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Report on the technical assessment of the proposed forest reference emission level of Peru submitted in 2016

Summary

This report covers the technical assessment of the submission of Peru, on a voluntary basis, 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 Peru covers the activity "reducing emissions from deforestation", which is one of the activities included in decision 1/CP.16, paragraph 70. In its submission, Peru has developed a subnational FREL for the Peruvian Amazon biome, with the aim of transitioning to a national FREL and/or a forest reference level in the future. The assessment team notes that the data and information used by Peru 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 by the assessment team for further technical improvement, 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 Peru on its proposed forest reference emission level (FREL),[1] submitted on 29 December 2015 in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place (as a centralized activity) from 14 to 18 March 2016 in Bonn, Germany, and was coordinated by the secretariat.[2] The TA was conducted by two land use, land-use change and forestry (LULUCF) experts from the UNFCCC roster of experts[3] (hereinafter referred to as the assessment team (AT)): Mr. Javier Fernández (Costa Rica) and Mr. Zoltán Somogyi (Hungary). In addition, Mr. Kamal Djemouai, an expert from the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention, participated as an observer[4] during the centralized activity in Bonn.

2. In response to the invitation by the Conference of the Parties (COP) and in accordance with the provisions of decision 12/CP.17, paragraphs 7–15, and its annex, Peru submitted, on a voluntary basis, its proposed FREL. This proposed FREL is one of the elements[5] 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. Peru provided its submission in two languages: English and Spanish. Peru underlined that its submission does not prejudge any nationally appropriate mitigation actions currently being considered or undertaken by the Party pursuant to the Bali Action Plan, nor does it prejudge any intended nationally determined contribution by Peru in the context of the Paris Agreement.

4. The objective of this TA was to assess the degree to which information provided by Peru was in accordance with the guidelines for submissions of information on FRELs and/or FRLs[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 Peru for the construction and future improvement of its FREL, as appropriate.[7]

5. The TA of the FREL submitted by Peru 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 Peru. The facilitative exchange during the TA allowed Peru to provide clarifications and information that were considered by the AT in the preparation of this report.[8] As a result of the facilitative interactions with the AT during the TA session, Peru submitted a modified

[1] The submission of Peru is available at <http://redd.unfccc.int/submissions.html?country=per>.
[2] Decision 13/CP.19, annex, paragraph 7.
[3] Decision 13/CP.19, annex, paragraphs 7 and 9.
[4] Decision 13/CP.19, annex, paragraph 9.
[5] Decision 1/CP.16, paragraph 71(b).
[6] Decision 12/CP.17, annex.
[7] Decision 13/CP.19, annex, paragraph 1(a) and (b).
[8] Decision 13/CP.19, annex, paragraphs 1(b), 13 and 14.

version on 13 June 2016 (in English only), which provided additional information in relation to some of the technical inputs by the AT. The modified submission is supported by six annexes,[9] with data on historical trends of anthropogenic gross deforestation and associated emissions, the statistical significance of these trends, their projection up to 2020 and information on key sectoral policies and measures in the period 2001–2014 and as of 2015 that support these projections. The modifications, including these additional data and information, improved the clarity and transparency of the submitted FREL, without the need to alter the approach used or the value of the originally proposed 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.[10]

B. Proposed forest reference emission level

7. In decision 1/CP.16, paragraph 70, 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 the provision of adequate and predictable support. The FREL proposed by Peru aims to reduce emissions from deforestation, which is one of the five activities included in paragraph 70 of this decision. Pursuant to paragraph 71(b) of the same decision, Peru has developed a subnational FREL for the Peruvian Amazon, with the aim of transitioning to a national FREL in the future.

8. The subnational FREL proposed by Peru is based on the period 2001–2014. The FREL is estimated using a trend projection (i.e. linear extrapolation) of the historical emissions associated with gross deforestation. The FREL includes only emissions from gross deforestation and excludes any subsequent emissions and removals in the deforested areas. Following this methodology, gross deforestation may include the conversion of forest plantations to other land-use categories; however, emissions from non-anthropogenic forest loss due to river meandering were excluded.

