



Report on the technical assessment of the proposed forest reference emission level and forest reference level of Bhutan submitted in 2020

Summary

This report covers the technical assessment of the voluntary submission of Bhutan on its proposed forest reference emission level (FREL) and forest reference level (FRL) in accordance with decision 13/CP.19 and in the context of results-based payments. The FREL and FRL proposed by Bhutan cover the activities reducing emissions from deforestation, sustainable management of forests, conservation of forest carbon stocks and enhancement of forest carbon stocks, which are among the activities included in decision 1/CP.16, paragraph 70. For its submission, Bhutan developed a national FREL and a national FRL. The FREL and FRL presented in the original submission, for the reference period 2005–2014, correspond to 553,668 and –8,761,000 tonnes of carbon dioxide equivalent per year, respectively. As a result of the facilitative process during the technical assessment, the FREL and FRL were modified to 505,837 and –8,539,085 tonnes of carbon dioxide equivalent per year, respectively. The assessment team notes that the data and information used by Bhutan in constructing its FREL and FRL are transparent, complete and in overall accordance with the guidelines contained in the annex to decision 12/CP.17. This report contains the assessed FREL and FRL 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

AD	activity data
AR	Assessment Report of the Intergovernmental Panel on Climate Change
AT	assessment team
C	carbon
CH ₄	methane
CO	carbon monoxide
COP	Conference of the Parties
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
EF	emission factor
FAO	Food and Agriculture Organization of the United Nations
FCPF	Forest Carbon Partnership Facility
FREL	forest reference emission level
FRL	forest reference level
GHG	greenhouse gas
GWP	global warming potential
IPCC	Intergovernmental Panel on Climate Change
LULUCF	land use, land-use change and forestry
NC	national communication
NFI	national forest inventory
N ₂ O	nitrous oxide
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
2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
2019 Refinement to the 2006 IPCC Guidelines	<i>2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>

I. Introduction and summary

A. Overview

1. This report covers the TA of the voluntary submission of Bhutan on its proposed FREL and FRL,¹ submitted on 6 January 2020, in accordance with decisions 12/CP.17 and 13/CP.19. The remote TA² took place from 22 to 26 June 2020 and was coordinated by the secretariat.³ The TA was conducted by two LULUCF experts from the UNFCCC roster of experts⁴ (hereinafter referred to as the AT): Jason Funk (United States of America) and Mwangi James Kinyanjui (Kenya). The TA was coordinated by Peter Iversen (secretariat).

2. In response to the invitation of the COP and in accordance with the provisions of decision 12/CP.17, paragraphs 7–15 and annex, Bhutan submitted its proposed FREL and FRL on a voluntary basis. The proposed FREL and FRL are one of the elements⁵ to be developed in implementing the activities referred to in decision 1/CP.16, paragraph 70. Pursuant to decision 13/CP.19, paragraphs 1–2, and decision 14/CP.19, paragraphs 7–8, the COP decided that each submission of a proposed FREL or FRL, as referred to in decision 12/CP.17, paragraph 13, shall be subject to a TA in the context of results-based payments.

3. Bhutan predominantly developed its FREL and FRL with a view to taking stock of emissions and removals for the forest sector and setting a baseline against which to measure future performance. The Party also plans to use the data collected to provide overall guidance for planning and implementing activities in forestry and other relevant sectors. The submission of the FREL and FRL is intended to help Bhutan to meet the commitment set out in its nationally determined contribution by revalidating its national forest cover, introducing a system for quantifying and monitoring carbon stocks and establishing a benchmark for tracking its performance in terms of forest management.

