Framework Convention on
Climate Change

Report on the technical assessment of the proposed forest reference emission level of Guyana submitted in 2014

Summary

      This report covers the technical assessment of the submission of Guyana, 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 Guyana covers the activities "reducing emissions from deforestation" and "reducing emissions from forest degradation", which are two of the activities included in decision 1/CP.16, paragraph 70. In its submission, Guyana has developed a national FREL. The assessment team notes that the data and information used by Guyana in constructing its FREL are transparent and complete, and are in overall accordance with the guidelines contained in the annex to decision 12/CP.17. This report contains the assessed FREL and a few areas identified for further technical improvement by the assessment team, according to the scope of the technical assessment in the annex to decision 13/CP.19.

Contents

I. Introduction and summary

A. Overview

1.   This report covers the technical assessment (TA) of the submission of Guyana on its proposed forest reference emission level (FREL),[1] submitted on 8 December 2014 in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place (as a centralized activity) from 16 to 21 February 2015 in Bonn, Germany, and was coordinated by the 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. Manuel Estrada (Mexico) and Mr. Atsushi Sato (Japan). In accordance with decision 13/CP.19, annex, paragraph 9, the Consultative Group of Experts on National Communications from Parties not included in Annex I to the Convention (CGE) was invited to participate in the TA as an observer. However, no representative of the CGE was able to participate at this TA session.

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

3.   The objective of this TA was to assess the degree to which information provided by Guyana was in accordance with the guidelines for submissions of information on FRELs[5] 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 Guyana for the construction and future improvement of FRELs, as appropriate.[6]

4.   The TA of the FREL submitted by Guyana 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 the guidelines and procedures of the same decision, a draft version of this report was communicated to the Government of Guyana. The facilitative exchange during the TA allowed Guyana to provide clarifications and information that were considered by the AT in the preparation of this report.[7] As a result of the facilitative interactions with the AT during the TA session, Guyana submitted a modified version on 27 April 2015, which took into consideration the technical input by the AT. The modifications improved the clarity and transparency of the submitted FREL, and resulted in a modification of the FREL originally proposed, without altering the approach used to construct the proposed FREL. This TA report was prepared based on the context of

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[1] The submission of Guyana is available at <http://unfccc.int/8414>.
[2] Decision 13/CP.19, annex, paragraph 7.
[3] Decision 13/CP.19, annex, paragraphs 7 and 9.
[4] Decision 1/CP.16, paragraph 71(b).
[5] Decision 12/CP.17, annex.
[6] Decision 13/CP.19, annex, paragraph 1(a) and (b).
[7] Decision 13/CP.19, annex, paragraphs 1(b), 13 and 14.

the modified FREL submission. The modified submission, which contains the assessed FREL, and the original submission are available on the UNFCCC website.[8]

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 Guyana, on a voluntary basis, for a TA in the context of results-based payments, covers the activities "reducing emissions from deforestation" and "reducing emissions from forest degradation". Pursuant to paragraph 71(b) of the same decision, Guyana has developed a national FREL for the entire national territory of Guyana. In its submission, Guyana applies a step-wise approach to its development of the FREL, in accordance with decision 12/CP.17, paragraph 10. The step-wise approach enables Parties to improve the FREL by incorporating better data, improved methodologies and, where appropriate, additional pools.

7. The FREL proposed by Guyana was based on a "combined reference level approach", in which the average of two elements of forest carbon emission was combined to construct a FREL. The first element is the historical annual forest carbon emissions percentage of Guyana for the period 2001–2012, calculated based on the historical data of Guyana. The second element is the average annual global forest carbon stock emissions percentage for the period 2001–2010, calculated based on data from the scientific literature. Both annual emissions percentages are estimated based on the sum of the forest carbon emissions from deforestation and forest degradation divided by the total amount of existing forest carbon stocks. The averaged percentage of 0.242 per cent ((0.049 per cent plus 0.435 per cent) divided by 2) was the basis for calculating the proposed FREL of Guyana, which is equal to 46,301,251 tonnes of carbon dioxide equivalent (t CO_2 eq) per year.