9. The FREL includes the carbon pools above-ground and below-ground biomass, while it excludes the carbon pools deadwood, litter and soil organic carbon (SOC). Of greenhouse gases (GHGs), the FREL includes only carbon dioxide (CO_2).

10. The proposed FREL is estimated for the period 2015–2020. The values projected for each year are not averaged. Peru intends to apply the following values as its proposed FREL (in tonnes of carbon dioxide equivalent per year (t CO_2 eq/year)): 77,570,486 (2015); 80,797,169 (2016); 84,023,853 (2017); 87,250,536 (2018); 90,477,220 (2019); and 93,703,903 (2020).

[9] The original submission contained two annexes relating to the historical trends of anthropogenic gross deforestation and its emissions in the Peruvian Amazon.

[10] <http://redd.unfccc.int/submissions.html?country=per>.

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 the construction of the forest reference emission level

11. Peru presented a transparent FREL submission, which was further clarified during the TA session by additional information provided to the AT. The AT notes the effort made by Peru to provide timely information. The AT sought a number of clarifications; the most important were related to: the use of the *2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines); land use and land cover information; forest stratification and reporting classes; the definitions of managed and unmanaged lands; the estimation of sources and sinks; the consideration of non-CO_2 gases; the selection and representativeness of emission factors; consistency with the national GHG inventory; the transition of forest land to other land uses and that of lands to forest land; the methodology used for the estimation of the FREL (including the proposed trend projection); natural disturbances and non-anthropogenic emissions; the validation of biomass allometric equations; drivers of deforestation; and the consideration of significant activities and carbon pools.

12. The AT notes that although the FREL submitted by Peru covers less than the entire national territory, it includes the entire Peruvian Amazon biome. According to Peru's submission, this is an area of 78,308,801 hectares (ha), or 60.9 per cent of the national territory. The forest area included in the FREL covers 69,380,729 ha, which was 92.7 per cent of Peru's forests in 2014. The AT notes that Peru is planning to include other biomes in future FREL submissions.

13. The AT notes that after the TA week, Peru officially submitted its third national communication[11] to the UNFCCC secretariat, including an updated national GHG inventory. For purposes of the TA, this updated inventory was used to assess consistency with the proposed FREL, in accordance with decision 13/CP.19, annex, paragraph 2(a).

14. The AT notes that Peru presented a national GHG inventory (including LULUCF) with the recalculated years 2000, 2005, 2010 and 2012. The *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* were used for compiling the inventory.[12] For the construction of the FREL, the 2006 IPCC Guidelines were used. The AT notes that several differences exist between the submitted FREL and the national GHG inventory, especially considering that the FREL is subnational whereas the GHG inventory covers the entire territory. Hence, the AT considers that further work is required to maintain consistency between the FREL and the corresponding anthropogenic forest-related GHG emissions by sources and removals by sinks in the national GHG inventory, because this would further improve the transparency and completeness of future FREL submissions (see also para. 28).

15. Considering information for the year 2012 that was included in Peru's national GHG inventory, 51 per cent of total net emissions for Peru were associated with the LULUCF sector (86,742.00 Gg CO_2 eq.). For 2010, a total of 87,664.47 Gg CO_2 eq was estimated to be emitted as a result of forest conversion, while for this same year, the proposed FREL

[11] Available (in Spanish only) at <http://unfccc.int/essential_background/library/items/3599.php?rec=j&priref=7846#beg>.

[12] See page 66 in Peru's third national communication.

submission reports 61,615.37 Gg CO_2 eq from gross deforestation in the Peruvian Amazon biome.