4. The objective of the TA is to assess the degree to which the information provided by Bhutan is in accordance with the guidelines for submissions of information on reference levels⁶ and to offer a facilitative, non-intrusive, technical exchange of information on the construction of the FREL and FRL with a view to supporting the capacity of Bhutan for the construction and future improvement of its FREL and FRL, as appropriate.⁷

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

6. Following the process set out in those guidelines and procedures, a draft version of this report was communicated to the Government of Bhutan. The facilitative exchange during the TA allowed Bhutan to provide clarifications and additional information, which were considered by the AT in the preparation of this report.⁹ As a result of the facilitative interactions with the AT during the TA, Bhutan provided a modified version of its submission on 5 August 2020, which took into consideration the technical input of the AT. The modifications improved the clarity and transparency of the submitted FREL and FRL without needing to alter the approach used to construct them. This TA report was prepared in the context of the modified FREL and FRL submission. The modified submission, containing

¹ The submission of Bhutan is available at <https://redd.unfccc.int/submissions.html>.

² Owing to the circumstances related to the coronavirus disease 2019, the TAs of the FREL and FRL submissions of developing country Parties in 2020 had to be conducted remotely.

³ Per decision 13/CP.19, annex, para. 7.

⁴ Per decision 13/CP.19, annex, paras. 7 and 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 Per decision 13/CP.19, annex, paras. 1(b), 13 and 14.

the assessed FREL and FRL, and the original submission are available on the UNFCCC website.¹⁰

B. Proposed forest reference emission level and forest reference 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 providing adequate and predictable support. The FREL and FRL proposed by Bhutan, on a voluntary basis for a TA in the context of results-based payments, cover the activities reducing emissions from deforestation, sustainable management of forests, conservation of forest carbon stocks and enhancement of forest carbon stocks, which are four of the five activities referred to in that paragraph. Bhutan reported that the fifth activity reducing emissions from forest degradation is implicitly taken into account in its approach (see para. 36 below). Pursuant to paragraph 71(b) of the same decision, Bhutan developed a national FREL and a national FRL that cover its entire territory. Of its total land area (3,839,400 ha), 2,705,291 ha (71 per cent) was classified as forest in 2010. For its submission, Bhutan applied a stepwise approach to developing its FREL in accordance with decision 12/CP.17, paragraph 10. The stepwise approach enables Parties to improve their FRELs or FRLs by incorporating better data, improved methodologies and, where appropriate, additional pools.

8. The national FREL proposed by Bhutan for the historical reference period 2005–2014 is the annual average of the CO₂ emissions associated with deforestation, including an adjustment for annualized SOC emissions resulting from activities that occurred during the reference period and an upward adjustment equivalent to 0.1 per cent of the biomass carbon stock (in line with Bhutan's approach under the FCPF). The FREL includes only the gross emissions from deforestation that are associated with clear-cuts and excludes any subsequent emissions and removals from deforested areas. The proposed FREL excludes the conversion of forest plantations to other land uses and the conversion of natural forest to natural wetlands.

9. The national FRL proposed by Bhutan for the same historical reference period 2005–2014 is the annual average of the combined net removals from the sustainable management of forests, conservation of forest carbon stocks and enhancement of forest carbon stocks. No adjustments were applied to the FRL.

10. The FREL and FRL presented in the modified submission, with the aim of providing a benchmark for assessing the implementation of REDD+ activities, in part to help Bhutan meet the commitment set out in its nationally determined contribution, correspond to 505,837 and –8,539,085 t CO₂ eq/year, respectively.¹¹

11. The proposed FREL and FRL include the pools above-ground biomass, below-ground biomass, deadwood, litter and SOC. Regarding GHGs, the submission includes CH₄, CO, CO₂ and N₂O. Non-CO₂ emissions accounted for around 43 per cent of emissions during the reference period.

12. In addition to the information provided in the FREL and FRL submission, Bhutan shared additional information with the AT, including six technical annexes to the submission and a collection of digital spreadsheets. The AT found this information to be helpful in clarifying the source of the information used in the submission and in increasing the transparency of Bhutan's approach. The AT commends Bhutan for providing this additional information in a comprehensive and prompt manner, which facilitated a more transparent technical exchange.

¹⁰ <https://redd.unfccc.int/submissions.html>.

¹¹ In its original submission, Bhutan proposed a national FREL and a national FRL of 553,668 and –8,761,000 t CO₂ eq/year, respectively. The difference between the original and the modified submission is due mostly to changes in EFs resulting from changes in the root–shoot ratio, wood density and soil carbon factors made to better reflect Bhutan's forest conditions.