8. The proposed FREL includes the following pools: above-ground biomass, below-ground biomass and dead wood. Above-ground biomass and below-ground biomass are used for global and Guyana estimations. Dead wood is only used for parts of the FREL based on Guyana's historical data for forest degradation. Gases other than carbon dioxide (CO_2) are not included in the FREL.

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. Guyana is a country with a high forest cover (approximately 85 per cent of its total area is forest) and a low historical deforestation rate. As a result, the historical trend of emissions from deforestation and forest degradation is unlikely to accurately predict future emissions from these sources in Guyana. Consequently, in order to reflect its national circumstances, Guyana has proposed the combined reference level approach. This approach

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[8] <http://unfccc.int/8414>.

combines two distinct elements in order to calculate the proposed FREL. The first element is a calculation of the historical emissions from deforestation and forest degradation in Guyana using data from the years 2001–2012, in terms of the percentage of the total forest carbon stock of the country. The second element is a global average emissions percentage constructed on the basis of data obtained from the scientific literature (Baccini et al., 2012;[9] Harris et al., 2012[10]). The average of these two elements is a percentage that is then used to estimate the FREL of Guyana, based on current forest carbon stock. The two elements are assessed separately below.

Historical emissions from deforestation and forest degradation in Guyana

10.   Guyana used the methodologies provided in 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 Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines) as the basis for estimating changes in carbon stocks in forest land converted to other land-use categories and in managed forests (deforestation), as well as carbon loss due to selective logging that occurred in managed forest (forest degradation).

11.   Gross emissions from deforestation and forest degradation were estimated from 2001 onwards by combining the activity data with the appropriate emission factors. The period 2001–2012 was selected because robust and credible activity data were available for both deforestation and forest degradation from timber harvesting for this period. Guyana assumed that the biomass immediately after forest conversion was zero and did not consider any subsequent CO_2 removal after deforestation or regrowth following forest degradation. For simplicity in accounting, Guyana also assumed the full emissions of soil carbon in the year of clearing, rather than spreading the emissions over 20 years as suggested by the 2006 IPCC Guidelines. The impact of the harvested wood product carbon pool was assumed to be zero in the modified submission because the potential long-term carbon stored in the pool demonstrated quite low significance in the analysis conducted by Guyana.

12.   The activity data for deforestation in Guyana used for the construction of the FREL were based on historical assessment of forest area change (from forest to non-forest) completed by the Guyana Forestry Commission (GFC), using the services of Pöyry and Indufor for six periods: 1990–2000, 2001–2005, 2006–September 2009, October 2009–September 2010, October 2010–December 2011 and January–December 2012. The analyses for these six periods were conducted by the same team of people using consistent methods. For the first four periods, Landsat imagery was used, for the fifth period, a combination of Landsat and RapidEye imagery was used, and for the sixth period, wall-to-wall high-resolution RapidEye imagery was used. The use of higher resolution imagery in the most recent time frame allowed for higher accuracy of interpretation in this period and for a re-evaluation of the total forest area for the previous years.

13.   All remote sensing products were assessed for accuracy (the accuracy of the forest area was greater than 97 per cent) and verified independently by a third party, and all steps were certified by external auditors. The AT commends the efforts made by Guyana for preparing more accurate forest area data and acknowledges that the high accuracy of these remote sensing products provides a low uncertainty of the activity data. For each time

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[9]   Baccini A, Goetz SJ, Walker WS, Laporte NT, Sun M, Sulla-Menashe D, Hackler J, Beck PSA, Dubayah R, Friedl MA, Samanta S and Houghton RA. 2012. Estimated carbon dioxide emissions from tropical deforestation improved by carbon-density maps. *Nature Climate Change*. 2: pp.182–185.

[10]   Harris NL, Brown S, Hagen SC, Saatchi SS, Petrova S, Salas W, Hansen MC, Potapov PV and Lotsch A. 2012. Baseline map of carbon emissions from deforestation in tropical regions. *Science*. 336: pp.1573–1576.

period up to September 2010, 30 m resolution satellite imagery was used to quantify deforestation resulting from various drivers including mining, agriculture, forestry infrastructure, road infrastructure and fire. For the October 2010 to December 2011 period, 5 m resolution RapidEye imagery was also used for half of Guyana's land area together with the 30 m imagery, and full wall-to-wall coverage with RapidEye imagery was used for 2012. The activity data for deforestation were classified by driver, including mining (mined areas and roads), agriculture, forestry infrastructure (roads and log decks only), road infrastructure and fire. Forest area change was estimated for forests converted to other lands for all drivers, based on the IPCC approach 3.

