Framework Convention on Climate Change

Technical report on the technical analysis of the technical annex to the third biennial update report of Viet Nam submitted in accordance with decision 14/CP.19, paragraph 7, on 16 April 2021

Summary

This technical report covers the technical analysis of the technical annex submitted on a voluntary basis, in the context of results-based payments, by Viet Nam on 16 April 2021 through its third biennial update report in accordance with decision 14/CP.19. The technical annex provides data and information on the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks, which are activities included in decision 1/CP.16, paragraph 70, and covers the same national territorial forest area as the assessed forest reference emission level (FREL) and forest reference level (FRL) proposed by Viet Nam in its modified FREL and FRL submissions of December 2016.

Viet Nam reported the results of implementing these activities for 2011–2018, which amount to a reduction in emissions of 18,293,162 tonnes of carbon dioxide equivalent (t CO_2 eq)/year and a concomitant increase in removals of 38,506,098 t CO_2 eq/year. Those results were measured against the assessed FREL of 59,960,827 t CO_2 eq/year and FRL of –39,602,735 t CO_2 eq/year.

The data and information provided in the technical annex are in overall accordance with the guidelines contained in the annex to decision 14/CP.19. The technical analysis concluded that the data and information provided by Viet Nam in the technical annex are mostly transparent and mostly consistent with the data and information used for establishing the assessed FREL and FRL in accordance with decision 1/CP.16, paragraph 71(b), and decision 12/CP.17, section II. This report contains the findings from the technical analysis and a few areas identified for capacity-building and future technical improvement in accordance with decision 14/CP.19, paragraph 14.

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Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AD	activity data
BUR	biennial update report
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
EF	emission factor
FREL	forest reference emission level
FRL	forest reference level
FRMS	Forest Resource Monitoring System of Viet Nam
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
LULUCF	land use, land-use change and forestry
MRV	measurement, reporting and verification
NFIMAP	National Forest Inventory Monitoring and Assessment Programme of Viet Nam
NFMS	national forest monitoring system
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 analysis
TTE	team of technical experts

I. Introduction

A. Introduction

1. This technical report covers the TA of the technical annex provided by Viet Nam on 16 April 2021 in accordance with decision 14/CP.19, paragraph 7, included in its third BUR, which was submitted in accordance with decision 2/CP.17, paragraph 41(a), and annex III, paragraph 19. In the technical annex, Viet Nam provided the data and information used for estimating its anthropogenic forest-related emissions by sources and removals by sinks, forest carbon stocks, and changes in forest carbon stock and forest area resulting from implementing REDD+ activities. The submission of the technical annex is voluntary and in the context of results-based payments in accordance with decision 14/CP.19, paragraph 8. The TA was coordinated by Jenny Wong (secretariat).

2. The TA of the technical annex is part of the international consultation and analysis of BURs referred to in decision 2/CP.17, annex IV, paragraph 4, the objective of which is to increase the transparency of mitigation actions and their effects through analysis by the TTE in consultation with Viet Nam and through a facilitative sharing of views, resulting in a separate summary report.[1]

3. Viet Nam made its first FREL and FRL submissions, in accordance with decision 12/CP.17, on 15 January 2016, which were subject to a technical assessment following the guidance provided in decision 13/CP.19 and its annex. As a result of facilitative interactions with the assessment team during the TA, which took place from 14 to 18 March 2016, Viet Nam submitted modified versions of its FREL and FRL on 20 July 2016, which took into consideration the technical input of the assessment team and resulted in the modification of the originally proposed FREL and FRL. Following additional technical input and suggestions for improving the transparency of the modified version by the assessment team, Viet Nam provided further modified submissions of its FREL and FRL on 22 December 2016. The modified FREL and FRL were included as elements of the technical annex to the Party's third BUR in accordance with the guidelines contained in the annex to decision 14/CP.19. The findings from the technical assessment of the FREL and FRL are included in a separate report.[2]

B. Process overview

4. The TA of the third BUR of Viet Nam took place from 29 November to 3 December 2021 as a desk analysis[3] and was undertaken by the following TTE drawn from the UNFCCC roster of experts on the basis of the criteria defined in decision 20/CP.19, annex, paragraphs 2–6: Menouer Boughedaoui (Algeria), Manuel Estrada (Mexico), Lawrence Ibhafidon (Nigeria), Hassan Ibrahim (Singapore), Tsutomu Koyama (Japan), Rocio Lichte (Germany), Kakhaberi Mdivani (Georgia), Awassada Phongphiphat (Thailand), Orlando Ernesto Rey Santos (Cuba), Dalia Abdelhamid Mahmoud Sakr (Egypt), Emma Salisbury (United Kingdom of Great Britain and Northern Ireland), Janka Szemesova (Slovakia), Marcelo Theoto Rocha (Brazil), Maarten van der Eynden (Norway), Robin White (Canada) and Alexander Zahar (Australia). Hassan Ibrahim and Tsutomu Koyama were the LULUCF experts who undertook the TA of the technical annex in accordance with decision 14/CP.19, paragraphs 10–13.

