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Report on the technical assessment of the proposed forest reference emission level and forest reference level of Samoa submitted in 2024

Summary

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

For its submission, Samoa developed a national FREL/FRL. The FREL for the activities reducing emissions from deforestation and reducing emissions from forest degradation presented in the original submission, based on the reference period 2013–2022, corresponds to 316,245 tonnes of carbon dioxide equivalent (t CO_2 eq) per year, including an upward adjustment. As a result of the facilitative process during the technical assessment, the FREL was modified to 278,590 t CO_2 eq for 2013–2022, including an upward adjustment. The FRL for the activity enhancement of forest carbon stocks presented in the original submission, based on the reference period 2013–2022, corresponds to –73,036 t CO_2 eq/year. As a result of the facilitative process during the technical assessment, the FRL was modified to –76,896 t CO_2 eq/year.

The assessment team notes that the data and information used by Samoa in constructing its FREL/FRL are mostly transparent, mostly complete and mostly in accordance with the guidelines contained in the annex to decision 12/CP.17. This report contains information on the assessed FREL/FRL and a few areas identified by the assessment team for future technical improvement in accordance with the provisions on the scope of the technical assessment contained in the annex to decision 13/CP.19.

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
2019 Refinement to the 2006 IPCC Guidelines	*2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AD	activity data
ART–TREES	Architecture for REDD+ Transactions–The REDD+ Environmental Excellence Standard
AT	assessment team
BUR	biennial update report
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
COP	Conference of the Parties
EF	emission factor
FAO	Food and Agriculture Organization of the United Nations
FREL	forest reference emission level
FRL	forest reference level
GCF	Green Climate Fund
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
LULUCF	land use, land-use change and forestry
NC	national communication
NFI	national forest inventory
REDD+	reducing emissions from deforestation; reducing emissions from forest degradation; conservation of forest carbon stocks; sustainable management of forests; and enhancement of forest carbon stocks (decision 1/CP.16, para. 70)
SamFRIS	Samoa Forests Resources Information System
TA	technical assessment

I. Introduction and summary

A. Overview

1. This report covers the TA of the submission of Samoa on its proposed FREL and FRL,[1] submitted on 15 January 2024, in accordance with decisions 12/CP.17 and 13/CP.19. The TA took place from 18 to 22 March 2024 and was coordinated by the secretariat.[2] The TA was conducted by the AT, consisting of two LULUCF experts from the UNFCCC roster of experts:[3] Jonathan Wesley Roberts (South Africa) and Chisa Umemiya (Japan). The Consultative Group of Experts was invited to participate in the TA as an observer,[4] but no representative was available. The TA was coordinated by Jenny Wong (secretariat).

2. In response to the invitation of the COP and in accordance with the provisions of paragraphs 7–15 of and the annex to decision 12/CP.17, Samoa submitted its proposed FREL/FRL on a voluntary basis. The proposed FREL/FRL is one of the elements[5] to be developed in implementing the activities referred to in paragraph 70 of decision 1/CP.16. Pursuant to paragraphs 1–2 of decision 13/CP.19 and paragraphs 7–8 of decision 14/CP.19, the COP decided that each submission of a proposed FREL/FRL, as referred to in paragraph 13 of decision 12/CP.17, shall be subject to a TA in the context of results-based payments.

3. The submission is supported by a supplementary document on forest and land-use change in Samoa in 2000–2022, which enhanced the transparency of the FREL/FRL submission. In addition, Samoa shared an Excel spreadsheet containing data and estimates used for constructing the FREL/FRL with the AT during the TA to enhance the transparency and completeness of the FREL/FRL submission.

4. The objective of the TA is to assess the degree to which the information provided by Samoa is in accordance with the guidelines for submissions of information on reference levels[6] and to offer a facilitative, non-intrusive, technical exchange of information on the construction of the FREL/FRL with a view to supporting the capacity of Samoa to construct and improve its FREL/FRL in the future, as appropriate.[7]

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

6. Following the process set out in those guidelines and procedures, a draft version of this report was communicated to the Government of Samoa. The facilitative exchange during the TA allowed Samoa to provide clarifications and additional information, which were considered by the AT in preparing this report.[9] As a result of the facilitative interactions with the AT during the TA, Samoa provided a modified version of its submission on 12 July 2024, which took into consideration the technical input of the AT. The modifications improved the clarity and transparency of the submitted FREL/FRL without needing to alter the approach used to construct it. This TA report was prepared in the context of the modified FREL/FRL submission.