14.   The amount of carbon emitted due to deforestation was calculated for each driver by stratum and represented as the emission factors in t CO_2 eq per unit of deforested area.

15.   With regard to the emission factors, the forest carbon stocks were estimated for all pools using country-specific data and conversion factors, and an allometric equation of Chave et al. (2005)[11] verified through destructive sampling of four large trees, resulting in emission factors that meet the IPCC requirements for the tier 3 methodology. An overarching spatial analysis framework, operating in a geographical information system (GIS), was used to create a potential for future change stratification system that developed a relationship between the historical deforestation pattern and the spatially represented factors of deforestation. In addition to stratifying by potential for change, the forests were also stratified by accessibility. The accessibility strata were also included, because, given the long history of logging in Guyana, areas near roads would have been disturbed and have lower carbon stocks than those areas far from roads. Guyana explained that the results of fieldwork showed that there were no significant differences in carbon stocks among the main forest types and that stratification by forest type was not necessary.

16.   The activity data for selective logging as the driver of forest degradation were the volumes of wood products, obtained from the records of GFC, which report on volume of timber extracted by the primary product class. Robust activity data are available from 2001 to 2012. Forest degradation estimates include three sources of emissions: (1) carbon losses from the extracted biomass in the commercial trees felled, (2) carbon losses from the damage caused to residual trees from the logging activities and (3) carbon losses from the extraction of trees due to construction of skid trails. The activity data of items (1) and (2) are the annual amounts of timber harvested at the national level. The activity data of item (3) are the lengths of skid trail estimated by the amount of timber harvested using the parameter of average length of skid trail per unit of timber harvested. The volume of illegal logging was also considered as activity data. In response to a request for clarification about the treatment of illegal logging in the FREL from the AT, Guyana explained that formal data on illegal logging are available from GFC from 2009 onwards. Before 2009, a factor of 15 per cent of legal logging taken from a United Nations Environment Programme report (2007)[12] was used to estimate the amount of illegal logging volume. Guyana explained that the illegal logging volume estimated using the value of 15 per cent may be considered larger than the actual amount occurring in Guyana.

17.   In order to estimate emissions due to degradation from selective logging, factors were created linking extracted volume with non-merchantable biomass of the felled tree (top and stump), collateral damage and damage from skid trails left as dead wood in the forest. A total of 183 logging plots was installed across four large-scale commercial forest

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[11] Chave J, Andalo C, Brown S, Cairns MA, Chambers JQ, Eamus D, Fölster H, Fromard F, Higuchi N, Kira T, Lescure JP, Nelson BW, Ogawa H, Puig H, Riéra B and Yamakura T. 2005. Tree allometry and improved estimation of carbon stocks and balance in tropical forests. *Oecologia.* 145(1): pp.87–99.

[12] *Green Carbon, Black Trade: Illegal Logging, Tax Fraud and Laundering in the World's Tropical Forests*. Available at <http://www.unep.org/pdf/RRAlogging_english_scr.pdf>.

concessions operating on a 25 year cutting cycle. The emission factors of "carbon losses from the extracted biomass in the commercial trees felled" are the wood density and carbon fraction. The emission factors of "carbon losses from the damage caused to residual trees from the logging activities" and "carbon losses from the extraction of trees due to construction of skid trails" are the estimated average emission ratios per each activity data unit based on studies undertaken in Guyana.

18. For each year, historical emissions from deforestation and forest degradation from timber harvest are summed to obtain the total emissions. The total forest carbon stock was estimated based on the parameter of carbon stock per hectare in each stratum (as an average for the period 2001–2012) multiplied by the forest area of Guyana in 2012. In response to a technical exchange of views between the AT and Guyana during the TA, the forest area used for this estimation was modified to represent the average forest area over the period 2001–2012 instead of a single year (i.e. 2012), which ensures the consistency of the time series with Guyana's carbon stock estimates. The averaged forest area was calculated based on the simple average of five forest area data values in 2005, 2009, 2010, 2011 and 2012.