5. The TA of the technical annex provided by Viet Nam was undertaken in accordance with the procedures contained in decisions 2/CP.17, 14/CP.19 and 20/CP.19. This technical report on the TA was prepared by the LULUCF experts in the TTE in accordance with decision 14/CP.19, paragraph 14.

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[1] FCCC/SBI/ICA/2021/TASR.3/VNM.

[2] FCCC/TAR/2016/VNM, published on 5 May 2017.

[3] Owing to the circumstances related to the coronavirus disease 2019, the TA of the third BUR submitted by Viet Nam had to be conducted remotely.

6. During the TA and subsequent exchanges, the LULUCF experts and Viet Nam engaged in technical discussions, and Viet Nam provided clarifications in response to questions raised by the LULUCF experts, in order to reach a common understanding on the identification of the capacity-building needs of the Party and areas for technical improvement.

7. Following the TA of the technical annex, the LULUCF experts prepared and shared the draft technical report with Viet Nam for its review and comments. The LULUCF experts responded to the Party's comments and incorporated them into and finalized this technical report in consultation with Viet Nam.

C. Summary of results

8. In decision 1/CP.16, paragraph 70, the Conference of the Parties 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 in accordance with its respective capabilities and national circumstances. In the context of results-based payments and in line with decision 12/CP.17, Viet Nam, on a voluntary basis, proposed a national FREL and FRL covering the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks for the purpose of a technical assessment in accordance with decision 13/CP.19 and its annex. The activities are being implemented in Viet Nam's national territory (excluding archipelagos and islands), covering a forest area of about 14 million ha. The assessed FREL and FRL of Viet Nam are 59,960,827 and –39,602,735 t CO_2 eq/year respectively.

9. The Party's FREL and FRL are based on its annual average historical CO_2 emissions and removals associated with the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks for the historical reference period 1995–2010. Viet Nam did not include emissions and removals from conservation of forest carbon stocks as it does not have a national definition for this activity. Viet Nam reported the results of implementing the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks for 2011–2018, calculated against the assessed FREL and FRL, which amount to emission reductions of 18,293,162 t CO_2 eq/year and enhanced removals of 38,506,098 t CO_2 eq/year.

II. Technical analysis of the information reported in the technical annex

A. Technical annex

10. For the technical annex to the third BUR submitted by Viet Nam, see annex I.[4]

B. Technical analysis

11. The scope of the TA is outlined in decision 14/CP.19, paragraph 11, according to which the TTE shall analyse the extent to which:

(a) The methodologies, definitions, comprehensiveness and information provided are consistent between the assessed FREL and FRL and the results of implementing REDD+ activities;

(b) The data and information provided in the technical annex are transparent, consistent, complete and accurate;

(c) The data and information provided in the technical annex are consistent with the guidelines referred to in decision 14/CP.19, paragraph 9;

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[4] In accordance with decision 14/CP.19, para. 14(a).

(d)   The results are accurate, to the extent possible.

12.   The remainder of this chapter presents the results of the TA of the technical annex to the Party's third BUR according to the scope outlined in paragraph 11 above.

1.   Consistency in methodologies, definitions, comprehensiveness and information provided between the assessed reference levels and the results in the technical annex

13.   In accordance with decision 14/CP.19, paragraph 3, the data and information used by a Party for estimating its anthropogenic forest-related emissions by sources and removals by sinks, forest carbon stocks, and changes in forest carbon stock and forest area resulting from implementing REDD+ activities should be transparent and consistent over time and with the data and information used for establishing its FREL and/or FRL in accordance with decision 1/CP.16, paragraph 71(b–c), and decision 12/CP.17, section II.

