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## Report on the technical assessment of the proposed forest reference level of Cambodia submitted in 2021

### *Summary*

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

For its submission, Cambodia developed a national FRL. The FRL presented in the original submission, for the reference period 2011–2018, corresponds to 59,959,491 tonnes of carbon dioxide equivalent per year. As a result of the facilitative process during the technical assessment, the FRL was modified to the annual average of emissions during the reference period 2011–2018, which corresponds to 60,257,501 tonnes of carbon dioxide equivalent per year.

The assessment team notes that the data and information used by Cambodia in constructing its 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 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

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AD	activity data
AT	assessment team
BUR	biennial update report
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
COP	Conference of the Parties
EF	emission factor
FREL	forest reference emission level
FRL	forest reference level
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
IPCC good practice guidance for LULUCF	<i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i>
NC	national communication
NFI	national forest inventory
REDD+	reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks (decision 1/CP.16, para. 70)
TA	technical assessment

## I. Introduction and summary

### A. Overview

1. This report covers the TA of the voluntary submission of Cambodia on its proposed FRL,<sup>1</sup> submitted on 8 January 2021, in accordance with decisions 12/CP.17 and 13/CP.19. The remote TA<sup>2</sup> took place from 22 to 26 March 2021 and was coordinated by the secretariat.<sup>3</sup> The TA was conducted by two land use, land-use change and forestry experts from the UNFCCC roster of experts<sup>4</sup> (hereinafter referred to as the AT): Lokesh Chandra Dube (India) and Craig William Elvidge (New Zealand). The TA was coordinated by Dirk Nemitz (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, Cambodia submitted its proposed FRL on a voluntary basis. The proposed FRL is one of the elements<sup>5</sup> 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 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. The objective of the TA is to assess the degree to which the information provided by Cambodia is in accordance with the guidelines for submissions of information on reference levels<sup>6</sup> and to offer a facilitative, non-intrusive, technical exchange of information on the construction of the FRL with a view to supporting the capacity of Cambodia to construct and improve its FRL in the future, as appropriate.<sup>7</sup>

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

5. Following the process set out in those guidelines and procedures, a draft version of this report was communicated to the Government of Cambodia. The facilitative exchange during the TA allowed Cambodia to provide clarifications and additional information, which were considered by the AT in the preparation of this report.<sup>9</sup> As a result of the facilitative interactions with the AT during the TA, Cambodia provided a modified version of its submission on 30 May 2021, which took into consideration the technical input of the AT. The modifications improved the clarity and transparency of the submitted FRL, except in the case of the activity enhancement of forest carbon stocks, which was included in the original submission but excluded from the modified submission. This TA report was prepared in the context of the modified FRL submission. The modified submission, containing the assessed FRL, and the original submission are available on the UNFCCC website.<sup>10</sup>

### B. Proposed forest reference level

6. 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

<sup>1</sup> The submission of Cambodia is available at <https://redd.unfccc.int/submissions.html?country=khm>.

<sup>2</sup> Owing to the circumstances related to the coronavirus disease 2019, the TAs of the FREL and FRL submissions of developing country Parties in 2021 had to be conducted remotely.

<sup>3</sup> As per decision 13/CP.19, annex, para. 7.

<sup>4</sup> As per decision 13/CP.19, annex, paras. 7 and 9.

<sup>5</sup> See decision 1/CP.16, para. 71(b).

<sup>6</sup> Decision 12/CP.17, annex.

<sup>7</sup> Decision 13/CP.19, annex, para. 1(a–b).

<sup>8</sup> Decision 13/CP.19, annex.

<sup>9</sup> As per decision 13/CP.19, annex, paras. 1(b), 13 and 14.

<sup>10</sup> <https://redd.unfccc.int/submissions.html?country=khm>.

national circumstances, in the context of providing adequate and predictable support. The FRL proposed by Cambodia, on a voluntary basis for a TA in the context of results-based payments, covers the activity reducing emissions from deforestation, which is one of the five activities referred to in that paragraph. Pursuant to paragraph 71(b) of the same decision, Cambodia developed a national FRL that covers its entire territory. In its submission, Cambodia noted its intention to apply a stepwise approach to developing its FRL 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.

