32. As noted with commendation in paragraph 17 above, the AT understands that Colombia is starting to implement the use of reference data to improve the overall accuracy of area estimates and to evaluate uncertainties. Although the AT notes that the carbon densities that determine the emission factors may have bias (because the sampling is related to accessibility rather than statistical design), the values are used consistently over time and are within the ranges expected on the basis of the IPCC data and other research data used for comparison. Moreover, Colombia is planning to implement an NFI, which should help to reduce possible bias. The AT commends Colombia for this.

33. Owing to the references in decisions 12/CP.17 and 13/CP.19 to consistency with the GHG inventories, the AT compared the deforestation estimates used to calculate the FREL with the estimates used for forest and grassland conversion in the most recently published GHG inventories for Colombia, which at the time of the TA were those associated with the second national communication. The TA found that the historical emission estimates associated with the FREL exceeded the forest and grassland estimates in the published GHG inventories by a factor of about five. Although the coverages are not the same, it seemed very unlikely that the values are consistent, and the AT found insufficient information in the GHG inventories to assess the reasons for the differences. The AT did not consider this further because Colombia explained that a new and improved GHG inventory will shortly be available through the first BUR and the third national

communication, and that it would contain estimates that are fully consistent with the FREL (before adjustment), including in respect of forest definition, allometric equations, emission factors and activity data. The new GHG inventory will also contain estimates of non-CO<sub>2</sub> GHG emissions associated with fires; these were found to be very small, and no allowance for them has been made in the FREL.

34. The AT considers that the submission and the annexes provided by Colombia, together with the clarifications given during the TA, constitute, for practical purposes, a complete, transparent and accurate description of the construction of the FREL, including the data sets, approaches and methods used. This transparency facilitates comparison with internationally available information on activity data and emission factors, increases confidence in the results obtained, and aids understanding of the areas for further development and improvement.

Description of relevant policies and plans, as appropriate

35. Information on future changes to domestic policies and plans has been included as part of the description of national circumstances and in the context of application of the adjustment. The information provided summarizes investment trends and development plans that could affect the drivers of deforestation. These policies and plans identified affect transportation access and infrastructure, mining and energy developments, and also efforts to reach a successful peace agreement between the Government and armed groups.

**3. Pools, gases and activities included in the construction of the forest reference emission level**

36. According to decision 12/CP.17, annex, subparagraph (c), reasons for omitting a pool and/or activity from the construction of the FREL should be provided, noting that significant pools and/or activities should not be excluded.

37. The carbon pools reported under deforestation include above-ground biomass and below-ground biomass. Dead wood, litter and soils were not reported owing to a lack of data. Colombia clarified during the TA that the NFI under preparation will generate data to allow the inclusion of dead wood and soil carbon pools in the next FREL, as well as to improve the estimates of above-ground biomass by statistically representative sampling. There are currently no plans to estimate the litter pool; the AT agrees that this is likely to be the least significant pool. The only gas emissions reported are those of CO<sub>2</sub>, as a result of changes in carbon stocks in living above- and below-ground biomasses due to deforestation. Assessment by Colombia based on the GHG inventories to be included in its first BUR suggests that non-CO<sub>2</sub> emissions from fires are relatively insignificant.

38. Among the eligible activities according to decision 1/CP.16, paragraph 70, Colombia has chosen “reducing emissions from deforestation” for calculation of the FREL. The AT understands that Colombia plans to extend the FREL to include “reducing emissions from forest degradation”. Forest degradation is not currently included because of its uncertainties. The AT commends Colombia for assessing a number of possibilities for future inclusion, including the use of remotely sensed data to detect shifts in spectral indices, synthetic aperture radar and LiDAR, and the direct detection of fragmentation and proxy indicators. The AT notes that progress could possibly be made through the use of remote sensing to detect disturbed areas plus a suitably stratified NFI to estimate carbon stocks associated with forests in areas where disturbance has taken place.

39. The AT notes that exclusion of non-biomass pools will probably reduce the estimated volume of emission reductions associated with implementing REDD-plus activities. Exclusion of forest degradation, on the other hand, could increase the estimated volume of emission reductions from implementing REDD-plus activities, if reduction of

deforestation were to be associated with an increase in emissions associated with degradation.

#### 4. Definition of forest

40. In its submission, Colombia defines forest for the purposes of construction of the FREL as “Land mainly covered by trees which might contain shrubs, palms, guaduas, grass and vines, in which tree cover predominates with a minimum canopy density of 30 per cent, a minimum canopy height (in situ) of 5 meters at the time of identification, and a minimum area of 1.0 ha. Tree covers from commercial forest plantations, palm crops and planted trees for agricultural production are excluded”. This leads to the exclusion of forest plantations and agroforestry. Deforestation is defined as “the direct and/or induced conversion of forest cover to another type of land cover in a given timeframe”. By implication, the time frame referred to in the deforestation definition is two years, because of the way in which deforestation is estimated as change identified over successive two year periods.