16. For the construction of the FREL, Peru used historical emissions data for gross deforestation for the period 2001–2014. Peru informed the AT that it is currently in the process of compiling land-use change information for the period 2000–2014, which will contribute to the understanding of the behaviour and extent of the drivers of deforestation. The AT considers that additional historical information, including that related to the drivers of deforestation, could be useful to support the FREL trend projection because current estimates may not be fully representative of future emissions in the Peruvian Amazon biome. The AT considers that, in future FREL submissions, Peru may provide information showing how emissions are associated with the drivers of deforestation and how this information can be used to further understand the behaviour of these drivers in order to contribute to more accurate emission projections.

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

17. The historical emission estimates are based on land cover information derived from a forest cover benchmark map (FCBM) for the year 2000 and a map of gross deforestation (MGD) covering annual deforested areas for the period 2001–2014, developed by the Ministry of Environment and the Ministry of Agriculture. The AT notes that neither the FCBM nor the MGD include explicit information on tree plantations, agroforestry systems or other types of management regimes that may involve temporary loss of tree cover but not deforestation. Further, the AT notes that the inclusion of temporary loss of tree cover may lead to the overestimation of emissions from deforestation. When approached by the AT on this issue, Peru responded that it has limited information on subsequent land use after deforestation and the related dynamics. The AT notes that, according to the 2006 IPCC Guidelines, relying solely on forest cover for determining activity data for changes in land use may result in errors. At the same time, the AT commends Peru for its ongoing work in generating land-use change information for the period 2000–2014, noting that this is an important area for future technical improvement.

18. The MGD does not include explicit information on non-anthropogenic forest loss (except for river meandering). The AT notes that, according to the 2006 IPCC Guidelines, the estimation of emissions from land use and land-use change requires the consideration of anthropogenic and non-anthropogenic sources of emissions by the application of the 'managed land' proxy. Unless more sophisticated data and methods are available, the application of this proxy is the only method for considering the effects of such factors as climate change – a fact mentioned in both the submission and Peru's response to the question raised by the AT concerning justification of the proposed FREL. Application of the managed land proxy in turn requires a national definition of managed lands. In response to the suggestion by the AT to provide such a definition, Peru, in its modified submission (p. 10), included a definition of managed lands, namely all forest land in the Peruvian Amazon biome is considered to be managed. The AT notes that, according to the 2006 IPCC Guidelines, "managed land is land where human interventions and practices have been applied to perform production, ecological or social functions".[13] The AT therefore considers that Peru may wish to revise its definition of managed lands to restrict it to areas where human intervention (as defined in the 2006 IPCC Guidelines) has occurred, in order to exclude from the FREL any potential emissions from non-anthropogenic forest loss, and to consistently apply this definition in both the FREL and future emission estimates. The

[13] Volume 4, chapter 1, page 1.5.

AT also considers that, for future FREL submissions, it would be important for Peru to include information on anthropogenic and non-anthropogenic events that may result in permanent forest loss. Finally, the AT considers that improvement in this area should also be reflected in the land representation scheme, in the forest classification and in the selection of emission factors.

19. The AT notes that, owing to the current lack of information on post-conversion land uses, Peru could not select emission factors for the estimation of post-conversion carbon stocks and their changes. This may lead to an overestimation of emissions from forest loss. The AT notes that the IPCC provides default values with the aim of enabling countries to achieve more accurate estimates of carbon stock changes in forest land converted to other land uses. While these default values may not be accurate for a country, they may still be used if country-specific values are not available; the default values can be replaced by country-specific values over time, following a stepwise approach. The AT considers that, in future FREL submissions, Peru may wish to provide information on both post-conversion land use and related emission factors that consider carbon stocks in subsequent land uses. Further, the AT considers that the information currently being generated in Peru's national forest inventory (NFI) and the land-use change analysis mentioned in paragraph 17 above could improve the selection and accuracy of emission factors. The AT welcomes the additional description provided by Peru on how NFI data were employed in the modified FREL submission and the Party's plans to complete the NFI (p. 40).

