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Report of the technical assessment of the proposed forest reference emission level of the United Republic of Tanzania submitted in 2017

Summary

This report covers the technical assessment of the submission of the United Republic of Tanzania, 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 the United Republic of Tanzania covers the activity "reducing emissions from deforestation", which is among the activities included in decision 1/CP.16, paragraph 70. In its submission, the Party has developed a national FREL as the sum of two subnational FRELs, that is for mainland Tanzania and for Zanzibar, as well as a FREL for reserved areas as a subset of the national FREL. The FREL presented in the submission is for the reference period 2002–2013 for mainland Tanzania and for 2004–2012 for Zanzibar. The national and reserved area FRELs corresponded to 58,462,472.67 and 32,220,890.17 tonnes of carbon dioxide equivalent per year (t CO_2 eq/year), respectively. As a result of the facilitative process during the technical assessment, the Party modified those initial proposed values to 43,736,974 and 7,183,038 t CO_2 eq/year, respectively. The assessment team notes that the data and information used by the United Republic of Tanzania in constructing its FREL 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 some areas identified by the assessment team for future 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 the United Republic of Tanzania on its proposed forest reference emission level (FREL),[1] submitted on 27 December 2016 in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place (as a centralized activity) from 13 to 17 March 2017 in Bonn, Germany, and was coordinated by the UNFCCC secretariat.[2] The TA was conducted by two land use, land-use change and forestry experts from the UNFCCC roster of experts[3] (hereinafter referred to as the assessment team (AT)): Mr. Rizaldi Boer (Indonesia) and Mr. Giacomo Grassi (European Union). In addition, Mr. Khanyisa Brian Mantlana, 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, the United Republic of Tanzania submitted its proposed FREL on a voluntary basis. The 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 decision 13/CP.19, paragraphs 1 and 2, and decision 14/CP.19, paragraphs 7 and 8.

3. The objective of the TA was to assess the degree to which information provided by the United Republic of Tanzania was in accordance with the guidelines for submissions of information on FRELs/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 the Party for the construction and future improvement of its FRELs/FRLs, as appropriate.[7]

4. The TA of the FREL submitted by the United Republic of Tanzania 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.

5. Following the process contained in those guidelines and procedures, a draft version of this report was communicated to the Government of the United Republic of Tanzania. The facilitative exchange during the TA allowed the Party 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, the Party submitted a final modified version of its FREL submission on 1 March 2018, which took into consideration the technical input of the AT. The modifications improved the accuracy, clarity and transparency of the submitted FREL. This TA report was prepared in 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.[9]

[1] The submission of the United Republic of Tanzania is available at http://redd.unfccc.int/submissions.html?country=tza.
[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.
[9] http://redd.unfccc.int/submissions.html?country=tza.

B. Proposed forest reference emission level

6. In decision 1/CP.16, paragraph 70, the COP encourages 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 the United Republic of Tanzania, 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 included in decision 1/CP.16, paragraph 70. In its submission, the Party applies a stepwise approach to the development of its FREL, in accordance with decision 12/CP.17, paragraph 10. The stepwise approach enables Parties to improve their FRELs/FRLs by incorporating better data, improved methodologies and, where appropriate, additional pools.

7. Pursuant to decision 1/CP.16, paragraph 71(b), the United Republic of Tanzania has developed a national FREL as the sum of two subnational FRELs, that is for mainland Tanzania and for Zanzibar, and additionally provided a FREL for reserved areas (a subset of the national FREL), with the aim of accessing results-based payments for REDD-plus[10] activities. The subnational FRELs are for the reference period 2002–2013 for mainland Tanzania and reserved areas and 2004–2012 for Zanzibar. The FREL proposed by the Party is based on the annual average of the carbon dioxide (CO_2) emissions associated with gross deforestation, defined as the change from forest to non-forest cover. The emissions from gross deforestation were calculated as the difference in average carbon density between forest and non-forest. The activity data used in constructing the FREL were generated using land-use and land-cover change analysis for the period 2002–2013 for mainland Tanzania and for 2004–2012 for Zanzibar. Emission factors were obtained from the national forest inventory. The national FREL presented in the modified submission corresponds to 43,736,974 t CO_2 eq/year, which is the sum of two subnational FRELs: 43,673,924 t CO_2 eq/year for mainland Tanzania and 63,050 t CO_2 eq/year for Zanzibar. In addition, a FREL for reserved areas of 7,183,038 t CO_2 eq/year (already included in the national FREL) was provided in the modified submission.[11] The AT notes that the Party did not provide information on the period of validity of the FREL.