41. In response to a question raised by the AT, Colombia indicated that the same definition of forest is used for the GHG inventories of the first BUR and the third national communication, which are under development. The AT identified that this definition is in line with the one adopted by Colombia under the Kyoto Protocol<sup>23</sup> for clean development mechanism purposes. Decision 13/CP.19, annex, paragraph 2(g), includes consideration of the forest definition used for reporting to other international organizations. In this context, the AT understands that the definition used for the FREL is consistent with that used by Colombia for the purposes of the Convention on Biological Diversity, but differs from that used by Colombia for reporting to the 2010 Forest Resource Assessment of the Food and Agriculture Organization of the United Nations, which uses a minimum area and canopy cover of 0.5 ha and 10 per cent, respectively, and includes forest areas with the potential to reach the minimum values.<sup>24</sup> The AT understands that the use of forest definitions for different purposes is under review, with the aim of increasing consistency.

42. Consistent with the discussion in paragraph 26 above, the AT notes that use of gross deforestation, defined as removal of crown cover, may overestimate emission reductions associated with reducing emissions from deforestation, to the extent that forest regeneration is not counted. The AT notes that this could be avoided by using a forest definition based on land use that is consistent with the IPCC methodologies as set out in the IPCC good practice guidance for LULUCF or the 2006 IPCC Guidelines. The AT recognizes that better understanding of the dynamics of carbon pools on land following removal of tree cover is likely to be needed for adoption of a land-use-based forest definition, and that exclusion of forest plantations and agroforestry is motivated by the desire for consistency with REDD-plus safeguards.<sup>25</sup> According to the modified FREL submission, forest plantations are mapped by remote sensing using, as support, ancillary data sets provided by timber companies and official statistics from the Ministry of Agriculture and Rural Development.

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<sup>23</sup> Decision 11/CP.7, annex, paragraph 1(a).

<sup>24</sup> See *Evaluación de los Recursos Forestales Mundiales 2010 Informe Nacional Colombia*, which is available as a country report at <<http://www.fao.org/forestry/fra/67090/en/>>.

<sup>25</sup> Under some circumstances (e.g. when they are established on land not previously covered by natural forest), forest plantations and agroforestry can reduce the pressure on natural forests.

### III. Conclusions

43. The information used by Colombia in constructing its FREL is in overall accordance with the guidelines for submissions of information on FRELs (as contained in the annex to decision 12/CP.17).

44. The documentation on methods, data and assumptions used, as well as the additional information provided by Colombia during the TA, provided a transparent and complete understanding of how the FREL was calculated. The four annexes of the modified submission provided a significant amount of additional technical material and increased transparency. The AT believes that the FREL is calculated in a manner consistent with the methods described.

45. The AT considers that the subnational FREL proposed by Colombia covers the most significant activity (reducing emissions from deforestation), the most important biome (tropical rainforest in Amazonia) and the most significant pools (above- and below-ground biomasses). This is consistent with a step-wise approach.

46. Colombia is proposing a subnational FREL as an interim measure. There is, so far, no monitoring of displacement as envisaged by decision 1/CP.16, paragraph 71(c), footnote 7. In the case of subnational FRELs, Colombia is investigating, as a priority, work that would make this possible, or enable the introduction of a national FREL. The AT encourages these developments.

47. Colombia plans, in the future, to extend the FREL to include “reducing emissions from forest degradation”, and has been examining technical options for doing this, as set out in paragraph 38 above. The AT commends Colombia for this work, and notes that progress could probably be made through the use of remote sensing to detect disturbed areas using proxy indicators plus a suitably stratified NFI to estimate carbon densities.

48. Although the value used for carbon density of the Colombian Amazonia biome is consistent with international data, it is not based on sample plots distributed according to statistical principles. Colombia expects, over the period 2015–2017, to implement its NFI. This will increase the accuracy of the carbon density estimates and will also allow soil and dead wood pools to be included in the FREL. The AT encourages this development.

49. The FREL is not consistent with the GHG inventories from Colombia’s second national communication, but the AT understands that an update of the GHG inventories will be published with Colombia’s first BUR and third national communication, and that this will be consistent with the FREL in terms of forest definition, emission factors, activity data and underlying allometric equations and wood densities. The AT considers this to be a useful development.