7. The national FRL proposed by Cambodia for the historical reference period 2011–2018 is the annual average of net CO<sub>2</sub> emissions associated with deforestation, which in this context includes deforestation in four forest types: evergreen, semi-evergreen, deciduous and other.

8. The forest definition adopted by Cambodia for REDD+ activities comprises a minimum area of 0.5 ha, a minimum height of 5 m and at least 10 per cent canopy cover. The Party clarified during the TA that its forest definition targets forests with trees that have the potential to reach 5 m in height. Rubber plantations, oil palm plantations and perennial crops are excluded; therefore, the proposed FRL includes emissions from the conversion of forests to those land uses as well as the conversion of forests to other non-forest land uses.

9. The information on AD used for constructing the FRL was extracted from a historical time series of forest-cover maps, and stratified area estimation was used to estimate AD. The reference data were generated from visual and spectral interpretation of land use for each year throughout 2011–2018, and uncertainty analysis was conducted. The national GHG inventory included in Cambodia's first BUR and NC2 was developed in early 2019 using the same data and information used for constructing the first FRL. While Cambodia submitted its first BUR in 2020, it has not yet conducted an NFI. Most forest inventory data have been collected through projects run by the Government in partnership with various institutions, and together these data provide estimates of forest biomass across the country.<sup>11</sup> For its second FRL submission, Cambodia collected new data that increased the quality of the EFs by forest type.<sup>12</sup> The FRL presented in the modified submission, with the aim of accessing results-based payments for REDD+ activities for 2011–2018, corresponds to 60,257,501 t CO<sub>2</sub> eq/year.<sup>13</sup> The corresponding uncertainty is 11.07 per cent.

10. The proposed FRL includes the pools above-ground and below-ground biomass and excludes the pools litter, deadwood and soil organic carbon. Regarding GHGs, the submission includes CO<sub>2</sub> only.

11. The FRL proposed by Cambodia is its second FRL submitted in the context of applying the stepwise approach in accordance with decision 12/CP.17, paragraph 10. Its previous national FRL was submitted on 18 November 2016 and was subject to a TA in March 2017;<sup>14</sup> it covered the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks for 2006–2014. The modified submission of the second FRL (May 2021) includes reducing emissions from deforestation as the only REDD+ activity. The previous assessed FRL corresponded to 78,953,951 t CO<sub>2</sub> eq/year for the historical period 2006–2014 and was therefore higher than the FRL proposed in the most recent submission. The assessed modified second FRL differs from the assessed modified first FRL owing mainly to revision of the reference period, application of the stratified area estimation approach for AD generation, use of revised EFs through incorporation of new data, different coverage of REDD+ activities and inclusion of uncertainty analysis.

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<sup>11</sup> See Sola et al. (2014) for details on retrieving national estimates from field plots.

<sup>12</sup> See Sola et al. (2019) for details on updated forest carbon stocks.

<sup>13</sup> In its original submission, Cambodia proposed a national FRL of 59,959,491 t CO<sub>2</sub> eq/year for 2011–2018. The difference between the original and the modified submission is due mostly to corrected calculations and the exclusion of the activity enhancement of forest carbon stocks.

<sup>14</sup> See document FCCC/TAR/2017/KHM.

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

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

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

12. For constructing its FRL, Cambodia used methodologies provided in the 2006 IPCC Guidelines and the IPCC good practice guidance for LULUCF.

13. Cambodia's approach was based on determining the historical average of emissions and removals from land-cover change over eight years, from 2011 to 2018. The AD were derived from four forest-cover maps (for 2010, 2014, 2016 and 2018). These wall-to-wall maps, which were derived from SPOT, Landsat and Sentinel satellite imagery and which cover the entire country, were developed into land-cover change maps for 2010–2014, 2014–2016 and 2016–2018, and finally into a land-use change matrix.