14.   The LULUCF experts noted that Viet Nam ensured overall consistency between its assessed FREL and FRL and estimated results of implementing the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks (from reforestation and forest restoration) in 1995–2010. Viet Nam presented enhancement of forest carbon stocks from reforestation and enhancement of forest carbon stocks from forest restoration as two separate activities in its technical annex, but noted, following a question from the LULUCF experts, that they should be considered together to maintain consistency with decision 1/CP.16, paragraph 70(a), (b) and (e), thus resulting in three activities for estimating the FREL and FRL. Overall consistency was ensured by:

(a)   Using mostly consistent methodologies and data to generate AD. Land-use and land-cover maps using 17 categories, including 12 types of forest, were used to construct land-use and land-cover change matrices for subperiods of five years covering the reference period (1995–2000, 2000–2005 and 2005–2010), while the difference between the maps in 2010 and 2018 was used to generate AD for the results period. Regarding uncertainty of AD, Viet Nam identified uncertainty levels of 5 per cent for the classification of forest and non-forest land, 20 per cent for the classification of forest type and 26 per cent for the classification of volume-based broadleaf evergreen forests. In terms of calculating the overall results, the same methodology as used to construct the FREL and FRL was adopted to develop the land-use and land-cover map and assess uncertainty during the results period. However, different satellite images were used to develop the maps for 2018 (Sentinel-2) from those used for the reference period (which included Landsat 7 and SPOT-5). Using different satellite imagery for developing land-use and land-cover maps over time would affect the uncertainty relating to the estimates of changes in land use and land cover;

(b)   Using mostly consistent methodologies and data to generate EFs, in particular using data from NFIMAP for estimating volume for each forest type. In estimating EFs, Viet Nam adopted a tier 2 methodology from the 2006 IPCC Guidelines. The carbon density for non-forest land types and the post-deforestation carbon density are assumed to be zero. NFIMAP was conducted every five years during the FREL and FRL construction period, but not between 2011 and 2015, when the National Forest Assessment Project, which included similar objectives, was being delivered (see also the discussion regarding data obtained as part of FRMS in paras. 23–25 below). The Party therefore generated EFs for 2011–2018 by comparing forest carbon stocks for each land-use and land-cover category between NFIMAP cycles 4 (2006–2010) and 5 (2016–2020), though these EFs may be affected slightly by the absence of data for 2011–2015. The LULUCF experts therefore noted that ensuring the availability of continuous five-year cycles of NFIMAP in the future or aligning with another monitoring system deployed in parallel, such as the FRMS, would increase the accuracy of the emission and removal estimates and future results. In calculating its results, the Party made a number of modifications to NFIMAP to improve economic efficiency, such as reducing the number of subplots and trees that need to be measured while maintaining almost the same level of accuracy as well as the overall sampling design and intensity (i.e. systematic sampling with an 8 x 8 km grid), resulting in a statistically sufficient number of sample plots;

(c)   Covering the same two carbon pools: above- and below-ground biomass. Similar methodologies were used to generate country-specific allometric equations for timber

and bamboo forests to estimate above-ground biomass, sample plots and forest types for each ecoregion, which is a tier 2 estimation method under the 2006 IPCC Guidelines. Default root-to-shoot ratios and carbon fraction taken from the 2006 IPCC Guidelines were applied to calculate below-ground biomass and carbon stocks. The LULUCF experts commend Viet Nam for using allometric equations specific to each ecoregion that took into account key emission categories and cost efficiency related to data collection. Further, the experts noted as an area for future technical improvement the development of country-specific root-to-shoot ratios as part of the stepwise approach, which would further improve the accuracy of the estimates;

(d)   Covering the same gas: CO_2;

(e)   Covering the same area: entire national territory, excluding archipelagos and islands;

(f)   Using the same forest definition, namely minimum thresholds of 10 per cent tree cover, height of 5 m and block area of 0.5 ha. For forest plantations, a minimum height of 1.5 m for slow-growing plantations and 3 m for fast-growing plantations and a minimum density of 1,000 trees/ha is used. Rubber is defined as a multipurpose tree and its plantations are included within planted forest.

15.   Overall, methodological consistency was mostly maintained by Viet Nam between constructing the FREL and FRL and calculating the REDD+ results, although some missing data and technical issues to be considered are explained elsewhere in this report (see para. 14(a–b) above). The LULUCF experts were, however, concerned about the treatment of reforestation under Programme 661, a programme to encourage reforestation, forest restoration and forest protection between 1998 and 2010. Although an adjustment was made to remove the impact of reforestation efforts under Programme 661 from the FRL calculations, an equivalent adjustment was not implemented for the results period. In response to a question from the LULUCF experts, Viet Nam explained that, as the average rotation cycle of plantation in Viet Nam is five years, most of the new forest areas detected in 2018 were planted during 2011–2018 and therefore the removals between 2011 and 2018 resulting from reforestation efforts under Programme 661 were likely to be quite small and could be disregarded. However, the LULUCF experts noted that Viet Nam did not share any quantitative assessment for those removals. Therefore, ensuring consistency in the treatment of the impact of reforestation under Programme 661 between the FREL and FRL and the results is an area for future technical improvement that would enhance the consistency and accuracy of the results presented and avoid overestimation of the results achieved. Further, the LULUCF experts noted that the presentation of total removals with and without the reforestation efforts under Programme 661 is another area for future technical improvement that would enhance the transparency of the results achieved.