[1] The submission of Samoa is available at https://redd.unfccc.int/submissions.html?country=wsm.
[2] As per decision 13/CP.19, annex, para. 7.
[3] As per decision 13/CP.19, annex, paras. 7 and 9.
[4] As per decision 13/CP.19, annex, para. 9.
[5] See decision 1/CP.16, para. 71(b).
[6] Decision 12/CP.17, annex.
[7] Decision 13/CP.19, annex, para. 1(a–b).
[8] Decision 13/CP.19, annex.
[9] As per decision 13/CP.19, annex, paras. 1(b), 13 and 14.

B. Proposed forest reference emission level and forest reference level

7. In paragraph 70 of decision 1/CP.16, the COP encouraged developing country Parties to contribute to mitigation actions in the forest sector by undertaking a number of activities, as deemed appropriate by each Party and in accordance with their respective capabilities and national circumstances, in the context of providing adequate and predictable support. The FREL/FRL proposed by Samoa, on a voluntary basis for a TA in the context of results-based payments, covers the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks, which are three of the five activities referred to in paragraph 70 of decision 1/CP.16. The proposed FREL/FRL is national in scope and covers all natural forests in the country. The FREL includes post-deforestation regrowth in cropland and grassland (i.e. removals) and its value represents the net emissions from deforestation. The FRL, on the other hand, includes the creation or improvement of carbon pools and reservoirs, which enhance removals and are part of Samoa's forest management activities. For its submission, Samoa applied a stepwise approach to developing its FREL/FRL in accordance with paragraph 10 of decision 12/CP.17, which enables Parties to improve their FREL or FRL by incorporating better data, improved methodologies and, where appropriate, additional pools.

8. In Samoa's modified submission, the FREL submitted for the activities reducing emissions from deforestation and reducing emissions from forest degradation corresponds to 261,190 t CO_2 eq/year, while the FRL for the activity enhancement of forest carbon stocks corresponds to –76,896 t CO_2 eq/year, based on the reference period 2013–2022.[10] Samoa, which considers itself to be a high-forest, low-deforestation country, applied an upward adjustment to its proposed FREL. For the FREL submitted in the modified submission, Samoa applied a more conservative upward adjustment method (i.e. considering 0.1 per cent of total carbon stocks over a five-year accounting period), corresponding to 278,590 t CO_2 eq/year. The table contained in annex I summarizes the main features of the FREL/FRL presented in the modified submission, with the aim of accessing results-based payments for REDD+ activities, including reference period, territorial coverage, and pools and gases included.

9. For constructing its FREL/FRL, Samoa used the 2006 IPCC Guidelines for classifying its land-use categories and the methodologies contained therein for estimating forest carbon stock changes and the emissions and removals resulting from deforestation, forest degradation and enhancement of forest carbon stocks.

10. The AD used for estimating emissions from deforestation were derived from an assessment of LULUCF using remote sensing imagery, and the assessment was undertaken by the Ministry of Natural Resources and Environment, namely its Forestry Division and its Spatial Information Agency. Forest-cover change during the reference period was estimated by analysing historical satellite imagery (using Landsat 7 and 8 and Sentinel 2) and using a stratified random sample plot data set. The FAO Open Foris Collect Earth tool was used for this assessment. For the AD for estimating forest degradation, Samoa identified areas of forest remaining forest with visible disturbances (e.g. loss through logging, land conversion or natural events). The Party used high-resolution satellite imagery and time-series data on tree-cover loss, as well as automated techniques to measure changes in forest areas. For the activity enhancement of forest carbon stocks, Samoa used high-resolution satellite imagery to assess the non-forest areas converted to forests through afforestation or reforestation activities.

11. Samoa used the default values for above-ground biomass associated with the relevant ecological zones (i.e. tropical wet and tropical rainforest), root-to-shoot ratio and carbon

[10] In its original submission, Samoa proposed a FREL of 296,830 t CO_2 eq/year, including an upward adjustment of 19,415 t CO_2 eq, and a FRL of –73,036 t CO_2 eq/year. The difference between the original and the modified submissions is due mostly to the recalculation of emissions from forest degradation resulting in a decrease of approximately 12 per cent, the recalculation of removals from enhancement of forest carbon stocks resulting in an increase of approximately 5 per cent, the use of different removal factors and the use of a more conservative adjustment formula that allows for only 0.1 per cent of the total carbon stock over the accounting period.

fraction for biomass from the 2006 IPCC Guidelines for developing the EFs applied in constructing its FREL/FRL. Although the Party indicated that it had estimated country-specific EFs using its 2013 NFI and considered regional values, it also noted a significant difference between the estimated country-specific EFs and the IPCC default values, as well as with the values used by Papua New Guinea for a particular forest class. In this context, Samoa decided to use the IPCC default values.