14. The forest-cover maps for 2010 and 2014 were the same as those used for constructing the first FRL. For the 2016 and 2018 maps, Cambodia followed the same methodology applied for the first FRL to develop land-cover maps with the same land-use classification as the maps for the first FRL and a minimum mapping unit of 5 ha.

15. Cambodia considered as deforestation changes from forest land to non-forest land, such as industrial cropland (paddy fields, rubber plantations and annual cropland) and infrastructure development (roads and hydropower dam construction).

16. Land-use change over the reference period was determined by estimating areas of land-use classes and subclasses from one land-cover map to the next. Change detection<sup>15</sup> involved the land-cover class of each segment of the initial map being compared with the corresponding segment of the subsequent map. The forest-cover change for each period (2010–2014, 2014–2016 and 2016–2018) was quantified using a geographic information system technique for geoprocessing and logical functions. As well as the forest-cover change maps, a data set obtained from sampling plots was used in estimating changes in land-use areas. Cambodia applied these plot-based reference data to estimate the accuracy and uncertainty of the forest-cover change maps, and also used the data to help it understand the drivers of deforestation. A stratified area estimation approach was used to compare the mapped data against the reference data. With this approach, Cambodia was able to determine the accuracy and adjusted area estimates for each map land-use class. The approach also provided information on confidence intervals.

17. Uncertainty was quantified using approach 1 (the error propagation method) from the 2006 IPCC Guidelines, which uses the sum of squares to estimate uncertainty. For the original submission, the overall uncertainty of the FRL for 2010–2018 was determined to be 6.79 per cent. Uncertainties for each year were also quantified and were found to increase – from 9.37 per cent for 2010–2011 to 15.46 per cent for 2017–2018. The major source of uncertainty in the FRL of the original submission was enhancement of forest carbon stocks. After careful consideration, Cambodia decided to exclude this activity from its modified submission (see para. 22 below for further details) and also made corrections to the formula being used for uncertainty estimations. In the modified submission, the overall uncertainty of the FRL for 2011–2018 is 11.07 per cent, with year-to-year uncertainty increasing from 9.40 per cent for 2011 to 15.51 per cent for 2018. However, owing to the corrected formula being used, the original and modified uncertainties cannot be compared.

18. In constructing its second FRL, Cambodia used EFs that had been updated from those calculated in 2014 and used for its first FRL and emission estimates that were based on an

<sup>15</sup> Using the procedure for forest-cover change maps, as described in the technical annex to Cambodia's first BUR, which is available at [https://unfccc.int/sites/default/files/resource/20201006\\_Cambodia\\_BUR\\_REDD\\_Technical\\_Annex.pdf](https://unfccc.int/sites/default/files/resource/20201006_Cambodia_BUR_REDD_Technical_Annex.pdf).

analysis<sup>16</sup> of all forest inventory projects from 1998 to 2017 (140 projects incorporating 2,100 plots), which covered the main forest types in the country (evergreen, semi-evergreen, deciduous, flooded and mangrove). Default IPCC root-to-shoot ratios were applied and high carbon stock forests (community forests) were excluded from the analysis. The updates to the EFs and emission estimates represent a significant improvement to the FRL, but an NFI would provide a better understanding of how representative the project data are and overcome potential bias attributable to project sampling methods and locations. Default values for above-ground biomass for pine forests and tree plantations were drawn from the IPCC good practice guidance for LULUCF. Post-deforestation carbon stock was assumed to be zero and, for afforestation activities, Cambodia assumed that the carbon stock value (154 t CO<sub>2</sub>/ha) was reached without carbon sequestration increasing as forests matured. For the bamboo land-cover type, area was included under forest area, while carbon stock in biomass and carbon stock change were assumed to be zero.