16.   In view of the above, the LULUCF experts concluded that the results presented of implementing the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks are mostly consistent with the assessed FREL and FRL. In particular, the LULUCF experts noted that consistently making adjustments to remove the impact of reforestation efforts under Programme 661 from the FRL but not during the results period may lead to overestimating the results achieved during the results period.

2.   Transparency, consistency, completeness and accuracy of the data and information provided in the technical annex

17.   As part of the TA process, Viet Nam provided additional information, in particular on developing AD and EFs, discrepancies between the FREL and FRL on the one hand and the GHG inventory on the other, and the adjustment described in paragraph 15 above. The LULUCF experts commend Viet Nam for its efforts to increase the transparency and ensure the completeness[5] of the data and information provided by sharing additional reports and spreadsheets with the LULUCF experts during the TA, thus allowing for reconstruction of

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[5] "Complete" here means including the information necessary for reconstructing the results.

the results, and by mentioning its intention to make the reports shared with the LULUCF experts and listed in annex III publicly available online after the TA process.[6]

18.   According to decision 12/CP.17, paragraph 8, the FREL and FRL shall be established taking into account decision 4/CP.15, paragraph 7, and maintaining consistency with the anthropogenic forest-related GHG emissions by sources and removals by sinks reported in the Party's GHG inventory. The team assessing Viet Nam's FREL and FRL noted that the Party did not maintain consistency in terms of sources of AD and EFs with those used for the GHG inventory included in its first BUR.[7] In response to a question from the LULUCF experts, Viet Nam explained that there were still discrepancies in the methodologies used in relation to the GHG inventory and REDD+ activities (e.g. a gain–loss method was used for the GHG inventory, while a stock difference method was used for REDD+ activities), but that it has made some progress in reducing discrepancies between the estimates in the GHG inventory for the LULUCF sector and the FREL and FRL. A report was commissioned to assess these discrepancies and propose solutions for overcoming them (Vu et al., 2019a). Following this assessment, for the third BUR spatial AD were used, forest carbon stock was calculated using plot measurement data and nationally developed allometric equations were applied, thus improving consistency between the reporting on the results and the GHG inventory. In addition, according to annex I of the technical annex, the total area reported for the technical annex is 330,168.27 km^2, while the total area reported in the third BUR is 331,235.97 km^2. Though Viet Nam explained that it did not take into account archipelagos and islands as part of the coverage for REDD+ activities, the LULUCF experts noted that further explanation of this exclusion in the technical annex would enhance transparency.

19.   In response to a question from the LULUCF experts, Viet Nam clarified that images of the maps used to construct the AD would be made publicly available online after the TA process.[8] The LULUCF experts commend Viet Nam for its efforts in this regard, which improve the transparency of its reporting.

20.   The LULUCF experts concluded that Viet Nam provided most of the information necessary for reconstructing the results of implementing the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks. The data and information provided in the technical annex are considered to be complete and mostly transparent, consistent and accurate.

3.   Consistency with the guidelines on elements to be included in the technical annex

21.   Viet Nam provided data and information on all the required elements in accordance with the guidelines contained in the annex to decision 14/CP.19, namely summary information from the final report containing the assessed FREL and FRL; results, as compared with the assessed FREL and FRL; a demonstration that the methodologies used to produce the results are consistent with those used to establish the assessed FREL and FRL (as outlined in chap. II.B.1 above); a description of forest monitoring systems and institutional roles and responsibilities in MRV of the results; much of the information necessary for reconstructing the results (as outlined in chap. II.B.2 above); and a description of how the elements contained in decision 4/CP.15, paragraph 1(c–d), have been taken into account. The LULUCF experts noted that Viet Nam presented results in Mt CO_2 eq/year (with decimal places that allowed for the calculation of the amounts in kt), and therefore noted the presentation of the results in t CO_2 eq/year, in line with decision 14/CP.19, annex, paragraph 2, as an area for future technical improvement.

22.   Viet Nam provided a summary table with the results of implementing the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks for 2010–2018, which are consistent with the assessed FREL and FRL, but did not fully allow for reconstruction of the results. In response to a question from the LULUCF experts, Viet Nam shared an additional Excel sheet that allowed the LULUCF experts to reconstruct the results. The LULUCF experts commend Viet Nam for that additional information and noted that the inclusion of a publicly available link in a

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[6] Available at http://vietnam-redd.org/en/cate/documents/redd-knowledge-44-20-1.html.

[7] Available at https://unfccc.int/documents/180728.