20. The information on emission factors was obtained from a compilation of 1,152 field plots established by multiple entities across the Peruvian Amazon biome and 50 plots from the NFI. The AT commends Peru for its effort in obtaining this information (through implementing a strict quality control procedure) to estimate average above-ground biomass carbon stocks in the biome. The AT notes that these data were used to estimate pre-conversion forest above-ground biomass carbon stocks, and that these values are within the default range of the 2006 IPCC Guidelines. During the TA, the AT suggested that Peru assess these data to verify the accuracy and representativeness of above-ground biomass carbon stock estimates, specifically for deforested areas. As a result of this technical exchange, Peru added figure 14 to the modified FREL submission (p. 43) that provides the location of the plots and deforested areas, and Peru concluded that these plots are representative of the deforested areas because they are in close proximity to or clearly within the same ecosystems as the deforested areas. In the modified FREL submission, the AT was not able to fully determine whether these estimates accurately represent pre-conversion above-ground biomass carbon stocks of deforested areas. Consequently, the AT considers that additional information in this regard would further improve the transparency of future FREL submissions, as well as help to build confidence in the emission estimates. The AT notes that biomass carbon stocks should be reported in t C and not in t CO_2 eq (e.g. in the modified FREL submission, table 6, section 3.3.2, p. 40).[14] Finally, given that the models and model parameters used are pan-tropical,[15] the AT considers that Peru may wish to validate these biomass allometric equations with national data.

21. The AT notes that Peru linearly extrapolated the 2001–2014 annual emissions trend to 2020 for estimating the FREL values for 2015, 2016, 2017, 2018, 2019 and 2020; this information was reported in table 4 in the modified FREL submission. Upon request by the AT, Peru provided additional information on the goodness of fit (*F*-values) and *p*-values for

[14] For example, equation 2.7 in the 2006 IPCC Guidelines (vol. 4, chapter 2, section 2.2.1 on "Overview of carbon stock change estimation", where annual carbon stock change is estimated as "tonnes C yr^{-1}").

[15] Chave J, Andalo C, Brown S, Cairns A, Chambers JQ, Folster H, Fromard F, Higuchi N, Kira T, Lescure JP, Nelson BW, Ogawa H, Puig H, Riera B and Yamakura YT. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. *Oecologia*. 145: 87–99.

linear regression models, and some of this information was included in the modified FREL submission (p. 24). Although the regression model used to linearly extrapolate historical emissions seems to be statistically significant for the Peruvian Amazon biome, the AT considers that additional information on future policies and/or changing socioeconomic factors may help support the trend projection. During the TA, the AT suggested that, for example, Peru assess whether the drivers of deforestation quantitatively correlate with gross deforestation emissions in the historical period and provide more information on how these drivers might behave in the 2015–2020 period. The AT also suggested to Peru a number of variables that could help it to understand future emissions, such as forest fragmentation, production of cash crops, population growth, road and railroad length, agro-industrial production and domestic migration to the Peruvian Amazon. The AT considers that, for future FREL submissions, Peru may use this type of information to support the trend projection and, consequently, its FREL construction. At the same time, the AT notes that, in the modified FREL submission, Peru included more information related to the AIDER (2015) study[16] on drivers of deforestation (p. 21) and on the policies and measures that could have an impact on emissions from deforestation in the near future (annex 6, p. 76).

22. The AT commends Peru for submitting additional information on its national GHG inventory in response to a question raised by the AT, including the provision of inventory data for the LULUCF sector in a spreadsheet for inventory years 2000, 2005, 2010 and 2012. Upon consideration of this additional data and information, the AT notes that the year 2000 had exceptionally high emissions from forest land conversion (100,656.72 Gg CO_2[17]). As the proposed FREL's historical period is 2001–2014, this information from year 2000 was not used in the construction of the FREL. The AT observed that if the year 2000 were to be included in the estimation of the FREL, it would considerably reduce both the slope of the gross emissions trend and the R^2-value, thereby increasing the confidence interval. Considering that Peru uses a regression model to project its FREL, the AT notes that the inclusion of as many data points as possible (e.g. potentially including existing information on emissions in the year 2000 from the national GHG inventory) will likely improve the statistical robustness of the model.