19. A summary of the approach, methodologies and data was included in the FREL submission from Guyana. Detailed information on the methodologies, the data and the measurement, reporting and verification (MRV) system including the sampling design is included in some referenced reports, and this information is publicly available. During the TA, Guyana provided a spreadsheet including calculations for the construction of the FREL, as well as additional oral and written information, to the AT, allowing the AT to reconstruct the FREL value.

Global average emissions ratio from deforestation and forest degradation

20. Regarding the global average emission ratio from tropical forest, Guyana estimated the values of carbon stored in tropical forests and annual net carbon emissions from tropical deforestation during the period 2001–2010 based on the data of Baccini et al. (2012) and adjusted by Harris et al. (2010,[13] 2012). The reason for using these studies is well justified in the FREL submission from Guyana. In the report by Baccini et al. (2012), the carbon held in tropical forest is derived from a combination of remote sensing and field measurements, which is in line with the methodological guidance adopted by the COP[14] in decisions relating to FRELs/FRLs for REDD-plus[15] activities. The methodology for estimating emissions from deforestation was the bookkeeping model[16] employed in previous analyses,[17] which estimates annual carbon flux that occurred from land-use change based on area change and carbon density of each land-use or land-management category.

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[13]   Harris NL, Hagen S, Saatchi SS, Petrova S, Brown S, Salas W and Hansen MC. 2010. *New Estimate of Greenhouse Gas Emissions from Tropical Land Use Change for the Period 2000 to 2005*. Winrock International Report to the World Bank under contract 7150484 (available from S. Brown).

[14]   Decisions 4/CP.15, 1/CP.16, 12/CP.17 and 13/CP.19.

[15]   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.

[16]   The bookkeeping model tracks annual per-hectare changes in carbon stocks when: (1) forest area is cleared for cropland, pasture or shifting cultivation; (2) forests are harvested; (3) plantations are established and (4) agricultural lands are abandoned and returned to forest. The sum of all changes in carbon for all areas under management defines the annual net flux of carbon from all changes in forest land use, reflecting both carbon emissions to, and removals from, the atmosphere.

[17]   Friedlingstein P, Houghton RA, Marland G, Hackler J, Boden TA, Conway TJ, Canadell JG, Raupack MR, Ciais P and Le Quéré C. 2010. Update on CO_2 emissions. *Nature Geoscience*. 3: pp.811–812.
Houghton RA. 1999. The annual net flux of carbon to the atmosphere from changes in land use 1850–1990. *Tellus*. 51B: pp.298–313.
Houghton RA. 2003. Revised estimates of the annual net flux of carbon to the atmosphere from

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

<u>Methodological information, including description of data sets, approaches and methods</u>

21.   The activity data cover the whole national territory of Guyana in line with the establishment of a national FREL. The AT requested clarification from Guyana on potential double counting of the activity data for deforestation and for forest degradation in Guyana's MRV system. Guyana confirmed that any timber harvesting prior to deforestation events had not been included in the commercial timber amount and that there had been no double counting until 2012 in their system. They explained that in Guyana, it is necessary to obtain a concession for timber logging. The information on concession area, the time series record of the forest degradation unit and the forest management plan were taken into account in Guyana's GIS work for detecting deforestation. This system can distinguish temporal forest cover loss and skid trails due to selective logging from deforestation events. In addition, if the forest degradation area is subsequently converted to non-forest land, Guyana registers the land-use change in its system, so avoiding double counting of emissions under both deforestation and forest degradation. Guyana explained further that potential double counting might occur from 2013 onwards, as commercial timber extraction is now requested before deforestation under a new regulation. In addition, if shifting cultivation is eventually included in the FREL, additional care will be required to distinguish emissions from deforestation events from those occurring due to shifting cultivation activities. Guyana noted that it will prevent any double counting in its future monitoring system. The AT acknowledges the importance of this work and commends the expression of the effort that will be made by Guyana.