[8] Available at http://vietnam-redd.org/en/cate/documents/redd-knowledge-44-20-1.html.

modified submission would further increase transparency. The emission reductions and results achieved in terms of removals from enhancement of forest carbon stocks are listed in tables 3 and 6 of the technical annex and amount to 18.293 and 38.506 Mt CO_2 eq/year respectively.

23. The LULUCF experts noted that Viet Nam provided a description of the NFMS and a transparent summary of the roles and responsibilities of the agencies and institutions involved in MRV of the results in the technical annex. In its submission and also during the consultation process, Viet Nam explained that it has two parallel systems in place for the monitoring of its forests, FRMS and NFIMAP, with NFIMAP being the main source of information for constructing the FREL and FRL and for calculating the REDD+ results.

24. In its submission, Viet Nam indicated that, although FRMS was the main data source for the official forest area in Viet Nam, the data from the system were not used for the REDD+ MRV. Although FRMS was not integrated into the MRV for REDD+, it contributed alongside NFIMAP to the monitoring activities under the National REDD+ Action Programme. In response to a question from the LULUCF experts on whether FRMS could be integrated into the MRV for REDD+, Viet Nam explained that it had performed a gap analysis that covered, for example, the costs, benefits and consequences of integrating FRMS. Viet Nam further explained that it did not have any historical data consistent with FRMS prior to 2003 and the FRMS maps for 2003–2015 were based on a different classification system from that used for the FRMS maps for 2016 onward. In order for the current FRMS to be used for REDD+ MRV, the 98-type classification system under FRMS would need to be reconciled with the 17-type classification system currently used for the FREL and FRL, and Viet Nam shared with the LULUCF experts a look-up table that will allow for such a reconciliation. The LULUCF experts identified the incorporation of FRMS into the FREL and FRL calculation process as an area for future technical improvement and commend Viet Nam for the preliminary analysis shared with the LULUCF experts in preparation for such incorporation.

25. The forest monitoring system is a national system covering about 14 million ha, excluding the country's archipelagos and islands. FRMS is led by the Forest Protection Department under the Viet Nam Administration of Forestry, Ministry of Agriculture and Rural Development, while NFIMAP, which is conducted every five years, has been led by the Forest Inventory and Planning Institute since 1990. Work on the forest-cover maps generated by NFIMAP for 1990–2010 was carried out in four cycles. It was not carried out for 2011–2015 but resumed for 2016–2020 to serve as the main source of data for calculation of the results. AD are based on the analysis of remote sensing images to produce land-use and land-use change maps over different time points. During the consultation process, Viet Nam highlighted that it performed checks using annual composite images from Landsat (2011–2017) and Sentinel-2 (2015–2017) to ensure no illogical forest conversion. The EFs were based on the national forest inventory cycles implemented before and after the results period. For each NFIMAP cycle, data from tree measurements were aggregated at the plot level and an average was calculated for each land-use and land-cover type at the regional level, following the same land-use and land-cover stratification as that used for the AD. Viet Nam also provided a weblink where further reports and data sets that were shared with the LULUCF experts will be made publicly available (see para. 17 above). The LULUCF experts commend Viet Nam for sharing this information.

26. According to decision 11/CP.19, paragraph 4(b), the NFMS should enable the assessment of different types of forest in the country, including natural forest. During the consultation process, and also in its submission, Viet Nam explained that the classification of land use and land cover using NFIMAP was based on 17 different land categories. These land categories included 12 forest types (covering forest types such as evergreen broadleaf, deciduous, bamboo, coniferous, mangrove, limestone and forest plantations) and 5 non-forest types. Evergreen broadleaf forests were further stratified into four volume-based subcategories (see table 10 of the technical annex). During the consultation process, it was highlighted to Viet Nam that, while both rubber and acacia are included under forest plantations in its FREL and FRL, only rubber is specified in its technical annex. Viet Nam explained that acacia is by default considered under forest plantations but considered part of a natural forest when planted as nursing trees to improve the growth of native species. Viet

Nam added that the areas with acacia planted as nursing trees were considered to be very small. The LULUCF experts noted that highlighting in the technical annex that acacias are considered under forest plantations is an area for future technical improvement that would increase transparency.

27.   On the basis of the available information and noting that the NFMS and the results reported in the technical annex cover the entire national territory (except archipelagos and islands), the LULUCF experts noted that, so far, there is no evidence of displacement of emissions.