23. The AT commends Peru for continuing its work in many areas, as described in the FREL submission and during the TA session. Two important areas of work identified by Peru are the NFI and the land-use change analysis. Peru also referred to improving its national forest monitoring system by observing near real-time forest disturbance and estimating non-CO_2 emissions. The AT considers that documenting these planned improvements in a dedicated section may help to increase the transparency of future FREL submissions. Further, the AT notes that Peru may choose to describe how these improvements will ultimately be considered in future FREL submissions.

Description of relevant policies and plans, as appropriate

24. The AT notes that Peru provided information on policies and plans in its original FREL submission, including information on recent developments in public frameworks on forests and climate change. Peru referred to the Strategy to Fight Desertification and Droughts, as well as to plans for updating its National Strategy on Biological Diversity. Further, Peru provided information on the approval of the National Strategy on Climate

[16] AIDER (Asociación para la Investigación y el Desarrollo Integral). 2015. *Motores, agentes y causa de la deforestación en la Amazonía Peruana. Sistematización, patrones espaciales y cuantificación de impactos.* Consultancy report to the Ministry of the Environment of Peru. (unpublished report).

[17] During the technical exchange with the AT, Peru provided the spreadsheet "Resultados USCUSS 2000" detailing the emission data from several IPCC categories related to the LULUCF sector for year 2000. The estimate constructed by the AT was based on the emissions from forest land conversion to agriculture, prairies, settlements and other lands, as reported by Peru for inventory year 2000.

Change, and on the role of the Strategy of Forests and Climate Change to include forests in the national response to climate change. In addition, Peru mentioned its intended nationally determined contribution to the UNFCCC, as well as the role of nationally appropriate mitigation actions and the Green Growth Strategy, currently under preparation. Finally, Peru described how the new Law on Forests and Wildlife provides a strategic framework for guiding REDD-plus activities.[18] Similarly, Peru explained that the Law on the Retribution Mechanism for Ecosystem Services is being revised, and that this law would help share benefits from REDD-plus implementation. Upon request by the AT during the TA session, Peru provided additional information on these and other policies and plans in its modified FREL submission (annex 6, p. 76), including information on key sectoral policies and measures implemented in the period 2001–2014 and since 2015.

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

25. The carbon pools included in the FREL are above-ground and below-ground biomass. Deadwood, litter and SOC are not included. The AT notes that Peru included SOC in its national GHG inventory, and that it reported 412 Gg CO_2 eq emissions from soils in 2012, which constitutes 0.41 per cent of total LULUCF gross emissions. Further, the AT notes that, while available and potentially non-significant, SOC data have not been considered in the construction of the FREL or used for demonstrating non-significance, following decision 13/CP.19, annex, paragraph 2(f).

26. The AT notes that Peru did not provide a justification of why omitted pools such as dead organic matter (DOM) pools (including deadwood and litter) were deemed to be not significant. With a view to supporting capacities and future improvements (decision 13/CP.19, paragraph 1(b)), the AT considers that Peru may wish to use IPCC default values for estimating carbon stock changes in DOM pools and for determining whether such pools can be deemed not significant and hence, omitted in future FREL submissions.

27. The AT notes that Peru's FREL submission includes CO_2 emissions only. According to the information presented by Peru in its national GHG inventory, methane emissions from the LULUCF sector were identified as a key category. Furthermore, the national GHG inventory includes emissions from nitrous oxide for the LULUCF sector. The AT considers that Peru may wish to also include emissions of non-CO_2 gases in its FREL estimate in future submissions.