II. Data, methodologies and procedures used in constructing the proposed forest reference emission level and forest reference level

How each element in the annex to decision 12/CP.17 was taken into account in constructing the forest reference emission level and forest reference level

1. Information used by the Party in constructing its forest reference emission level and forest reference level

13. For constructing its FREL and FRL, Bhutan used the 2006 IPCC Guidelines and guidance from the Global Forest Observations Initiative and the Greenhouse Gas Protocol. Bhutan also considered the Green Climate Fund scorecard and guidelines from the FCPF Methodological Framework for high-forest, low-deforestation countries, on the basis of which it adjusted its FREL upward, increasing the value by 335,331 t CO₂ eq/year. Bhutan followed a national approach that avoids the internal displacement of emissions and facilitates an assessment of the impact of national-level policies and measures. Forest sector emissions for the FREL and FRL were calculated on the basis of the definition of forest in the Party's 2011 National Forest Policy and 2017 Forest and Nature Conservation Rules and Regulations.

14. Bhutan identified four REDD+ activities: reducing emissions from deforestation; sustainable management of forests; conservation of forest carbon stocks; and enhancement of forest carbon stocks. Deforestation is described as the clearing of an area of forest land on a non-temporary basis to serve another use, while the activities conservation of forest carbon stocks and sustainable management of forests are applied to forest land remaining forest land within and outside of conservation areas, respectively. The activity enhancement of forest carbon stocks takes place in afforestation and reforestation areas. Bhutan noted that, although forest degradation occurs, the activity reducing emissions from forest degradation is taken into account under sustainable management of forests and conservation of forest carbon stocks, and hence is not reported as a separate REDD+ activity.

15. The historical reference period for Bhutan is 10 years, covering 2005–2014 and divided into two contiguous epochs: 2005–2009 and 2010–2014. This is in line with the FCPF Methodological Framework.

16. Bhutan used a combination of tier 1 and tier 2 approaches to generate the AD and EFs for constructing its FREL and FRL. The AD used in constructing the FREL were extracted from a historical time series of land-use maps developed by the Department of Forests and Park Services for 2005–2014 using the Global Forest Change product (Hansen et al., 2013). Data from the NFI and harvested timber records maintained by the Department of Forests and Park Services were used to provide estimates of forest stocks and EFs for the different REDD+ activities. Where local EFs were not available, Bhutan applied the default EFs from the 2006 IPCC Guidelines, which was considered appropriate by the AT. The removal rates in forests were obtained from Bhutan's NFI using methodological guidance from the Global Forest Observations Initiative and the 2006 IPCC Guidelines, as applicable.

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

(a) Methodological information, including description of data sets, approaches and methods

17. Bhutan clearly described how it generated AD and EFs for each of the REDD+ activities. After noting inconsistencies between local land-use and land-cover data, Bhutan compared the Global Forest Change product with ground-truth information and identified the most appropriate method for generating AD. Landsat data for 2004, 2009 and 2014 were analysed using the FAO system for earth observations, data access, processing and analysis for land monitoring with a view to identifying areas of forest conversion (deforestation) in

each of the non-forest land categories. Further, the accuracy of the AD was validated using the Collect Earth tool and other locally available data. During the TA, Bhutan clearly justified its choice of AD, which the AT agreed were based on scientifically proven methods and national circumstances, in accordance with the 2006 IPCC Guidelines.

18. EFs for each land-use category were generated from NFI data. The NFI features a systematic sampling design with sample plots laid out in a 4 km x 4 km grid, resulting in 2,424 cluster plots, each consisting of three plots, which yielded an appropriate margin of error that could be applied to the national level. The NFI plot design consists of a cluster of three circular plots aligned in an L shape for measuring above-ground tree and sapling biomass. For measuring coarse woody debris, a 50m line transect between the plots was used. For measuring shrubs, herbs and litter, square plots of 5m x 5m, 1m x 1m and 20 cm x 20 cm, respectively, were used. The soil sampling was carried out using frames of 10cm x 10cm x 10 cm and up to 30cm in depth.