28.   Viet Nam provided a description of how IPCC guidance and guidelines were taken into account in accordance with decision 4/CP.15, paragraph 1(c). For estimating emission reductions and removals, it used the methodology provided in the 2006 IPCC Guidelines for estimating carbon stock changes in forest land converted to other land uses. Accordingly, the emissions from deforestation and forest degradation and removals from enhancement of forest carbon stocks were estimated for 2011–2018 by combining AD (i.e. areas of annual change between forest strata) with the appropriate EF or removal factor (i.e. emissions or removals associated with the corresponding forest type).

29.   Viet Nam included the most significant carbon pools in its FREL and FRL and estimation of results, namely above- and below-ground biomass. Deadwood, litter and soil organic matter were not included owing to lack of data, and non-CO_2 GHGs were excluded as their emissions were considered insignificant. Nonetheless, Viet Nam mentioned during the consultation process that all five carbon pools and methane from forest fires (though insignificant) were included in the GHG inventory. The LULUCF experts commend Viet Nam for its plan to obtain better information on other carbon pools and non-CO_2 gases with the aim of including them in future FRELs and FRLs and estimates of results as part of the stepwise approach.

4.   Accuracy of the results proposed in the technical annex

30.   The LULUCF experts noted that the Party estimated the results of implementing the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks using a mostly transparent and mostly consistent approach. They commend Viet Nam for its significant long-term efforts to build up a robust NFMS that is capable of providing transparent estimates of emissions and removals from the REDD+ activities undertaken.

31.   Both the established FREL and FRL and the results obtained for 2011–2018 from implementing the activities are based on the estimation of carbon stock changes in above- and below-ground biomass calculated as the difference in biomass before and after land conversions, with the assumption that annual emissions and removals occur evenly between two successive land-use and land-cover maps during the reference and the results period, even though Viet Nam considers the average rotation cycle of its plantation forests to be five years, as highlighted during the consultation process, and results were estimated using land-use and land-cover maps at eight-year intervals. The AD used in constructing the FREL and FRL were based on interpreted images from Landsat (for 1995, with mapping back to 1990) and SPOT-4 and SPOT-5 (for 2000, 2005 and 2010). However, Sentinel-2, which has a higher spatial resolution, was used to develop the AD for 2018 with no other land-use mapping exercise undertaken in the intervening years. Viet Nam explained during the consultation process that it attempted to ensure consistency between the land-use maps for the reference period and the results period by conducting checks to ensure that there was no illogical conversion. The LULUCF experts concluded that a consistent approach to interpreting geospatial images across the time series, with a view to ensuring coherence and enhancing accuracy, identified as areas for technical improvement in the report on the technical assessment of Viet Nam's FREL and FRL, should also be applied in relation to the results.

32.   With regard to Programme 661, as reported in the technical assessment of the Party's FREL and FRL, Viet Nam adjusted its FRL by excluding removals achieved through reforestation efforts under Programme 661 during its reference period. In response to a question from the LULUCF experts, Viet Nam explained that it was difficult to ascertain the

removals from areas planted under Programme 661 in the results period, considering that most plantation forests under Programme 661 had already been harvested, as the average rotation cycle there was five years. Viet Nam assumed that most of its new forest areas detected in 2018 were planted in 2011–2018 and that any remnants of reforestation efforts from Programme 661 in the reporting period were insignificant and could be ignored. Notwithstanding the information provided and acknowledging that it was difficult to distinguish between plantations under Programme 661 and other plantation forests or forest land in 2018, the LULUCF experts noted that this may have an impact on the accuracy of the results presented by Viet Nam (see para. 15 above).

33.   There was an inconsistency in the time frame of the results period reported in the technical annex. In tables 2–4 of the technical annex, the results period was indicated as 2010–2018, while in table 8, which gives a comparative summary of the FREL and FRL and results, the results period was indicated as 2011–2018. In response to a question from the LULUCF experts regarding a potential overlap between the reference level period (1995–2010) and the results period, namely the year 2010, which could undermine the accuracy of the results, Viet Nam highlighted that the inconsistency was due to a different set of team members preparing the technical annex, but stated that there should only be one results period, namely 2011–2018, as the reference to 2010 in the results period is actually a reference to the use of a map considered to be dated 31 December 2010. In addition, on the cover page and in the introduction, conclusion and sections 2.1, 4.1.2 and 5.3 of the technical annex, Viet Nam explained that the reported results are for 2014–2018. As presented by Viet Nam in section 5.3 of the technical annex, estimates for 2014–2018 are based on AD that allow results to be assessed over the full period of 2011–2018 with a pro rata calculation of 5/8 (to adjust for the length of the results period). In response to a question from the LULUCF experts, Viet Nam clarified that it reported only the estimated results for 2014–2018 because this is required by the Green Climate Fund for pilot REDD+ project proposals. The LULUCF experts noted that, as the results period was 2011–2018, Viet Nam could have reported results for all years between 2011 and 2018, while presenting results for 2011–2013 and 2014–2018 as needed.