22.   Guyana revised the values of the total forest area (18.5 million ha) in the modified submission of the FREL from those included in the original submission (17.6 million ha). The AT noted that the value of the forest area in the modified submission of the FREL is not exactly the same as, but is very close to, the value reported in Guyana's second national communication. This difference between forest area values is the result of efforts to improve the accuracy of forest area data by Guyana. The AT notes that the same deforestation area was reported in both the modified submission and the original submission. Guyana confirmed that the revised forest area did not affect data detection of deforested area. As new research was used in the estimation of historical forest emissions in Guyana, the data and estimated results were not consistent with the corresponding anthropogenic forest-related greenhouse gas (GHG) emissions by sources and removals by sinks as contained in the national GHG inventory of the second national communication. Guyana explained that the next submission of the GHG inventory will be consistent with the FREL, either in the third national communication or the first biennial update report.

23.   In Baccini et al. (2012), the area covered is tropical America, Africa and Asia (Australia excluded), and the only pool included in the carbon stock estimation is above-ground biomass. With regard to the estimation of net emissions included, Guyana explained in response to a request for clarification from the AT that emissions from deforestation estimated for the country include above-ground and below-ground biomasses, emissions from fuelwood harvest, emissions from industrial logging, emissions from cultivated soil, removals from recovery of secondary forest after harvesting, removals associated with carbon stored in harvested wood products and removals from shifting cultivation. In order to be consistent with the treatment of the historical emissions in Guyana, the gross emissions from deforestation (0.81 petagrams of carbon per year (PgC/yr)) and the gross

changes in land use and land management 1850–2000. *Tellus.* 55B(2): pp.378–390.

Le Quéré C, et al. 2009. Trends in the sources and sinks of carbon dioxide. *Nature Geoscience.* 2, pp.831–836.

Pan Y, et al. 2011. A large and persistent carbon sink in the world's forests. *Science.* 333: pp.988–993.

emissions from industrial logging (0.45 PgC/yr) were used as the components to estimate global emissions in the combined reference level approach. Guyana adjusted the global forest carbon stock estimation by Baccini et al. (2012) by including the below-ground biomass pool. The method for expanding the estimation from above-ground biomass to the whole living biomass was to apply continent-specific factors of above-ground biomass to below-ground biomass derived from other scientific literature (Harris et al., 2010). Guyana explained that the data from Harris et al. (2010) were selected because they included global estimations that were relatively comparable to those of Baccini et al. (2012). The AT confirmed that the calculation was implemented in line with the explained method and data by Guyana and commends the effort made by Guyana to seek consistency between the carbon pools included by Guyana and those considered for the global estimates.

24.   In section 6.1 of its FREL submission, Guyana discusses how the main drivers of deforestation and forest degradation might contribute to the country's emissions from the forest sector in the coming years. The AT noted that the information provided in this section did not clearly relate to the increase in emissions resulting from the application of the combined reference level approach. In response to this comment, Guyana provided additional information in its modified FREL submission, including the percentage shares of the estimated FREL that might correspond to each of the identified drivers.

25.   Guyana further explained that it followed two parallel tracks of assessment to better inform on Guyana's national circumstances across the land-use sectors and the emissions that may result from activities related to these sectors. First, discussions were held with experts from the main land-use sectors of forestry, mining and agriculture, looking at the historical trend of emissions, current and planned developments, and projected future emission levels. The second track of assessment looked at the infrastructure drivers through the spatial platform available at GFC as part of the MRV system. Based on the likely spatial impacts for the Amaila Falls and the Guyana Brazil road, computations were conducted on likely emissions impacts. The AT commends Guyana for this additional information, and notes that the projected emissions are informed by a national process of sector development, which concludes on a distribution of the emissions among already identified drivers. The AT noted that this proposal results in a significant increase in emissions, to which Guyana explained that basing the FREL on historical emissions alone would not be realistic, because Guyana is a high forest cover country with historically low rates of deforestation. Therefore, other approaches that may be used would also lead to an emission level higher than the historical emission level.

Description of relevant policies and plans, as appropriate

26.   As the proposed FREL is based on combined historical emissions of Guyana and a global study, no assumptions about future changes to domestic policies have been directly included in the FREL submission. Guyana introduced some information on its REDD-plus activities, and forest and low-carbon development policies and programmes in section 6.1 of its submission.