8. The proposed FREL includes the carbon pools above-ground biomass, below-ground biomass and deadwood. Regarding greenhouse gases (GHGs), the submission includes CO_2 only.

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

9. For the construction of its FREL, the United Republic of Tanzania used the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for Land Use, Land-Use Change and Forestry* and the *2006 IPCC Guidelines for National*

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

[11] In the Party's original submission, the national FREL corresponded to 58,462,472.67 and the reserved area FREL to 32,220,890.17 t CO_2 eq/year. The difference in the figures between the submissions is due mainly to national emissions being estimated for the modified submission by multiplying the activity data for each subclass by the corresponding emission factor instead of using data aggregated at the level of the primary classes.

Greenhouse Gas Inventories. CO_2 was the only GHG considered in the submission. According to the FREL submission, the total area of forest land is 48.1 million ha in mainland Tanzania, 93 per cent of which is woodlands, and 0.1 million ha in Zanzibar. The land area was categorized into seven land-use/land-cover classes (forest land, bushland, grassland, cultivated land, other land, wetland and water), subsequently grouped into four broad primary classes (forest, non-forest, wetland and water) and then subdivided into several subclasses.[12] The land subclasses follow the land-cover classification used in the 2015 National Forest Resources Monitoring and Assessment (NAFORMA) of Tanzania[13] and the Zanzibar Woody Biomass Survey (ZWBS).[14]

10. The national FREL proposed by the United Republic of Tanzania covers only one of the five REDD-plus activities, namely reducing emissions from deforestation. The emissions for the FREL were calculated on the basis of the historical average of emissions associated with gross deforestation between two data points, 2002–2013 for mainland Tanzania and 2004–2012 for Zanzibar. 2002 was chosen as the start of the reference period for mainland Tanzania because of the availability of Landsat 7 Enhanced Thematic Mapper Plus imagery prior to the failure of the inline scanner of the Landsat 7 satellite in 2003, and 2013 was selected because higher-quality imagery from Landsat 8 Operational Land Imager was available. Furthermore, 2013 coincides with the finalization of the NAFORMA measurements that were used as the basis for forest classification and activity data stratification. 2004 was chosen as the start of the reference period for Zanzibar because of the availability of orthophotographs, which were the basis for the land-cover map that was used for ZWBS in 2005. 2012 was selected because of the availability of RapidEye data and it coincides with the finalization of the second phase of ZWBS, which was used as the basis for forest classification and activity data stratification.

11. Activity data (i.e. area of gross deforestation) were determined for the three primary classes of land cover (forest, non-forest and wetland) and for each of the forest subclasses following an iterative process: (1) image processing and pre-processing; (2) collection of training data and classification; (3) post-classification processing; and (4) accuracy assessment. According to the modified FREL submission, the accuracy of the classification of forest land converted to non-forest land was 69 per cent (producer's accuracy) and 56 per cent (user's accuracy) for mainland Tanzania, and 91 per cent (producer's accuracy) and 52 per cent (user's accuracy) for Zanzibar. The accuracy assessment was used to provide error-adjusted area estimates for the forest and deforestation classes. The final interpretations from all Landsat scenes were mosaicked to produce a wall-to-wall forest change map for the entire country (see figures 3a and 3b of the modified FREL submission).

12. Emission factors (i.e. the carbon stock of the above-ground biomass, below-ground biomass and deadwood pools) were originally determined at the level of the land-cover subclasses using allometric equations developed for each subclass. According to the NAFORMA report referenced in the FREL submission, the emission factors are based on 32,660 NAFORMA field plots, covering all land-cover types in mainland Tanzania with more than 240,000 trees measured. The relative sampling error of the wood volume for the main vegetation types is mostly less than 10 per cent. The total average carbon densities (in t carbon/ha), calculated as the sum of the carbon stocks of the above-ground biomass, below-ground biomass and deadwood pools for each primary class, were 33.35 (forest), 5.81 (non-forest) and 4.28 (wetland) for mainland Tanzania, and 12.26 (forest) and 5.73 (non-forest) for Zanzibar.