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

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

19. The AT notes that much of the information necessary to assess the transparency, accuracy and completeness of the FRL was contained in the annexes to the submission. The AT considered the information and was able to reproduce the calculation of the FRL accurately when using the information contained in both the main text and the annexes. This approach is consistent with the presentation of information in Cambodia's first FRL. The AT considers that the additional information provided by Cambodia in its modified submission considerably increases the transparency of the proposed FRL and clarifies the drivers of deforestation within the country and the forest definition. The modified submission also includes minor improvements to the text and tables.

20. The AT notes that Cambodia updated the information used to calculate its FRL since it submitted its first BUR in May 2020. During the TA, the Party clarified that the national GHG inventory compilation cycle and FRL preparation period did not completely coincide. Therefore, several information sources and some data used to estimate emissions for the BUR and FRL differ. For the BUR, carbon stock change estimates were extrapolated from 2014 to 2016, while for the FRL they were generated from maps and project data (sample plots). For the BUR, deforested area changes between 2010 and 2014 were estimated using a pixel count method, while for the FRL they were determined using stratified area estimation. The AT commends Cambodia for continuing to work on updating data and improving methodologies, and for describing the differences between the national GHG inventory and the BUR.

21. The AT notes that Cambodia reported deforestation activities which result in (1) all biomass being removed, (2) the loss of all biomass carbon stocks and (3) zero regrowth of biomass post deforestation. During the facilitative exchange with the AT, the Party clarified that its assumptions were made in the absence of reliable estimates of biomass stock in forest land converted to other land. Cambodia noted its intention to include post-deforestation carbon stock in the third FRL and the next GHG inventory, and its plan to improve the EFs for non-forest categories. The AT commends Cambodia for the planned improvement, and notes that this improvement will increase accuracy of emission estimates for deforestation activities.

22. During the facilitative exchange, the AT noted that the EFs used to determine carbon stocks and changes were based on the assumption that afforested and reforested forests were mature rather than on the application of an annual carbon accumulation growth rate. During the TA, the Party proposed an improvement to the calculation of annual carbon accumulation, which involved calculating carbon stock over time on the basis of when a forest was established and the forest type's annual growth increment. Cambodia completed an accuracy assessment of the relevant AD and EFs, and reported in the modified submission that it had low confidence in them, as well as limited data with which to determine a national growth

<sup>16</sup> See Sola et al. (2019).

rate for land converted to forest. Therefore, after consideration, Cambodia excluded the activity enhancement of forest carbon stocks from afforestation or reforestation from its modified submission. As part of the stepwise approach, the Party will look into addressing this issue for future FRL submissions. The AT, while commending Cambodia for this planned future inclusion, notes it as an area for future technical improvement, which will significantly improve the accuracy of reporting the enhancement of forest carbon stocks over time.

23. The AT commends Cambodia for providing, during the facilitative exchange, clarification and additional information related to:

- (a) Key sources of data for estimating EFs;
- (b) The process for generating AD, including the stratified area estimation approach;
- (c) AD and EF uncertainty and how these were calculated;
- (d) Policies and plans;
- (e) Justification for the reference period chosen.

24. The AT commends Cambodia for using the best available historical data from four years (2010, 2014, 2016 and 2018). The AT also commends Cambodia for continuing to work on updating and improving its sources of data, and notes the Party's plan to implement its recently designed NFI, which is expected to improve country-specific EFs. The AT considers obtaining such information as an area for further technical improvement, which will significantly improve the transparency and reproducibility of future FRL submissions.

25. The FRL proposed by Cambodia is its second FRL submitted in the context of applying the stepwise approach in accordance with decision 12/CP.17, paragraph 10. The previous FRL submission was subject to a TA in 2017.<sup>17</sup> In its most recent submission, Cambodia described changes from previously submitted information in accordance with decision 12/CP.17, annex, paragraph (b). The Party described the following changes:

- (a) The process for generating AD has been modified to include in the AD the best available information and to enable uncertainty to be reported in a timely manner;
- (b) EFs have been refined and analysed with greater rigour to avoid, as far as possible, the overestimation or underestimation of emissions;
- (c) Uncertainty analysis, including uncertainty propagation and a description of the sources of systematic error, has been included.