28. In its FREL submission, Peru included only the activity "reducing emissions from deforestation". The AT notes that, during the present TA, Peru did not provide justification as to why the exclusion of other activities may be deemed potentially not significant in its FREL. During the TA session, Peru provided data sheets containing detailed information on the estimation of emissions and removals, as included in its national GHG inventory. The AT observed that, according to this information, for the period 2000–2012, 65 per cent of total LULUCF net emissions were associated with forest land converted to other land uses, 22 per cent with forest land remaining forest land and 13 per cent with land converted to forest land. Peru indicated during the TA session that it plans to update its GHG estimates of historical emission and removals and develop future national GHG inventories by using spatially explicit information to ensure that the inventories are consistent with the data and methods used in future FREL submissions and with the estimation of emissions and removals resulting from the activities referred to in decision 1/CP.16, paragraph 70. This

[18] In decision 1/CP.16, paragraph 70, the COP encouraged 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.

would contribute to harmonizing the reports in the future. In light of this information, the AT commends Peru for this effort and considers that Peru may wish to include additional potentially significant activities in future FREL submissions.

4. Definition of forest

29. The AT notes that Peru provided a definition of forest for the Peruvian Amazon biome, which is based on forest cover criteria. The forest definition included in the modified FREL submission is: minimum mapping unit, 1 Landsat pixel (0.09 ha); minimum tree height at maturity in situ, 5.00 m; and minimum crown cover, 30 per cent. The AT notes that additional information on land use would be useful to achieve consistency with the 2006 IPCC Guidelines for the definition of forest land. Similarly, the AT notes that the definition of forest in the FREL submission is different from the definition reported by Peru to the Food and Agriculture Organization of the United Nations for the Forest Resources Assessment. In its FREL submission, Peru acknowledged that different definitions coexist, and that the Party applies three forest definitions for international and multilateral reporting. In accordance with decision 13/CP.19, annex, paragraph 2(g), Peru explained in both its FREL submissions why and how the forest definition was chosen – that it took into consideration the scale of land-use change in the Amazon and the technical specifications of the activity data processing chain. The AT notes that Peru may wish, as it is planning, to harmonize the country's forest definitions to increase transparency.

III. Conclusions

30. The AT commends Peru for including in its FREL the most significant activity ("reducing emissions from deforestation") of the five activities in decision 1/CP.16, paragraph 70, in accordance with national capabilities and circumstances, and acknowledges Peru's ongoing efforts to maintain consistency with the LULUCF emissions reported in its national GHG inventory.

31. As a result of the facilitative interactions with the AT during the TA session, Peru submitted a modified FREL submission that took into consideration some of the technical inputs by the AT. The AT notes that, although the FREL values were not modified, the transparency of information improved the modified submission and commends Peru for the efforts it made.

32. The information used by Peru in constructing its FREL for gross deforestation is transparent and complete and is in overall accordance with the guidelines for submission of information on FRELs (as contained in the annex to decision 12/CP.17). The AT notes certain issues that affect the accuracy of the FREL. These issues are mainly related to the inclusion of potential non-anthropogenic emissions and the exclusion of carbon pools, activities and gases, as well as to an incomplete land representation, all of which, in turn, affect the selection of appropriate emission factors. In accordance with decision 12/CP.17, paragraph 8, and decision 13/CP.19, annex, paragraph 2(a), the AT considers that other areas also require further work (see paras. 35 and 36 below) to maintain consistency with corresponding anthropogenic forest-related GHG emissions by sources and removals by sinks as contained in the national GHG inventory.

33. The AT notes that other activities could be significant in the Peruvian Amazon biome, corresponding with the key categories forest land remaining forest land and land converted to forest land, as contained in Peru's national GHG inventory. Further, the AT notes that these categories may correspond to three of the other activities referred to in decision 1/CP.16, paragraph 70: reducing emissions from forest degradation; the

enhancement of forest carbon stocks; and the sustainable management of forests. The AT encourages Peru to consider the inclusion of additional potentially significant activities in future FREL and/or FRL submissions. Otherwise, Peru should provide reasons for omitting activities deemed not significant, in accordance with decisions 12/CP.17, annex, paragraph (c) and 13/CP.19, annex, paragraph 2(f) (see para. 28 above).