13. The FREL was calculated by multiplying, at the level of each forest subclass, the activity data by the difference in carbon density between forest and non-forest (i.e. the emission factor) and was computed separately for mainland Tanzania and for Zanzibar.

[12] For mainland Tanzania, the forest land subclasses include montane, lowland, mangrove, plantation forests and woodlands. Woodlands includes open and closed woodlands, and thickets (see table 5 of the modified FREL submission).

[13] The NAFORMA report is available at http://www.tfs.go.tz/en/resources/view/naforma-report-2015.

[14] The ZWBS is available at http://www.forestryznz.or.tz/index.php/conservation/2-uncategorised/45-woody-biomass-surveys.

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

14. The AT noted that, in the calculation of the original FREL, the United Republic of Tanzania used activity data and emission factors aggregated at the level of the primary classes and not disaggregated by forest subclass; whereas the emission factors were originally calculated for each forest subclass and were subsequently aggregated at the level of the primary classes using weighted averages. Given the likely wide variation in carbon density between the forest land subclasses (e.g. between lowland forest and open woodlands), the AT considered that the approach used by the Party may lead to the underestimation or overestimation of national emissions from gross deforestation because the approach assumes an unlikely proportionality between the area deforested and total area for each subclass. The AT provided the Party with an example of the potential problem and suggested that it estimate national emissions by multiplying the activity data for each subclass by the corresponding emission factor. For the modified FREL submission, the Party took into account the technical input of the AT. Specifically, the modified submission (tables 5 and 8) includes the activity data and emission factors disaggregated by forest subclass, and emissions were calculated by multiplying the activity data by the appropriate emission factor at the level of each forest subclass and not by the aggregated emission factor. As a result of this and other improvements, the emission estimate reported in the modified submission was approximately 25 per cent lower than that originally reported. The AT commends the Party for this improvement.

15. The AT noted large differences in the estimates of gross deforestation between the proposed FREL and a number of other sources of information, and requested the Party to provide likely reasons for the discrepancies. Several explanations were provided by the Party during the TA. The AT notes that making those explanations available online or in an additional annex to the modified FREL submission would enhance the transparency of the proposed FREL.

16. The AT noted that the original FREL submission did not include sufficient detail to allow assessment of the accuracy of the methods used to derive activity data, and requested the Party to provide more information and examples. In response, the Party included in the modified FREL submission a list of the images used for the estimation of activity data (in appendix 2) and additional text and examples to clarify the image processing approach (in appendix 3). The AT commends the Party for providing the additional information.

17. An accuracy assessment using reference data was used to correct the forest area and deforestation estimates. In theory, the reference data should be of far higher quality than the mapping data. However, in this case, the AT noted that the reference data are a combination of a historical map based on Landsat from the Regional Centre for Mapping and Resource Development and the recent NAFORMA field data set. It is not obvious that the reference data are superior in validity to the mapping data set. Furthermore, the AT noted that the difference between the reference data set and the FREL data is not insignificant, with only 56 per cent of deforestation points being correctly confirmed and 31 per cent of deforestation points being missed. Nevertheless, acknowledging the scarce availability of high-quality reference data, the AT commends the Party's efforts to estimate an unbiased FREL taking into account the results of the accuracy assessment.

18. The AT noted that the land-use/land-cover classes defined in the FREL submission are inconsistent (i.e. between tables 1 and 6 of the modified submission) and also inconsistent with those reported to the Food and Agriculture Organization of the United Nations (FAO) for the 2015 Global Forest Resources Assessment (FRA).[15] The Party defined wooded crops, a subclass of cultivated land, as non-forest in table 1 but as forest in table 6. The areas of deforestation derived from the land-use and land-cover change analysis for mainland Tanzania and Zanzibar (tables 2a and 2b) are not consistent with those used for the construction of the FREL (table 9). The Party reported that the inconsistencies are due mainly to the change of the forest definition. The Party provided the

[15] The country report is available at http://www.fao.org/3/a-az366e.pdf.

AT with clear and transparent information on the implications of changing the forest definition for the land-cover classes used for the construction of the FREL.