2.   **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.   In the estimation of deforestation emissions in Guyana, the pools estimated are: above-ground biomass, below-ground biomass, dead wood, litter and soil. With regard to the emissions from forest degradation, the pools estimated are: above-ground biomass, below-ground biomass, dead wood and harvested wood product. Litter and soil carbon

stock changes are not estimated in forest degradation in Guyana because of their low impact during selective logging events. The AT notes that all significant carbon pools are estimated and considered in the FREL submitted by Guyana.

29.   The AT noted that the carbon stock of the living biomass carbon pool in Guyana's forest of around 283 t C/ha used in the construction of the FREL is high in comparison with many other tropical forests around the world. The values provided by Guyana are sometimes double the levels of carbon appearing in other studies or reports, including the second national communication of Guyana. During the TA, the AT requested further clarification on this point, and Guyana explained that the applied value of carbon content had been derived from the latest survey in Guyana with the additional information supporting the high carbon content in Guyana's forests.[18] The TA considers that the high level of Guyana's forest carbon is credible and expects that other national reports such as the national communications will be modified in the future in order to be consistent with the carbon stock data used in this FREL submission.

30.   The emissions from non-CO_2 gases estimated in the original submission were methane and nitrous oxide emissions from forest fires associated with deforestation in Guyana. Guyana noted that its modified submission does not include non-CO_2 gases, because its revised forest carbon stratification effort has shown that the areas previously classified as being affected by forest fires were now identified as occurrences of shifting agriculture. Monitoring of shifting agriculture will be aligned as such in future updates of the FREL. Guyana explained that other GHG emissions sources from forests were not significant in Guyana and were not quantified. The AT considers that the exclusion of other non-CO_2 gases does not have a significant impact on the total emissions from the REDD-plus activities included in Guyana's FREL. The AT also notes that when additional sources of emissions are included in the FREL in the future, the inclusion of non-CO_2 gas emissions should also be considered as an area for future technical improvement.

31.   During the TA, the AT discussed with Guyana that the inclusion of all estimated carbon pools in Guyana's historical emissions causes inconsistent treatment of carbon pools compared to the global emission estimation in the combined reference level approach, because the global estimation includes fewer carbon pools. In the modified submission, Guyana included the above-ground biomass and below-ground biomass carbon pools for both activities (deforestation and forest degradation) and, additionally, the dead wood carbon pool for forest degradation. The other pools are excluded from the construction of the FREL using the combined reference level approach. The AT commends Guyana for making an additional effort during the TA in order to increase the consistency between the global data of Baccini et al. (2012) and Guyana's historical emission estimates, to the extent possible.

32.   The AT acknowledges that Guyana included the most significant activities (reducing emissions from deforestation and forest degradation) of the five activities identified in paragraph 70 of decision 1/CP.16, in accordance with its national capabilities and circumstances. The AT notes that Guyana mentioned that some causes of forest degradation other than selective logging have not been quantified, although these were considered to be insignificant taking into account the available information. In addition, the gains of removals in forest land in Guyana have not been estimated due to a lack of credible research data. Guyana explained that there is ongoing work to address these issues in the future. In addition, Guyana included below-ground biomass in the estimation of global

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[18]   Brief information can be found in section 5.1.2 of the modified submission from Guyana. The following reference provides additional information: Mitchard ETA, et al. 2014. Markedly divergent estimates of Amazon forest carbon density from ground plots and satellites. *Global Ecology and Biogeography*. 2398: pp.935–946.

forest emissions and forest carbon stock in the modified submission. The values of global emissions provided in the modified submission have been taken from peer-reviewed research. Guyana provided additional information allowing the AT to reproduce the estimates of global emissions.

3. Definition of forest

33.   Guyana provided in its submission the definition of forest used in the construction of the FREL, which is a minimum area of 1.0 ha, a minimum height of 5 m and a minimum tree canopy cover of 30 per cent. This definition is not the same as the one that the Party uses in its national GHG inventories included in its first and second national communications (minimum area of 0.5 ha, a height of 5 m or more and at least 10 per cent canopy cover). The reason for the differences in the forest definition, explained by Guyana during the TA, is that the national MRV system for the REDD-plus programme was developed based on the ranges set by the Marrakech Accords. Guyana also explained that the differences in the forest definition affected the consistency between the forest area values reported in the second national communication and the FREL submission and that the new forest definition will be reflected in its future GHG inventories in national communications and biennial update reports, which will then result in full consistency.