19. Taking the NFI data as a basis, Bhutan used local and global allometric equations to calculate the carbon content of the different above-ground biomass pools differentiated by source: trees, shrubs, herbs and saplings. Owing to a lack of EFs for below-ground biomass, Bhutan applied a global equation for tree and sapling roots. During the TA, the AT noted that the equation selected generated a very high ratio for calculating below-ground biomass, falling outside of the regional default range provided in the 2006 IPCC Guidelines for tropical mountain ecosystems. In the modified submission, Bhutan used a revised equation, which yielded values within the default range. Similarly, global equations were used to estimate biomass for litter and deadwood. The default values in the 2006 IPCC Guidelines were used in all these cases to convert biomass into carbon and CO₂ eq.

20. Bhutan used national wood density data to develop the biomass expansion factors used in allometric equations for converting tree harvest data into biomass. During the TA, the AT identified that the average wood density value of 0.69 t/m³ for broadleaved species was based on 19 tree species instead of the 21 species reported by the Party. The AT commends Bhutan for amending this value to 0.62 t/m³, which was used to calculate emissions from the sustainable management of forests and conservation of forest carbon stocks for the modified submission.

21. Bhutan used a higher EF value for the conversion of forest to cropland, settlements and other land compared with that used for the conversion of forest land to grassland. During the TA, Bhutan explained that, in the former case, it assumed a full loss of biomass carbon, including for trees, shrubs, herbs, below-ground biomass, litter and coarse woody debris, while for the conversion of forest to grassland no loss of biomass was assumed for shrubs, herbs, deadwood or below-ground biomass. The AT commends Bhutan for including this clarification in the modified submission.

22. For changes in SOC due to the conversion of forests to non-forests, Bhutan assumed, in accordance with the 2006 IPCC Guidelines, that a new equilibrium will be reached over a 20-year period. An annual EF equal to 5 per cent of the difference in SOC between the two land uses was therefore assumed. Since Bhutan does not have data on land-use conversions before 2005, this approach means that delayed emissions caused by activities that occurred before the reference period are not included in the FREL. Bhutan applied an adjustment to the FREL value to take into account delayed SOC emissions, which resulted in an additional 10,725 t CO₂ eq/year, calculated as the annual SOC emissions resulting from conversions during 2005–2014. The AT considers this approach to be conservative as it does not tend to overestimate emissions in the FREL. As such, it is unlikely to contribute to overestimated reductions during the performance period, since the SOC emissions in the FREL only reflect the conversion activities that occurred during the reference period. The AT notes that this adjustment is in addition to the upward adjustment of 0.1 per cent of the biomass carbon stock (335,331 t CO₂ eq/year) applied to the FREL, calculated on the basis of the above-ground biomass, below-ground biomass, litter and dead organic matter carbon pools (and excluding the SOC pool) and applied because Bhutan is a high-forest, low-deforestation country.

23. During the AT, Bhutan explained that emissions from the SOC pool were estimated using default values from the 2019 Refinement to the 2006 IPCC Guidelines for the non-

forest land uses. The average of these default values was 55.53 t C/ha, which is close to the average SOC value for non-forest land of 57.956 t C/ha derived from the NFI using soil sample plots collected from non-forest areas across the country. The AT commends Bhutan for using the updated IPCC default values and for verifying that these default values are similar to the estimates derived from its national data.

24. Bhutan notes that, while most of the timber harvested in the country is located in forests outside protected areas and subject to sustainable practices, some timber is also harvested in protected areas in order to meet the needs of people residing near or within the protected areas and provide a social safeguard for those inhabitants. Data on the amount of timber harvested, differentiated between conifers and broadleaved trees, were used to estimate CO₂ emissions on the basis of average wood density and biomass expansion factors. In these areas of sustainable forest management, annual growth rates are based on local growth data. The same procedure for estimating emissions and sequestration from the activity sustainable management of forests was applied to the activity conservation of forest carbon stocks within protected areas. Bhutan explained that, owing to lack of data, the dead organic matter and SOC pools are assumed to remain constant during timber harvesting.