19. The FREL submission states that the estimation of carbon stock for different land-use/land-cover classes was based on NAFORMA. However, the AT noted that the allometric equations provided in appendix 4 to the original FREL submission are more complete than those in the NAFORMA report. The Party clarified that the allometric equations for above-ground and below-ground biomass in appendix 4 to the modified submission were used to estimate biomass in kg for the major vegetation types that constitute more than 90 per cent of the biomass in the country. For the vegetation types that have no allometric equations for estimating above-ground and below-ground biomass, the Party used volume equations in combination with wood density and biomass expansion factors. During the TA, the AT noted that the volume equations provided in appendix 4 to the original submission were not all used, and suggested that the Party revise the appendix by providing only the equations used in the construction of the FREL and providing the results of the estimation of above-ground biomass, below-ground biomass and deadwood along with the standard error for each vegetation type. The AT notes that, in the modified FREL submission, the Party provided information on the confidence interval and uncertainty of the carbon estimates for each land-cover subclass and had removed the unused allometric equations.

20. The uncertainty of the emission factors (carbon stock) for each land-cover subclass for mainland Tanzania (see table 8 of the modified FREL submission) is very low (mostly less than 5 per cent), while those for Zanzibar are mostly more than 10 per cent. For example, the uncertainty of the emission factor for forest plantations in mainland Tanzania is only 1.44 per cent, while that for Zanzibar is 32 per cent. The Party did not provide detailed information on the methods used to estimate the uncertainty of the emission factors. For instance, despite the estimation of the emission factors using allometric equations, which also contain errors, no information was provided on how the errors in the allometric equations were taken into account. The AT notes that providing more information on how the uncertainty of carbon stocks was calculated would enhance the transparency of the FREL submission.

21. In addition, the wood densities used for converting volume to weight for the FREL are from the global wood density database (Chave et al., 2009; Zanne et al., 2009),[16] while the NAFORMA report (p.30) provides wood densities for four forest classes. During the TA, the Party clarified that wood densities were sourced from the global wood density database, and, where wood densities for some species were missing from the database, a default value of 500 kg/m^3 was used.

22. To enhance transparency, the AT requested the Party to provide a land transition matrix (including information on land use/land cover after deforestation) and the activity data and emission factors for each subclass (see para. 14 above) in the modified FREL submission. Furthermore, the AT noted that making publicly available (e.g. online) all the Landsat scenes used, along with the Party's interpretation of the land-use/land-cover changes, would improve the transparency of the FREL submission and facilitate reproducing the estimates. The AT notes that, in the modified FREL submission, the Party provided the source of the images used for the development of the FREL and explained the process used to generate activity data from the images. The AT commends the Party's efforts to provide transparent information.

23. The AT noted that the Party provided an accuracy assessment for land-cover change data in the FREL submission and also for the tree volume of the primary vegetation types in the NAFORMA report. However, for the original FREL submission, the Party did not use this information to calculate a full uncertainty assessment for the estimated emissions. Following the request of the AT for the Party to conduct such an assessment, in the

[16] Chave J, Coomes D, Jansen S, Lewis SL, Swanson NG and Zanne AE. 2009. Towards a worldwide wood economics spectrum. *Ecology Letters*. 12: pp.351–366. Available at https://doi.org/10.1111/j.1461-0248.2009.01285.x; and Zanne AE, Lopez-Gonzalez G, Coomes DA, Ilic J, Jansen S, Lewis SL, Miller RB, Swenson NG, Wiemann MC, Chave J and Lopez-Gonzalez G. 2009. *Global wood density database*. Available at https://datadryad.org//handle/10255/dryad.235.

modified FREL submission (table 9) the Party included an estimate of overall uncertainty, which was estimated to be about 12 per cent of the FREL emission value.

24. In reference to decision 13/CP.19, annex, paragraph 2(a), the AT noted the different methods used for the FREL submission relative to the methods used for the second national communication (submitted in 2015).[17] In response to a question from the AT, the Party clarified that the data and methods used for the second national communication were based on an IPCC tier 1 approach, while those used for the FREL submission were based on a tier 3 approach. Furthermore, the Party explained to the AT that the data and methods used in the construction of the FREL will be taken into account to ensure consistency with the calculations in future national GHG inventories, including the third national communication.