26. During the TA, the AT identified the following differences in methods and data used between Cambodia's previous and most recent FRL submission:

- (a) The reference period for Cambodia's first FRL was 2006–2014. In the original submission of its second FRL, the reference period was 2010–2018, and this was corrected to 2011–2018 in the modified submission. During the facilitative exchange with the AT, the Party clarified that pre-2010 land-use change maps were based on a coarser methodology owing to the lack of satellite images, and that the national circumstances before 2010 do not reflect the circumstances of deforestation in the country. Cambodia, considering the recommendations of various initiatives and voluntary carbon standards indicating that reference periods of more than 10 years or under 4 years may not be representative of deforestation trends, selected the reference period of 2011–2018 for its second FRL;
- (b) A stratified area estimation approach was used to estimate AD for the second FRL;
- (c) The calculation of EFs were updated and new data integrated for the second FRL;
- (d) An uncertainty analysis was included in the second FRL submission.

<sup>17</sup> See document FCCC/TAR/2017/KHM.

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

27. Information about past, current and future domestic policies and plans was included as part of the description of Cambodia's forest sector in the FRL submission (section 1.4). These policies and plans include the National Forest Programme 2010–2029, the National Protected Areas Strategic Management Plan 2016–2030, the Fisheries Law of 2006, the Cambodia Climate Change Strategic Plan 2014–2023, the National Strategic Plan on Green Growth 2013–2030 and the white paper on land policy enacted in 2015. In response to a request for clarification from the AT, the Party explained that the second FRL is aligned with current policies and strategies – including the nationally determined contribution, the (draft) subdecree on GHGs and the (draft) regulatory framework for REDD+ – that aim to improve the transparency of the emissions accounting system for the forest sector. In Cambodia's modified submission, additional information on policies and plans was included to facilitate understanding of the drivers of deforestation and forest degradation and the impact of deforestation on historical and future emissions.

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

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

29. The pools included in the Party's FRL are above-ground biomass and below-ground biomass. The AT notes Cambodia's intention to include all five carbon pools in its future FRL submissions as part of the stepwise approach, subject to funding of a full NFI. Four different approaches have been developed by the Party to estimate the above-ground biomass, including one that uses the IPCC default allometric equation for the relevant forest type and other equations from local or pantropical models.

30. With regard to emissions from deadwood, litter and soil organic carbon, the AT requested clarification of the reasons for omitting these pools. In response Cambodia explained that the pools were not included because its preference is to use country-specific values for these pools but a full NFI has not yet been conducted. The AT considers that the exclusion of these pools could result in an underestimation of emissions. Furthermore, the AT notes that the IPCC good practice guidance for LULUCF provides a method for estimating carbon stock changes in deadwood, litter and soil organic carbon and the corresponding default EFs. The AT considers the treatment of emissions from these pools as an area for future technical improvement of the FRL.

31. The AT notes that Cambodia's FRL includes only CO<sub>2</sub>, with no non-CO<sub>2</sub> gases being reported. The AT also notes that, though the Party currently has no AD or EFs on non-CO<sub>2</sub> gases, it is working, as part of the stepwise approach, towards gathering the necessary data on forest wildfires for its next FRL submission. The AT, while commending Cambodia for its intention to include non-CO<sub>2</sub> gases in its next FRL submission, considers the treatment of non-CO<sub>2</sub> gases as an area for future technical improvement.

32. The AT acknowledges that Cambodia included in its FRL the most significant activity, reducing emissions from deforestation, of the five activities identified in decision 1/CP.16, paragraph 70, in accordance with its national capabilities and circumstances. The AT notes that other activities could also be significant. The AT notes the inclusion of other activities in the FRL as an area for technical improvement for future submissions, and welcomes Cambodia's intention to include information on these activities as part of the stepwise approach.