34. Peru linearly extrapolated the 2001–2014 trend of gross emissions to 2020, and presented these extrapolated emissions as FREL values for 2015, 2016, 2017, 2018, 2019 and 2020. However, Peru also has data for the year 2000, which presents exceptionally high emissions from forest land conversion (100,656.72 Gg CO_2). As the proposed FREL's historical period is 2001–2014, this information from year 2000 was not used in the proposed FREL. The AT notes that if the year 2000 were included in the estimation of the FREL, it would significantly reduce both the slope of the gross emissions trend projection and the R^2-value of the fit, thereby increasing the confidence interval for the estimate. For future FREL submissions, Peru may wish to reflect on how to address these exceptionally high emissions in the year 2000 (see para. 22 above).

35. Pursuant to decision 13/CP.19, annex, paragraph 3, the AT identified the following areas for future technical improvement:

(a) Using the full scope of the most recent IPCC guidance and guidelines, as adopted by Peru, and following the good practice guidance by the IPCC for estimating emissions by sources and removals by sinks for the other activities referred to in decision 1/CP.16, paragraph 70. One option is to the use the key category analysis for the most important sources and sinks, as already done in the national GHG inventory, as a guide to plan future improvements that could possibly include other activities referred to in decision 1/CP.16, paragraph 70, while also considering paragraphs 22 and 25–28 above;

(b) Continuing to explore methodological options for assessing other activities referred to in decision 1/CP.16, paragraph 70; for example, by making use of existing data in the national GHG inventory (see para. 28 above);

(c) Using land-use criteria, in addition to land cover information, to define forest and forest land, as provided in the 2006 IPCC Guidelines, and to develop a forest classification that incorporates information on relevant land management regimes such as tree plantations, agroforestry systems and other types of indigenous management practices, especially those that may result in temporary forest loss. If appropriate and practicable, exclude potential non-anthropogenic emissions that may result in (temporary) forest loss in unmanaged areas (see paras. 17 and 18 above);

(d) Using default emission factors or developing country-specific emission factors for estimating post-conversion carbon stocks, based on knowledge of subsequent land uses, as well as considering validation of allometric equations and other parameters used to estimate emission factors with existing national information, if available (see paras. 19 and 20 above);

(e) Undertaking a deeper analysis of drivers of emissions from deforestation in order to better estimate future behaviour that would better support trend projections, and applying confidence intervals at a reasonable confidence level (see paras. 16 and 21 above);

(f) Using the ongoing NFI work to improve the estimation of carbon stocks and carbon stocks changes in, to and from forest land, which could inform the estimation of key carbon pools (see para. 23 above).

36. In assessing the pools included in the FREL, pursuant to decision 13/CP.19, annex, paragraph 2(f), the AT identified the following additional areas for future technical improvement:

(a) Treatment of emissions from SOC and non-CO_2 gases, especially considering that this information was presented in Peru's national GHG inventory (see paras. 25 and 27 above);

(b) Treatment of emissions from DOM (i.e. the inclusion of these carbon pools or the provision of justification for their omission). To do this, consider the use of IPCC tier 1 defaults that may be used to determine potential significance; otherwise, consider using the NFI to obtain nationally derived activity data and emission factors (see para. 26 above).

37. The AT commends Peru for compiling information on emissions from gross deforestation for a very large extent of its territory – the Peruvian Amazon biome – including the compilation of 1,152 plots for estimating above-ground biomass carbon stocks. The AT also commends Peru for presenting a transparent FREL submission and for providing additional information in a timely manner to the AT during the TA. Finally, the AT commends Peru for its ongoing efforts to strengthen its national forest monitoring system and its NFI, to obtain additional data on land-use change dynamics, and to consider the inclusion of additional biomes in future FREL submissions, with the aim of transitioning to a national level FREL in accordance with decision 1/CP.16, paragraph 71(b).