25. The AT commends the United Republic of Tanzania's efforts to provide a land use transition matrix (including information on land use after deforestation), activity data and emission factors for each forest subclass, the revised method used to calculate the FREL, additional information and examples for the methodology used to estimate activity data, and the new estimates of the overall FREL uncertainty. The AT considers that the information provided improved the transparency, completeness and accuracy of the FREL submission, thereby helping to build confidence in the estimated emissions.

Description of relevant policies and plans, as appropriate

26. The United Republic of Tanzania did not provide any description of policies and plans as the Party considered that no policies or plans affected the development of its FREL.

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

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

28. The pools included in the FREL are above-ground biomass, below-ground biomass and deadwood; litter and soil carbon were not included. The AT noted that, in the NAFORMA report (table 13.3, p.75), the soil organic content of topsoil (0–10 cm) for all land-cover types ranges from 0.9 to 10.7 kg/m^2 (equivalent to 9–100 t/ha) with an average of about 3.9 kg/m^2 or 39 t/ha. The soil organic content for that level of depth is quite high. A study in Ethiopia indicated that such a value corresponds to a soil depth of 100 cm (Gebeyehu et al., 2017).[18] The AT requested the Party to check the data and find a reference from neighbouring regions in order to adequately justify the exclusion of the pools. The Party indicated that soil data were excluded because they could not be used to monitor changes in carbon, while data on litter were not collected for NAFORMA or ZWBS because of frequent fires that burned the litter layer. The AT considers that the exclusion of the soil carbon and litter pools has been justified by the Party (as due to insufficient data) and commends the Party's intention to obtain better information on the pools in the future with the aim of including them as part of the stepwise approach.

29. The AT acknowledges that the United Republic of Tanzania included 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, in particular forest degradation, which was acknowledged as significant in the FREL submission by the

[17] The second national communication of the United Republic of Tanzania is available at https://unfccc.int/sites/default/files/resource/tzanc2.pdf.

[18] Gebeyehu G, Soromessa T and Teketay D. 2017. Organic carbon stocks, dynamics and restoration in relation to soils of agroecosystems in Ethiopia: a review. *International Journal of Environment*. 6: pp.1–22.

United Republic of Tanzania. The Party clarified the rationale for the non-inclusion of other activities as mainly being due to inadequate data and the unavailability of a reliable monitoring system. The AT acknowledges the intention expressed by the Party to address these limitations for the improvement of future FREL submissions as part of the stepwise approach.

30. In addition, the AT notes that the FREL submission suggests that forest degradation and deforestation share some drivers; for example, extraction of wood for energy. Therefore, any future reduction in emissions from deforestation (included in the FREL) risks being offset by an increase in emissions from forest degradation (not yet included in the FREL). Given the above, the AT considers the inclusion of forest degradation in the FREL as a priority area for future technical improvement. Furthermore, the AT notes that a more detailed description of ongoing efforts to monitor forest degradation would enhance the transparency of the FREL submission.

31. The AT notes that the United Republic of Tanzania included only CO_2 in the calculation of its FREL, this being the most emitted gas from deforestation, as also indicated in the GHG inventory of the Party's second national communication. The AT considers the treatment of non-CO_2 gases to be an area for future technical improvement because of the frequent fires in the country, especially in woodlands.

4. Definition of forest

32. The United Republic of Tanzania defines forest as an area of land of at least 0.5 ha, with minimum tree crown cover of 10 per cent or with existing planted or natural tree species with the potential to reach more than 10 per cent crown cover, and with trees that have the potential to reach or have reached a minimum height of 3 m at maturity in situ. Having consulted with the Party during the TA, the AT notes that the definition reported in the FREL submission is not the same as the one that the Party used for its national GHG inventory and reporting to FAO for the FRA. In the FREL submission, the minimum height reported is 3 m at maturity in situ, as proposed by the Party's Technical Working Group on Forest Definition on the basis of public consultations involving various stakeholders to cater for REDD-plus and the clean development mechanism. For its national GHG inventory and reporting to FAO, the Party applied a minimum height of 5 m (see appendix 5 to the modified FREL submission).