50. Using expert judgement based on international post-conflict literature, the FREL has been adjusted by 10 per cent because emissions from deforestation are expected to increase as a consequence of a successful peace agreement. The historical data show some evidence of positive correlation between increased GDP growth and increased deforestation rate, but, overall, the deforestation trend in the Colombian Amazonia biome has remained constant over the period 2000–2012, despite a 65 per cent increase in the national GDP. The need and magnitude of the adjustment will depend on the rate at which conditions change following cessation of conflict and should be reviewed as part of the TA of any new FREL submitted by Colombia in the future. The AT understands that application of the adjustment for the current FREL would not apply in the case where an agreement to end the conflict is not reached under the current peace process.

51. In summary, the AT notes that Colombia has at hand an improvement programme to:

- (a) Establish consistency between the FREL and GHG inventories in time for inclusion in its first BUR;
- (b) Use reference data for better activity data estimates, and an NFI for better statistical sampling of biomasses and inclusion of additional pools;
- (c) Monitor displacement or move from subnational to national coverage;
- (d) Expand activities to include forest degradation.

52. In addition, and consistent with decision 13/CP.19, annex, paragraph 3, the AT considers that Colombia could usefully consider the following areas identified for future technical improvement:

- (a) Emissions from non-CO<sub>2</sub> gases, using the methods developed for the GHG inventories to be published in association with the first BUR and the third national communication;
- (b) The feasibility of adopting a land-use definition of forest and deforestation so that regeneration on deforested areas can be taken into account, possibly relative to a base map;
- (c) More detailed justification of the adjustment for national circumstances, which should be possible as information on the relationship between REDD-plus activities and economic and social trends accumulates following a peace agreement.

53. In conclusion, the AT commends Colombia for developing its national capabilities for forest monitoring, and for showing a strong commitment to the continuous improvement of its FREL estimates, in line with the step-wise approach. The AT acknowledges that the areas for future improvements identified in this report are subject to national capabilities and policies, and notes the importance of adequate and predictable support. The AT also acknowledges that the assessment process was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Colombia. Finally, the AT notes the willingness of Colombia to contribute to the global effort to mitigate climate change through the REDD-plus process.

54. The table in the annex summarizes the main characteristics of Colombia's proposed FREL.

## Annex

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

	<i>Main features of the FREL</i>	<i>Remarks</i>
Proposed FREL (in t CO <sub>2</sub> eq/yr)	51 599 618.7	Paragraph 11
Type and duration of FREL	FREL based on average historical emissions from 2000 to 2012	Paragraph 7
Adjustment for national circumstances	Yes	Based on a post-conflict scenario developed by Colombia (paras. 28–31)
National/subnational <sup>a</sup>	Subnational	For the Colombian Amazonia biome (see para. 7 and elsewhere)
Activities included <sup>b</sup>	Reducing emissions from deforestation	The FREL includes gross emissions from deforestation (without considering forest regeneration); degradation is not included due to lack of data
Pools included <sup>b</sup>	AB and BB	Accurate data are not available for other pools; the NFI should provide data for dead wood and soil
Gases included	CO <sub>2</sub>	Non-CO <sub>2</sub> gas emissions are thought to be very small; they should be covered in the new GHG inventories associated with the first BUR and the third national communication
Forest definition <sup>c</sup>	Included	“Land mainly covered by trees which might contain shrubs, palms, guaduas, grass and vines, in which tree cover predominates with a minimum canopy density of 30 per cent, a minimum canopy height (in situ) of 5 meters at the time of identification, and a minimum area of 1.0 ha. Tree covers from commercial forest plantations, palm crops and planted trees for agricultural production are excluded” (see paras. 40–42)
Relationship with latest GHG inventory	Methods used for FREL differ from latest GHG inventories published in the second national communication	The GHG inventories in the first BUR and the third national communication are currently under development with updated methodologies, and are expected to be consistent
Description of relevant policies and plans <sup>d</sup>	Included in the context of adjustment	Paragraph 35
Description of assumptions on future changes in	Not applicable	

<i>Main features of the FREL</i>	<i>Remarks</i>
policies <sup>d</sup> Descriptions of changes to previous FREL	Not applicable
Future improvements identified	Yes Paragraph 52

*Abbreviations:* AB = above-ground biomass, BB = below-ground biomass, BUR = biennial update report, FREL = forest reference emission level, GHG = greenhouse gas, NFI = national forest inventory, t CO<sub>2</sub> eq/yr = tonnes of carbon dioxide equivalent per year.

<sup>a</sup> If subnational, comments should include information on the treatment of displacement of emissions.

<sup>b</sup> In the case of omitted pools or activities, comments should include the justification provided by the country.

<sup>c</sup> The forest definition should be summarized, and it should be stated if it differs from the definition used in the greenhouse gas inventory or in reporting to other international organizations.

<sup>d</sup> May be relevant to the description of national circumstances, which is required in the case of adjustment.