34.   Viet Nam provided some brief information on accuracy and uncertainty in the technical annex. During the technical assessment of its FREL and FRL, the Party provided information about the development of uncertainty estimates for tree measurement, carbon stocks, EFs, removal factors and AD using the error propagation method in order to improve the accuracy of estimates. In the technical annex, Viet Nam stated that the uncertainty analysis of the land-use changes was taken into account in constructing the AD, which was an improvement compared with the method used for constructing the FREL and FRL. Given the assumptions used, as well as the views provided in paragraphs 31–33 above, the LULUCF experts concluded that the results are mostly accurate.

C.   Areas identified for technical improvement

35.   The LULUCF experts concluded that the following areas for technical improvement identified in the report on the technical assessment of Viet Nam's FREL and FRL also apply to the provision of information on the results of implementing the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks:

        (a)   Using a consistent approach for interpreting geospatial images across the time series to ensure coherence and enhance accuracy (see paras. 14, 25 and 31 above and para. 19 of document FCCC/TAR/2016/VNM);

        (b)   Harmonizing the AD and EFs used between the GHG inventory and the FREL and FRL submission (see para. 18 above and paras. 25 and 29 of document FCCC/TAR/2016/VNM);

        (c)   Providing time-series information on forest and land-use transitions (see para. 14 of document FCCC/TAR/2016/VNM);

(d)   Using time-series-consistent data in estimating carbon stock densities (see para. 31 of document FCCC/TAR/2016/VNM);

(e)   Improving the definition of forest degradation to include thresholds such as canopy cover and carbon stock decline and to exclude short-term loss of carbon stock (see para. 32 of document FCCC/TAR/2016/VNM);

(f)   Including in the FREL and FRL non-biomass pools (dead organic matter and soil carbon) and non-CO_2 gases on the basis of relevant work being undertaken (see paras. 34–35 of document FCCC/TAR/2016/VNM);

(g)   Assessing the effect of forest fires on the resulting non-CO_2 emissions from deforestation and forest degradation (see para. 35 of document FCCC/TAR/2016/VNM).

36.   Furthermore, the LULUCF experts noted that Viet Nam could consider:

(a)   Ensuring consistency in the treatment of the impact of reforestation efforts under Programme 661 between the FREL and FRL and the results to avoid overestimation of the results achieved (see para. 15 above);

(b)   Presenting total removals with and without reforestation efforts under Programme 661 to enhance the transparency of the results achieved (see para. 15 above);

(c)   Ensuring the availability of continuous five-year cycles of NFIMAP in the future or aligning with another monitoring system deployed in parallel, such as the FRMS, which would increase the accuracy of the estimated emissions and removals and thus the results in the future (see para. 14(b) above);

(d)   Developing country-specific root-to-shoot ratios to further improve the accuracy of the estimates as part of the stepwise approach (see para. 14(c) above);

(e)   Incorporating the FRMS into the MRV of the results (see para. 23 above);

(f)   Presenting the results in t CO_2 eq/year in line with decision 14/CP.19, annex, paragraph 2 (see para. 21 above).

D.   Comments and responses of the Party

37.   During the consultation process, Viet Nam noted a number of areas of capacity-building needs. Addressing those needs could enable Viet Nam to improve its data and methodologies and include additional activities and gases in future FREL and FRL submissions. After exchanges with the LULUCF experts, Viet Nam identified the following capacity-building needs:

(a)   Ensuring consistency between the GHG inventory and MRV of the results by harmonizing the AD and EFs for both the GHG inventory and REDD+ activities and ensuring consistent application of methodologies (i.e. gain–loss or stock difference method) for both the GHG inventory and REDD+ activities;

(b)   Including non-biomass pools (dead organic matter and soil carbon) and non-CO_2 gases in future FREL and FRL submissions and in the results;

(c)   Including other REDD+ activities by separating net emission reductions from sustainable management of forests and conservation of forest carbon stocks;

(d)   Improving the accuracy of the forest-cover mapping process to reduce the uncertainty of the results;

(e)   Aligning the FRMS with the MRV of the results to allow for the estimation of the results at the provincial level.

III.   Conclusions

38.   The LULUCF experts conclude that Viet Nam reported the results of implementing three activities in the entire national territory (except archipelagos and islands): reducing

emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks. The results include estimates of emission reductions and removals of CO_2 from two carbon pools: above- and below-ground biomass. The results of the activities were reported using methodologies, definitions, assumptions and information that are mostly consistent with those used for constructing the assessed FREL and FRL.

39.   The LULUCF experts consider the data and information provided in the technical annex to be complete and mostly transparent, consistent and accurate.