33. The AT commends the Party for the clear and transparent response it provided during the TA on the implications of changing the forest definition. The Party demonstrated that by changing the minimum height of trees from 5 m (FRA) to 3 m (FREL), some land cover previously defined as non-forest became defined as forest. The AT notes that five land-cover subclasses previously defined as non-forest (other land) became defined as forest, thus increasing the reported area of forest of the country and also the gross deforestation rate. During the technical exchange with the Party, it was explained that the change was motivated by the fact that the biodiversity values of the additional forest land are high. The Party plans to use the new forest definition in its subsequent reporting to FAO for the FRA and for its next national communication. The AT notes that making publicly available the explanations used to justify such change in the forest definition resulting from the stakeholder consultations would enhance the transparency of the FREL submission.

34. The AT noted that the Party did not provide detailed information in the original FREL submission on the consideration of possible temporarily unstocked areas. During the TA, the Party clarified that any change from forest to non-forest cover was considered as gross deforestation, except in forest plantations where replanting is guaranteed and locations are clearly defined or known; therefore, temporarily unstocked plantation areas were not treated as deforested owing to their potential to attain forest status (see appendix 6 to the modified FREL submission). In terms of temporary loss of forest cover in areas of unknown location and unknown boundaries that could be defined as deforestation, at a later stage, if such land fulfilled the forest definition due to growth, it would be included as growth/forest gain (non-forest converted to forest cover). The AT notes that making these explanations publicly available would enhance the transparency of the FREL submission, and also notes the importance of further addressing the issue if needed in the future; that is,

by recalculating the FREL should any area currently classified as deforested be identified as temporarily unstocked instead.

35. The AT notes that, in line with the forest definition above, the conversion of natural forest to forest plantations is not considered gross deforestation. In relation to the need to provide such information in future FREL submissions, the AT suggests that the Party develop a system that is able to identify any area of conversion of natural forest to plantations in its reporting system, even if this is not considered deforestation. This would contribute to enhancing the transparency of future FREL submissions.

III. Conclusions

36. The information used by the United Republic of Tanzania in constructing its FREL for the activity "reducing emissions from deforestation" is overall transparent, complete and in accordance with the guidelines for submissions of information on FRELs/FRLs (contained in the annex to decision 12/CP.17).

37. The AT acknowledges that the United Republic of Tanzania included in its national FREL the likely most significant activity, carbon pools and gas in terms of emissions from forests. In doing so, the AT considers that the Party followed decision 1/CP.16, paragraphs 70 and 71(b), on activities undertaken and on elaborating a national FREL, and decision 12/CP.17, paragraph 10, on implementing a stepwise approach. However, the AT notes that forest degradation is not yet included in the FREL despite being acknowledged as significant by the Party. The AT commends the Party for providing information on ongoing work to include other activities in the FREL (see paras. 28–30 above).

38. As a result of the facilitative interactions with the AT during the TA, the United Republic of Tanzania submitted a modified submission that took into consideration the technical input of the AT, specifically on the need for a better stratification of emission factors. As a result, the modified emission value for the FREL was about 25 per cent lower than the original. Furthermore, in accordance with decision 13/CP.19, annex, paragraph 2(c), the AT notes that the transparency, completeness, consistency and accuracy of information was improved in the modified FREL submission, and commends the Party's efforts (see para. 7 above).

39. The AT notes that the United Republic of Tanzania submitted a national FREL as the sum of two subnational FRELs, that is for mainland Tanzania and for Zanzibar, and additionally provided a FREL for reserved areas for mainland Tanzania. The AT suggests that the Party clarify more explicitly that the FREL for reserved areas is a subset of (i.e. already included in) the national FREL, and provide more information on the rationale for providing a separate FREL for reserved areas (see para. 7 above).

40. The AT notes the different methods used for the FREL submission relative to the second national communication. The Party clarified that higher-tier data and methods were used for the FREL submission than for the second national communication, and that consistency will be ensured with future national GHG inventories, including the third national communication. Hence, consistency should be expected between the data that will be used for the third national communication and those used in the construction of the FREL (see para. 24 above).