25. According to annual forest fire data from the Department of Forests and Park Services, emissions from forest fires occur only in forests under the activity sustainable management of forests. In response to a question raised by the AT, Bhutan explained that it had not detected any fires in forests in conservation areas, with the exception of prescribed burning as part of habitat management in grasslands. Since these fires did not occur in areas classified as forests, these emissions were not included in the FREL or FRL. Emissions of non-CO₂ gases (CH₄, CO and N₂O) were converted to CO₂ eq using GWP values from the AR5.

26. Bhutan identified the activity enhancement of forest carbon stocks in areas in which a replanting programme is being implemented, described as plantations. Data on these areas have been periodically updated since the 1950s and cover, for example, areas planted and survival rates. Bhutan calculated emissions from this activity using actual growth rate data (2.01 t dry matter/ha/year) for 2005–2009 and 2010–2014. During the assessment the AT noted that the growth rate is low compared with the default values in the 2006 IPCC Guidelines, but is within the range of default values provided in the 2019 Refinement to the 2006 IPCC Guidelines. Bhutan explained that this growth rate is derived from data in the NFI and is therefore more accurate than the IPCC default values. The Party also clarified that the same growth rate was used for estimating removals in natural forests. The AT notes that this low historical growth rate is an opportunity for Bhutan to enhance forest carbon stocks by improving tree survival rates in the future.

27. Bhutan reported the combined uncertainty of the annual GHG estimates for the FREL and FRL as 23.95 and 11.53 per cent, respectively. These values were calculated using the aggregate uncertainty levels of each REDD+ activity and account for error propagation resulting from combining AD and EFs. During the TA, Bhutan identified a limitation in the calculation of uncertainty levels for some EFs and AD. To address this issue, Bhutan used expert judgment to calculate the uncertainty for the volume of timber removed, forest areas damaged by fires, and plantation areas. The AT commended Bhutan for using expert judgment to estimate uncertainty in these situations because this allows the propagation of errors to be accounted for. However, the AT considers that improving data availability would enhance the accuracy of the uncertainty calculations, and identified this as an area for future technical improvement.

28. Bhutan maintained consistency with the GHG inventory presented in its NC2 by using the same forest definition and the same approach to identifying AD. In some cases, it improved the approach used for the FREL and FRL submission by using nationally derived EFs instead of the default values from the 2006 IPCC Guidelines used in the GHG inventory. Bhutan explained that this improvement will also be applied for future GHG inventories. The AT commends Bhutan for its ongoing efforts to improve its national GHG inventory.

29. Bhutan provided the data used for generating its FREL and FRL in six Excel spreadsheets, which are interlinked by formulas and illustrate the Party's methodological choices. The AT was able to reconstruct the FREL and FRL on the basis of these spreadsheets. The AT noted that these files were appropriately updated to take into account

discussions during the TA. The AT commends Bhutan on its efforts in this regard. However, the AT noted that these spreadsheets are complex and may not be easy for an external party to use. The AT also noted that the Party could enhance the transparency of the submission by making the information in these Excel spreadsheets publicly available.

(b) Description of relevant policies and plans, as appropriate

30. Historically, Bhutan has had low levels of emissions from deforestation, since it has a high proportion of forest cover (71 per cent) and over 51 per cent of its national territory is located within protected area networks. The Constitution of Bhutan mandates the maintenance of at least 60 per cent forest cover. These forests are managed through the National Forest Policy and legislative acts and regulations that specify forest management for protected areas, state forest management units and community forests. Bhutan committed to remaining carbon-neutral in 2009 and reaffirmed this commitment in its 2017 nationally determined contribution.

31. However, Bhutan believes that a number of factors could lead to higher emissions, including population growth, planned development of hydropower resources, planned road building, expansion of agriculture areas, mining activities, increased incidences of forest fires and the allocation of forest resources for household and commercial use. As over one third of Bhutan's energy is produced from wood fuel and each household is legally entitled to an allocated amount of timber, the anticipated growth in population is expected to have a significant impact on emissions.