40.   The LULUCF experts find the data and information provided in the technical annex to be mostly consistent with the guidelines referred to in decision 14/CP.19, paragraph 9.

41.   The results are mostly accurate, based on the assumptions used.

42.   In conclusion, the LULUCF experts commend Viet Nam for showing strong commitment to continuously improving the data and information used for calculating the results, in line with the stepwise approach, which are mostly consistent with those used for constructing its assessed FREL and FRL. Some areas for future technical improvement have been identified by the LULUCF experts and five capacity-building needs have been identified by the Party in this report. At the same time, the LULUCF experts acknowledge that such improvements are subject to national capabilities and circumstances, and note the importance of adequate and predictable support.[9] The LULUCF experts also acknowledge that the TA process was an opportunity for a facilitative and constructive technical exchange of views and information with the Party.[10]

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[9]   As per decision 2/CP.17, para. 57.
[10] As per decision 14/CP.19, paras. 12–13.

Annex I

Technical annex to the biennial update report

Owing to the complexity and length of the submitted technical annex to the BUR, and in order to maintain the original formatting, the **technical annex has not been reproduced here. It is available on the UNFCCC website at https://unfccc.int/BURs.**

Annex II

Summary of the main features of the reported results of implementing the activities referred to in decision 1/CP.16, paragraph 70, based on information provided by Viet Nam

	Key elements	Remarks
Results reported	Reduction of emissions of 18 293 162 t CO_2 eq/year; increase in removals of 38 506 098 t CO_2 eq/year	See paragraph 9 of this document
Results period	2011–2018	Although the technical annex mentions 2014–2018, the reported results are estimated on the basis of changes between 2011 and 2018, multiplied by a ratio of 5/8 to present results over a subperiod of five years (2014–2018) (see para. 33 of this document)
Assessed FREL	59 960 827 t CO_2 eq/year	
Assessed FRL	–39 602 735 t CO_2 eq/year	An adjustment was made to the FRL to exclude sinks associated with reforestation efforts under Programme 661 during the reference period (see para. 15 of this document and paras. 8 and 22–24 of document FCCC/TAR/2016/VNM)
Reference period	1995–2010	
National/subnational	National	Excluding archipelagos and islands (see para. 14 of this document)
Activities included	Reducing emissions from deforestation Reducing emissions from forest degradation Enhancement of forest carbon stocks	In its technical annex, Viet Nam presented enhancement of forest carbon stocks from reforestation and from forest restoration as two activities. However, both fall under the scope of the activity enhancement of forest carbon stocks referred to in decision 1/CP.16, paragraph 70 (see para. 14 of this document)
Pools included	Above- and below-ground biomass	See paragraphs 14 and 29 of this document
Gas included	CO_2	See paragraphs 14 and 29 of this document
Consistency with assessed FREL/FRL	Methods, definitions and information used for the assessed FREL and FRL are mostly consistent with those used for the results	The treatment of removals due to reforestation efforts under Programme 661 was not consistent (see para. 15 of this document). Also, as mentioned by Viet Nam in its submission, land-use and land-cover maps applied for the reference period were based on Landsat 7 and SPOT-5, whereas Sentinel-2 was used for estimates for 2018 (see paras. 14, 25 and 31 of this document)
Description of NFMS and institutional roles	Included	See paragraphs 23–27 and 30 of this document
Identification of future technical improvements	Included	Several areas for future technical improvement have been identified (see paras. 35–36 of this document)

Annex III

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

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 modified FREL and FRL submissions of Viet Nam. Available at https://redd.unfccc.int/submissions.html?country=VN.

"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 of the technical assessment of the proposed forest reference emission level of Viet Nam submitted in 2016. FCCC/TAR/2016/VNM. Available at https://unfccc.int/resource/docs/2016/tar/vnm.pdf.

C. Other documents

The following references have been reproduced as received:

Höyhtyä T, 26 July 2011. *Improved NFIMAP Sampling Design. Bac Kan Case Study.* Project "Support to national assessment and long term monitoring of the forest and tree resource in Viet Nam (NFA)". Food and Agriculture Organization of the United Nations.

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Vu TP, Nguyen VX and Nguyen TML. 2019a. *Selecting data sources and methods for improving inconsistency between REDD+ forest reference (emission) level and the National Greenhouse Gas Inventory.* Ha Noi, Viet Nam: UN-REDD Programme.

Vu TP, Nguyen VX and Nguyen TML. 2019b. *Options to address discrepancies in accounting emissions and removals in national greenhouse gases inventory for land use, land use change and forestry and REDD+.* Ha Noi, Viet Nam: UN-REDD Programme.

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