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

(a) Including the activity "reducing emissions from forest degradation" in future FREL submissions. According to the FREL submission, forest degradation is likely a significant source of emissions. The AT notes the risk that any future reduction in emissions from deforestation (included in the current FREL) would be offset by an increase in emissions from forest degradation (not yet included in the current FREL). Therefore, the AT considers the inclusion of the activity "reducing emissions from forest degradation" to be a priority area for future technical improvement (see para. 30 above);

(b) Providing more information on the source of errors considered for the emission factors (carbon stock estimates) for each forest subclass, including information on the number of sampling plots and errors in the allometric equations. The AT considers that the Party's FREL would benefit from a more in-depth assessment of uncertainty, including capturing all sources of error and using higher-tier methods (e.g. Monte Carlo simulation) (see para. 20 above);

(c) Developing a system that is able to identify and report any area of conversion of natural forest to plantations, even if this is not considered gross deforestation (see para. 35 above).

42. In assessing the pools and gases included in the FREL, pursuant to decision 13/CP.19, annex, paragraph 2(f), the AT noted the omission of the litter and soil pools and of non-CO_2 gases. The AT considers the inclusion of non-CO_2 gases to be a priority area for future technical improvement because of the frequent fires in the country, especially in woodlands (see paras. 28 and 31 above).

43. The AT acknowledges and welcomes the intention expressed by the United Republic of Tanzania:

(a) To carry out repeated carbon stock measurements, combined with remote sensing data of higher spatial and temporal resolution, in order to provide the necessary data for including forest degradation and enhancement and conservation of forest carbon stocks in future FREL submissions;

(b) To make publicly available the additional information provided during the TA, for example on differences in estimated gross deforestation in the proposed FREL and from the ongoing efforts to monitor forest degradation, either online or in an additional annex to the FREL submission.

44. In conclusion, the AT commends the United Republic of Tanzania for showing commitment to the continuous improvement of its FREL estimates in line with the stepwise approach. A number of areas for future technical improvement of the United Republic of Tanzania's FREL have been identified in this report. At the same time, the AT acknowledges that such improvements are subject to national capabilities and policies, and notes the importance of 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 the United Republic of Tanzania.

45. The table contained in the annex summarizes the main characteristics of the United Republic of Tanzania'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)	43 736 974 for national area (43 673 924 for mainland Tanzania and 63 050 for Zanzibar) and 7 183 038 for reserved areas	The national FREL is based on the annual average of the CO_2 emissions associated with gross deforestation (see para. 7 of this document)
Type and duration of FREL	FREL = historical average emissions for 2002–2013 for mainland Tanzania and 2004–2012 for Zanzibar	No period of validity of the FREL was provided (see para. 7 of this document)
Adjustment for national circumstances	No	
National/subnational[a]	National, as the sum of two subnational FRELs: one for mainland Tanzania and one for Zanzibar	Proposed national FREL is the sum of two subnational FRELs, for mainland Tanzania and for Zanzibar, and a FREL for reserved areas was also provided (see para. 7 of this document)
Activities included[b]	Reducing emissions from deforestation	The FREL includes only gross deforestation, defined as the change from forest cover to non-forest cover; it considers the average carbon stock of non-forest areas following deforestation, but does not consider any subsequent emissions or removals from the deforested areas (see para. 7 of this document)
Pools included[b]	AB, BB, DW	The Party mentioned in its FREL submission that soil data were excluded as they could not be used to monitor changes in carbon, while data on litter were not collected for the National Forest Resources Monitoring and Assessment or the Zanzibar Woody Biomass Survey (see para. 28 of this document)
Gases included	CO_2	CO_2 is the dominant gas emitted from deforestation activities; treatment of non-CO_2 gases will be an area for future technical improvement once additional activities are included in the FREL (see para. 31 of this document)
Forest definition[c]	Included	The definition has been modified since the Party's second national communication and reporting for the 2015 Global Forest Resources Assessment; the change of the definition was motivated by the biodiversity value of the low carbon stock land (see para. 32 of this document)
Relationship with latest GHG inventory	Methods used for FREL not consistent with the latest GHG inventory (2015)	The forest definition used for the FREL is not consistent with the one used for the GHG inventory; and the activity data and emission factors used for the latest GHG inventory were considered outdated (see

Main features of the FREL		*Remarks*
		paras. 24 and 32 of this document)
Description of relevant policies and plans[d]	Not included	See paragraph 26 of this document
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 improvement were identified (see para. 41 of this document)

Abbreviations: AB = above-ground biomass, BB = below-ground biomass, DW = deadwood, FREL = forest reference emission level, GHG = greenhouse gas.

[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.