32. Bhutan estimates that these factors will contribute to a significant increase in deforestation rates, albeit these rates will remain below the regional average. The Party applied a limited upward adjustment to its FREL corresponding to a 0.1 per cent loss in forest biomass carbon stock over five years, which resulted in a higher level of emissions in the FREL, albeit still lower than Bhutan's own projection of future emissions. Bhutan did not apply an adjustment to the removals represented in its FRL.

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

33. According to decision 12/CP.17, annex, paragraph (c), reasons for omitting a pool or activity in constructing the FREL or FRL should be provided, noting that significant pools and activities should not be excluded.

34. The pools included in the Party's FREL and FRL are above-ground biomass, below-ground biomass, deadwood, litter and SOC. No pools were omitted.

35. Bhutan included non-CO₂ emissions in its FREL, including CH₄, CO and N₂O. Non-CO₂ emissions accounted for 42 per cent of the emissions during the reference period when converted to standardized GWP units (i.e. t CO₂ eq). Emissions from fires were included in the calculation of emissions from the sustainable management of forests, since wildfires are not expected to lead to permanent land-use changes. Bhutan did not document any instances of wildfires within conservation areas or other areas included in the FREL calculations; therefore, no emissions from fires were estimated for these areas.

36. The AT acknowledges that Bhutan included the most significant activities, reducing emissions from deforestation, sustainable management of forests, conservation of forest carbon stocks and enhancement of forest carbon stocks, of the five activities identified in decision 1/CP.16, paragraph 70. Further, the AT acknowledges Bhutan's statement that the FREL implicitly includes the fifth activity reducing emissions from forest degradation because changes in forest carbon stocks are comprehensively covered by the approach used for the activities sustainable management of forests and conservation of forest carbon stocks. The AT acknowledges that the FREL and FRL therefore capture emissions from forest degradation.

37. Overall, the AT commends Bhutan for providing information on emissions from fires and SOC and of non-CO₂ gases. The AT acknowledges the Party's intention to make better use of remote sensing data, reduce uncertainties and improve the quality of its NFI data.

4. Definition of forest

38. Bhutan provided in its submission the definition of forest used in constructing its FREL and FRL. The definition is the same as the one that the Party uses for its national GHG inventory and its reporting to FAO for the Global Forest Resources Assessment (i.e. minimum area of 0.5 ha, height of 5 m or more and at least 10 per cent canopy cover).

III. Conclusions

39. The information used by Bhutan in constructing its FREL and FRL for reducing emissions from deforestation, sustainable management of forests, conservation of forest carbon stocks and enhancement of forest carbon stocks is transparent and complete and in overall accordance with the guidelines for submissions of information on reference levels.

40. The FREL and FRL presented in the modified submission, for the reference period 2005–2014, correspond to 505,837 and –8,539,085 t CO₂ eq/year, respectively.

41. The AT acknowledges that the FREL and FRL proposed by Bhutan cover four of the five REDD+ activities and, through the comprehensive inclusion of changes in carbon stocks, also implicitly account for emissions and removals associated with the fifth activity emissions from forest degradation. Its FREL and FRL include all land areas and all relevant pools and gases in terms of emissions from forests (the AT is unaware of any forest process that can generate removals of non-CO₂ gases, which justifies the omission of these gases from the FRL).

42. As a result of the facilitative interactions with the AT during the TA, Bhutan 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 and FRL submission, with only minor modifications to the approaches and EFs used to construct the FREL and FRL, and commends Bhutan on its efforts. The new information provided in the modified submission, including the examples of how estimates of CO₂ emissions from deforestation were calculated, increased the reproducibility of the FREL and FRL calculations.

43. The AT notes that, overall, the FREL and FRL maintain consistency, in terms of sources of AD and EFs, with the GHG inventory included in Bhutan's NC2.¹²

44. Pursuant to decision 13/CP.19, annex, paragraph 3, the AT identified an area for future technical improvement. As explained in paragraph 27 above, Bhutan used expert judgment to calculate the uncertainty for some of the EFs and AD used to calculate the FRL. The AT noted that improving data availability would enhance the accuracy of the uncertainty values calculated and enhance the overall uncertainty values arising from the aggregation of AD and EFs.