38. The AT acknowledges and welcomes the intentions expressed by Peru to:

(a) Work on a 2000–2014 land-use analysis, considering the six land-use categories included in the 2006 IPCC Guidelines, and to incorporate information on management regimes, as well as improve the current forest classification;

(b) Continue work on completing the NFI;

(c) Validate biomass allometric equations and other relevant parameters with existing national data;

(d) Consider additional biomes, as a part of an effort to move towards a national FREL.

39. In conclusion, the AT commends Peru for showing a strong commitment to the continuous improvement of its FREL estimates, in line with the stepwise approach. The AT acknowledges that the areas for future technical improvement identified in this report are subject to national capabilities and policies, and notes the importance of adequate and predictable support.[19] The AT also acknowledges that the assessment process was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Peru.

40. The table in the annex summarizes the main characteristics of Peru's proposed FREL.

[19] Decision 13/CP.19, annex, paragraph 1(b), and decision 12/CP.17, paragraph 10.

Annex

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

Main features of the FREL		*Remarks*
Proposed FREL (in t CO_2 eq/year)	77 570 486 for 2015 80 797 169 for 2016 84 023 853 for 2017 87 250 536 for 2018 90 477 220 for 2019 93 703 903 for 2020	Peru's FREL includes gross emissions from deforestation (i.e. excludes any subsequent emissions and removals from deforested areas). FREL values increase in time given that the historical trend in emissions for 2001–2014 was linearly extrapolated to 2020, following the equation of y = 3 226 683.45x – 6 424 196 675.76 where x is time and y is total emissions from gross deforestation (t CO_2 eq) (para. 10)
Type and duration of FREL	2015–2020	Paragraph 10
Adjustment for national circumstances	No	–
National/subnational[a]	Subnational	Includes the Peruvian Amazon biome (para. 7)
Activities included[b]	Reducing emissions from deforestation	Peru defines gross deforestation as the loss of forest land as a result of both anthropogenic and non-anthropogenic causes (excluding river meandering). For constructing the FREL, Peru considers forest loss during 2001–2014 and excludes removals in deforested areas (para. 8)
Pools included[b]	AB, BB	For these carbon pools, it is assumed that the carbon stocks after deforestation are zero. All other carbon pools are excluded (paras. 25–26)
Gases included	CO_2	Paragraph 27
Forest definition[c]	Included	Minimum tree crown cover of 30 per cent, minimum land area of 0.09 ha and minimum tree height at maturity in situ of 5.00 m (para. 29)
Relationship with latest GHG inventory	Methods used for the FREL differ from those used in the latest GHG inventory (2012)	Differences in methods exist as a result of the application of the 2006 IPCC Guidelines in the construction of the FREL. Several sources and sinks that are included in the national GHG inventory are excluded from the FREL (paras. 14, 25 and 27)

Main features of the FREL		*Remarks*
Description of relevant policies and plans[d]	Included	Paragraph 24
Description of assumptions on future changes in policies[d]	Not applicable	–
Descriptions of changes to previous FREL	Not applicable	–
Future improvements identified	Yes	Several areas for future technical improvements were identified (paras. 35 and 36)

Abbreviations: AB = above-ground biomass, BB = below-ground biomass, FREL = forest reference emission level, GHG = greenhouse gas, t CO_2 eq/year = tonnes of carbon dioxide equivalent per year, 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

[a] If subnational, comments should include information on the treatment of displacement of emissions.

[b] In the case of omitted pools or activities, comments should include the justification provided by the country.

[c] The forest definition should be summarized, and it should be stated if it differs from the definition used in the GHG inventory or in reporting to other international organizations.

[d] May be relevant to the description of national circumstances, which is required in the case of adjustment.