**4. Definition of forest**

33. Cambodia provided in its submission the definition of forest used in constructing its FRL: minimum area of 0.5 ha, height of 5 m or more and at least 10 per cent canopy cover. During the TA, the Party explained that forest includes areas of forest regrowth, that is naturally regenerated forests that have been subject to anthropogenic activities such as selective logging, agriculture and human-induced fire. These regrowth areas also include (1) forests with a mix of naturally regenerated trees and planted or seeded trees, and in which naturally regenerated trees are expected to constitute more than 50 per cent of the growing

stock at stand maturity, and (2) abandoned forest land and bare land that will regrow into forest within 10 years.

34. The forest definition is the same as that used by the Party for its first FRL submission and for its reporting to the Food and Agriculture Organization of the United Nations for the Global Forest Resources Assessment, except that rubber plantations, oil palm plantations and perennial crops are not reported as forest in the second FRL submission. The AT notes that the definition also possibly excludes afforestation activities until trees reach 5 m in height. In response to a question raised on this matter during the facilitative exchange, Cambodia explained that the height of trees refers to tree species that reach 5 m or more when mature and the forest definition includes afforestation and reforestation when the trees are capable of reaching a height of 5 m in situ and of meeting the canopy cover requirement. A description of land-use and land-cover types was included in annex II to Cambodia's modified submission. The AT commends Cambodia for providing this clarification and additional information on the forest definition to increase transparency.

### III. Conclusions

35. The information used by Cambodia in constructing its FRL for reducing emissions from deforestation is transparent, complete and in overall accordance with the guidelines for submissions of information on reference levels.

36. The FRL presented in the submission is Cambodia's second FRL. The previous FRL was submitted on 18 November 2016 and was subject to a TA in 2017; it covered the activities reducing emissions from deforestation and enhancement of forest carbon stocks for 2006–2014.

37. The FRL presented in the most recent modified submission includes the activity reducing emissions from deforestation but excludes enhancement of forest carbon stocks owing to accuracy concerns and methodological issues. The modified submission is for the reference period 2011–2018 and corresponds to 60,257,501 t CO<sub>2</sub> eq/year.

38. The AT acknowledges that Cambodia included in its FRL the most significant activity covering the entire national territory and the most significant pools in terms of emissions from forests. The AT considers that, in doing so, Cambodia followed decision 1/CP.16, paragraph 70, on activities undertaken, and paragraph 71(b), on elaborating a national FRL, and decision 12/CP.17, paragraph 10, on applying the stepwise approach. The AT commends Cambodia for providing information on its ongoing work to develop FRLs for other activities.

39. As a result of the facilitative interactions with the AT during the TA, Cambodia 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 FRL submission. The value of the FRL was modified as a result of the exclusion of the activity enhancement of forest carbon stocks. The new information provided in the modified submission and the examples of how CO<sub>2</sub> emissions from deforestation were calculated increased the reproducibility of the FRL calculations.

40. The AT notes that, overall, Cambodia maintained consistency, in terms of sources of AD and EFs used for its FRL, with those used for the GHG inventory included in its NC2 and first BUR.<sup>18</sup> The AT also notes that some inconsistencies in the AD and EFs used arose from improvements in the determination of AD and EFs for the second FRL.

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

- (a) Continuing to improve the accuracy of estimated EFs and AD for enhancement of forest carbon stocks (see paras. 18 and 22 above);
- (b) Conducting the recently designed NFI, which is expected to improve the country-specific EFs (see para. 24 above).

<sup>18</sup> In reference to the scope of the TA, as per decision 13/CP.19, annex, para. 2(a).

42. Pursuant to decision 13/CP.19, annex, paragraph 2(f), in assessing the pools and gases included in the FRL the AT noted that the pools and gases excluded by Cambodia are likely to be insignificant in the context of the FRL. Nevertheless, pursuant to decision 13/CP.19, annex, paragraph 3, the AT identified the following additional areas for future technical improvement regarding pools and gases excluded from the FRL:

(a) Treatment of emissions from deadwood, litter and soil organic carbon (i.e. including the pools or providing more information justifying their omission) (see para. 30 above);

(b) Treatment of non-CO<sub>2</sub> gases (i.e. to maintain consistency with the GHG inventory included in the Party's NC and BUR) (see para. 31 above);

(c) Inclusion of further REDD+ activities (see para. 32 above).