45. The AT acknowledges and welcomes the Party's intention to continue enhancing its EFs, including those for annual biomass growth, wood density and SOC, in order to provide accurate estimates of emission reductions arising from the proposed REDD+ activities.

46. In conclusion, the AT commends Bhutan for showing strong commitment to continuously improving its FREL and FRL estimates in line with the stepwise approach. The AT agrees with the necessity of addressing the minor areas for future technical improvement identified by Bhutan in its FREL and FRL submission. 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.¹³ The AT also acknowledges that the TA was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Bhutan.

47. The table contained in annex I summarizes the main features of Bhutan's proposed FREL and FRL.

¹² In reference to the scope of the TA, as per decision 13/CP.19, annex, para. 2(a).

¹³ 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 and forest reference level based on information provided by Bhutan

	<i>Main features of the FREL and FRL</i>	<i>Remarks</i>
Proposed FREL and FRL	FREL: 505 837 t CO ₂ eq/year FRL: –8 539 085 t CO ₂ eq/year	The FREL covers the activity reducing emissions from deforestation and the FRL covers net removals and removals from the activities sustainable management of forests, conservation of forest carbon stocks and enhancement of forest carbon stocks, and implicitly includes the activity reducing emissions from forest degradation (see paras. 7 and 36 of this document)
Type and reference period of FREL and FRL	FREL and FRL = average of historical emissions and removals in 2005–2014	See paragraphs 8–9 of this document
Application of adjustment for national circumstances	Yes	The FREL was adjusted upward, resulting in an increase of 346 056 t CO ₂ eq/year (see paras. 8, 13 and 22 of this document)
National	National	See paragraphs 8–9 of this document
Activities included	Reducing emissions from deforestation Conservation of forest carbon stocks Sustainable management of forests Enhancement of forest carbon stocks	The FREL and FRL cover all forest-related emissions and removals and implicitly also cover the activity reducing emissions from forest degradation (see para. 36 of this document)
Pools included	Above-ground biomass Below-ground biomass Deadwood Litter SOC	See paragraphs 11 and 34 of this document
Gases included	CH ₄ , CO, CO ₂ , N ₂ O	Emissions of non-CO ₂ gases were converted to CO ₂ eq using the GWP values from the AR5 (see paras. 11, 25 and 35 of this document)
Forest definition	Included	The definition is a minimum area of 0.5 ha, height of 5 m or more and at least 10 per cent canopy cover. The same definition is used for reporting to FAO and compiling the national GHG inventory (see para. 38 of this document)
Consistency with latest GHG inventory	Methods used for estimating the FREL and FRL are consistent with those	The methods used for the FREL and FRL are consistent with those used for the latest GHG inventory, but include updated EFs based on a combination of

<i>Main features of the FREL and FRL</i>		<i>Remarks</i>
	used for the latest GHG inventory, as included in the NC2 (submitted in 2011)	tier 1 and 2 approaches (see para. 28 of this document)
Description of relevant policies and plans	Included	See paragraphs 30–31 of this document
Description of assumptions on future changes to domestic policies, if included in the construction of the FREL and FRL	Included	Bhutan is a high-forest, low-deforestation country. Its population growth and planned national developments are expected to lead to an increase in forest-related emissions, which the Party partly compensated for by adjusting its FREL upward (see paras. 8, 13, 31 and 32 of this document)
Description of changes to previous FREL and FRL	Not applicable	
Identification of future technical improvements	Included	See paragraph 44 of this document

Annex II

Documents and information used during the technical assessment

A. Reference documents

First FREL and FRL submission of Bhutan. Available at

<https://redd.unfccc.int/submissions.html>.

“Guidelines and procedures for the technical assessment of submissions from Parties on proposed forest reference emission levels and/or forest reference levels”. Annex to decision 13/CP.19. 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”. Annex to decision 12/CP.17. Available at

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B. Other documents

The following references have been reproduced as received:

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