34.   The TA noted that the global forest carbon and deforestation emissions given by Baccini et al. (2012) were derived from wall-to-wall mapping analysis using a combination of remote sensing and field data, but that the forest definition of this analysis might not be fully consistent with the selected forest definition in Guyana because global deforestation analysis does not take into account the canopy cover ratio in its assessment. This issue is unavoidable in the application of the combined reference level approach for the FREL. The AT noted the additional information provided by Guyana in its modified submission explaining that the difference between the forest definitions used was not critical, because Guyana's native forests were practically all dense closed canopy forests. Thus, Guyana's forests would also meet the criteria of the forest definition of the Food and Agriculture Organization of the United Nations, and using either definition would not change the total area of forest cover in Guyana.

III. Conclusions

35.   The information used by Guyana in constructing its FREL for reducing emissions from deforestation and reducing emissions from forest degradation is transparent and complete, and is in overall accordance with the guidelines for submissions of information on FRELs (as contained in the annex to decision 12/CP.17).

36.   The AT acknowledges that Guyana included in the FREL the most significant activity and the most significant pools in terms of emissions from forests, and that the FREL covers the entire national territory of Guyana. In doing so, the AT considers that Guyana followed decision 1/CP.16, paragraph 70, on activities undertaken, paragraph 71(b), and decision 12/CP.17, paragraph 10, on implementing a step-wise approach. The AT commends Guyana for the information provided on its ongoing work into the development of FRELs for improving the accuracy and coverage of the estimations.

37.   As a result of the facilitative interactions with the AT during the TA session, Guyana submitted a modified submission that took into consideration the technical input by the AT. The AT notes that the transparency and completeness of the information improved significantly in the modified FREL submission and commends Guyana for its efforts.

38.   The AT notes that, overall, the FREL does not maintain consistency, in terms of sources for the activity data and the emission factors, with the GHG inventory included in

Guyana's second national communication.[19] The AT also notes that the data used in the construction of the FREL are the latest reflections of research recently carried out in Guyana and are considered to be more accurate than the data used in the GHG inventory. The AT encourages Guyana to use the improved data in the preparation of its next GHG inventory on forest-related emissions.

39. A partnership between Guyana and Norway agreed on the use of a temporary "cap" whereby Guyana's emissions are basically capped at the current rate, but payments by Norway are made (on a sliding scale) based on a separate "crediting (or payments) baseline". The payments baseline is calculated as the midway point between the rate of deforestation in Guyana from 2000 to 2009 (0.03 per cent) and the average deforestation rate for developing countries between 2005 and 2009 (0.52 per cent), or a payments baseline of 0.275 per cent. The cap on emissions was set as the deforestation rate in 2010 (0.056 per cent). If Guyana exceeds this rate in any given year, the payments are reduced on a sliding scale, up to the rate of 0.1 per cent, at which point, there are no payments made. Guyana explained that the application of this cap improves the environmental integrity of the FREL, and that it expects such a cap to apply whenever the combined reference level approach used in the current FREL submission is applied.

40. The AT notes that the combined reference level approach used by Guyana in its submission was developed in the year 2009, before any of the relevant COP decisions were adopted. The resulting FREL, which is about four times larger than the historical forest-related emissions, and although linked to a national sectoral planning process, should be quantifiably linked to the historical emission rate and the national circumstances of Guyana. For instance, there should be more clarity as to how the average deforestation emissions of developing countries as a whole are related to Guyana's future emissions, considering the variety of drivers, national circumstances, deforestation rates and carbon stock contents found across such countries. Additional challenges of this approach are the matters regarding Guyana's data and global data, as well as the different forest definitions. Consequently, the AT concludes that, from a technical point of view, the combined reference level approach applied by Guyana is appropriate as an interim approach. For a more optimal solution in the longer term, a clearer link should be made to national circumstances as more data on the future drivers become available.