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

(a) Continue monitoring forest degradation in order to assess whether the reduction of deforestation is leading to the displacement of emissions, and include emissions from forest degradation in future FRL submissions when new and adequate data and better information are available;

(b) Continue monitoring and collecting AD and EFs in order to include the activity enhancement of forest carbon stocks in future FRL submissions;

(c) Collect AD and EFs that allow non-CO<sub>2</sub> gases to be included in future FRL submissions;

(d) Collect AD on litter, deadwood and soil organic carbon that allow these pools to be included in future FRL submissions;

(e) Conduct the NFI in order to improve country-specific EFs.

44. In conclusion, the AT commends Cambodia for showing strong commitment to continuously improving its FRL estimates in line with the stepwise approach. A number of areas for the future technical improvement of Cambodia's FRL have been identified in this report. At the same time, the AT acknowledges that such improvements are subject to national capabilities and policies, and notes the importance of providing adequate and predictable support.<sup>19</sup> The AT also acknowledges that the TA was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Cambodia.

45. The table contained in annex I summarizes the main features of Cambodia's proposed FRL.

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<sup>19</sup> As per decisions 13/CP.19, annex, para. 1(b); and 12/CP.17, para. 10.

## Annex I

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

	<i>Main features of the FRL</i>	<i>Remarks</i>
Proposed FRL	60 257 501 t CO <sub>2</sub> eq/year	See paragraph 9 of this document
Type and reference period of FRL	FRL = average of historical emissions in 2011–2018	See paragraphs 7 and 13 of this document
Application of adjustment for national circumstances	No	
National/subnational	National	Cambodia developed a national FRL (see para. 7 of this document)
Activity included	Reducing emissions from deforestation	See paragraph 11 of this document
Pools included	Above-ground biomass Below-ground biomass	The litter, deadwood and soil organic carbon pools were excluded (see para. 30 of this document)
Gas included	CO <sub>2</sub>	Methane and nitrous oxide were excluded (see para. 32 of this document)
Forest definition	Included	Minimum area of 0.5 ha, height of 5 m or more and at least 10 per cent canopy cover; rubber plantations, oil palm plantations and perennial crops were excluded (see para. 33 of this document)
Consistency with latest GHG inventory	Methods used for estimating the FRL are not consistent with those used for the latest GHG inventory (2019)	The national GHG inventory included in the first BUR and NC2 was developed in early 2019 using data and information from the first FRL. The information sources and data and methodologies used to estimate emissions for the second FRL (compiled in 2020) were, in some cases, not the same. The updated data and improved methodologies will be used for the next GHG inventory (see paras. 20–21 of this document)
Description of relevant policies and plans	Included	See paragraph 27 of this document
Description of assumptions on future changes to domestic policy, if included in constructing the FRL	Not applicable	
Description of changes to previous FRL	Included	See paragraph 25 of this document
Identification of future technical improvements	Included	Several areas for future technical improvement have been identified (see paras. 41–42 of this document)

## Annex II

### Reference documents

#### A. Reports of the Intergovernmental Panel on Climate Change

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

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

#### B. UNFCCC documents

First and second modified FRL submissions of Cambodia. Available at <https://redd.unfccc.int/submissions.html?country=khm>.

“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 <https://unfccc.int/sites/default/files/resource/docs/2011/cop17/eng/09a02.pdf#page=19>.

Report on the TA of the proposed FRL of Cambodia submitted in 2016. FCCC/TAR/2017/KHM. Available at <https://redd.unfccc.int/submissions.html?country=khm>.

#### C. Other documents

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

Sola, G., Vanna, S., Vesa, L., Van Rijn, M., & Henry, M. (2014). Forest biomass in Cambodia: from field plot to national estimates.

Sola, G., Van Rijn, M., & So, T. (2019). Updated Forest carbon stocks for REDD + Emission and Removal Factors in Cambodia.

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