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

(a) The way in which the effects of national circumstances and national policies and programmes are quantified and reflected in the FREL should be improved in order to increase the transparency of the FREL;

(b) In assessing the pools and gases included in the FREL, pursuant to decision 13/CP.19, annex, paragraph 2(f), the AT notes that the current omissions of pools and gases are likely to be conservative in the context of the FREL. The AT notes that emissions from dead wood, litter and soil pools are not included in the FREL due to a lack of reliable estimates of these pools, and identified the treatment of these pools as an additional area for future technical improvement;

(c) The AT considers that the exclusion of other non-CO_2 gases does not have a significant impact on the total emissions from the REDD-plus activities included in Guyana's FREL. The AT also notes that when additional sources of emissions are included in the FREL in the future, estimation of non-CO_2 gas emissions should also be considered as an area for future technical improvement.

42. The AT acknowledges and welcomes the intention expressed by Guyana to continue:

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[19] In reference to the scope of the TA, decision 13/CP.19, annex, paragraph 2(a).

(a)   Monitoring forest and forest-related emissions;

(b)   Efforts to estimate emissions from other drivers of forest degradation in addition to selective logging, which have not yet been quantified;

(c)   Efforts to estimate removals due to regrowth, which have not yet been quantified;

(d)   Carrying out research and gathering information in order to improve the transparency and accuracy of the approach used to estimate its FREL;

(e)   Efforts to prevent any double counting between deforestation and forest degradation in its future monitoring system.

43.   In conclusion, the AT commends Guyana for showing an intention to update its FREL submission within the next five years in order to reflect refined data on drivers and forest carbon stocks, in line with the step-wise approach. A number of areas for future technical improvements of Guyana's FREL have been identified in this report. At the same time, the AT acknowledges that these improvements are subject to national capabilities and policies, and notes the importance of adequate and predictable support.[20] The AT also acknowledges that the assessment process was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Guyana.

44.   The table in the annex summarizes the main characteristics of Guyana's proposed FREL.

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[20]   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/yr)	46 301 251	Calculated from the estimated combined (Guyana and global) reference emissions percentage of 0.242 per cent and the total forest carbon stock of Guyana over the period 2001–2012 (para. 7)
Type and duration of FREL	Combined reference level approach	The reference level is represented as the amount of emissions. The historical period of 2001–2012 is taken into account and adjusted for national circumstances using the combined reference level approach (see below and para. 9)
Adjustment for national circumstances	Yes	As the historical emission trend is unlikely to accurately predict future emissions in Guyana, a global emission level was also taken into account for the adjustment using the combined reference level approach (para. 9)
National/subnational[a]	National	Guyana's FREL covers the whole national territory (para. 6)
Activities included[b]	Deforestation Forest degradation	The gross emissions from deforestation (without considering biomass regrowth), including all types of land conversion to non-forest land, as well as the gross emissions from selective logging under forest degradation are included (paras. 6 and 32)
Pools included[b]	AB, BB, DW	All five pools were considered for Guyana, but the combined FREL was constructed only with part of them due to limitations in global data (paras. 8 and 31)
Gases included	CO_2	Non-CO_2 gases were neither estimated nor included in the combined FREL (para. 30)
Forest definition[c]	Included	Minimum tree canopy cover of 30 per cent, minimum land area of 1 ha and minimum tree height of 5 m (para. 33)
Relationship with latest GHG inventory	Methods used for FREL differ from those in the latest GHG inventory (2012)	The difference in methods is due to more recent data and the 2006 IPCC Guidelines used in the FREL as compared to those in the GHG inventory. In future GHG inventories, it is planned to apply the updated data and methodologies used in the FREL (para. 38)
Description of relevant policies and plans[d]	Included	Included in section 6.1 of the FREL submission (para. 26)

Main features of the FREL		*Remarks*
Description of assumptions on future changes in policies[d]	Included	The national circumstances and future perspective describe ongoing policy frameworks and planned new policies and measures (para. 26)
Descriptions of changes to previous FREL	Not applicable	
Future improvements identified	Yes	Some technical improvements are identified and their submission is planned (para. 41)

Abbreviations: AB = above-ground biomass, BB = below-ground biomass, DW = dead wood, FREL = Forest reference emission level, GHG = greenhouse gas, IPCC = Intergovernmental Panel on Climate Change, t CO_2 eq/yr = tonnes of carbon dioxide equivalent per year, 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

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

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

[c] The forest definition should be summarized, and it should be stated if it differs from the definition used in the greenhouse gas 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.