12. Samoa undertook a qualitative and quantitative uncertainty analysis based on the tier 1 error propagation approach described in the 2006 IPCC Guidelines, complemented by methodological guidance from the Global Forest Observations Initiative. In the modified submission, Samoa reported that the combined uncertainty for the emissions and removals reported in its FREL/FRL, estimated at a 95 per cent confidence interval, is 21.99 and 32.80 per cent respectively.

II. Technical assessment of the proposed forest reference emission level and forest reference level

13. The table below describes the findings from the TA of the data, methodologies and procedures used by the developing country Party under assessment in constructing its FREL/FRL within the scope of the TA in accordance with decision 13/CP.19 and its annex.

Findings from the technical assessment of the data, methodologies and procedures used by the developing country Party under assessment in constructing its forest reference emission level and/or forest reference level

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
1	2(a) Consistency with the national GHG inventories	The AT noted that, overall, Samoa did not maintain consistency, in terms of sources of AD and EFs used for its FREL/FRL, with those used for the national GHG inventory included in its NC2 submitted in 2010. During the TA, Samoa acknowledged that the AD and EFs used for its FREL/FRL were not fully consistent with those used for the national GHG inventory included in its NC2. The inconsistency between the two submissions is due to the different sources of data used. For the NC2, the Party used data from SamFRIS 2003, while for the FREL/FRL submission the Party used AD collected in 2023. The EFs used to construct the FREL/FRL were based on IPCC default values. In the modified submission, Samoa indicated that it was in the process of developing its first BUR and that the outcomes of the TA of its FREL/FRL will play a vital role in informing the GHG inventory included in its first BUR. The AT notes that Samoa submitted its first BUR in September 2024. Nevertheless, the AT notes that it was not clear from the first BUR how Samoa maintained consistency between the latest GHG inventory and the FREL/FRL. The AT also notes that, for the GHG inventory, the Party used different terms for forest types (e.g. native forests, plantation forests, secondary forests) to estimate AD, while for the FREL/FRL the Party considered the six vegetation types categorized as forest land (i.e. mangroves, closed forest, medium dense forest, open forest, secondary forest and plantations). For the GHG inventory, the Party also used data from the 2013 NFI, which were not used in constructing the FREL/FRL. Finally, while Samoa applied the IPCC gain–loss method for estimating emissions and removals in the first BUR, it applied the IPCC stock-change approach for its FREL/FRL submission. Samoa explained that improved data used for constructing its FREL/FRL will inform future GHG inventory submissions, thereby improving the GHG inventory submissions while also enhancing consistency. The AT commends Samoa for the improvements made in the FREL/FRL.	The AT notes that maintaining consistency between the FREL and the corresponding estimates in the national GHG inventory submitted together with the biennial transparency report is an area for future technical improvement of the FREL/FRL.
2	2(b) How historical data have been taken into account	Samoa's FREL/FRL is based on a historical average for the reference period 2013–2022. Forest-cover change during this period was estimated by analysing historical satellite imagery (i.e. imagery from Landsat 7 and 8 and Sentinel 2) and using a stratified random sample plot data set. The FAO Open Foris Collect Earth tool was used for this assessment. The Party reported both annual emissions and removals and included an overall adjustment to the FREL value based on the GCF scorecard guidance for REDD+ results-based payments. The AT noted that, in the annual historical data presented in the FREL/FRL submission, data for 2021 were missing, indicating that the estimates may not be	The AT notes that focusing on the sampling protocol used for future forest monitoring activities, and considering improved sample selection and enhanced interpretation guidance for imagery, will assist in conducting the visual assessment of forest-cover change in Samoa. The AT identified these issues as areas for future

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		complete. During the TA, Samoa explained that no land-use change was identified for 2021 and thus no emissions were reported for that year. The AT concludes that using sample-based area estimation could result in missing values for land-use change and notes that Samoa should pay closer attention to the use of this approach in identifying the locations of the areas of potential land-use change, in particular when applying the approach in future assessments of forest-cover change.	technical improvement of the FREL/FRL.
3	2(c) Transparency and accuracy – approaches	The AT noted that Samoa reported AD for 2000–2022 but only used data for 2013–2022 to construct its FREL/FRL. The AT requested further clarification from Samoa regarding the data outside the reference period (i.e. for 2000–2012) and how the data were considered in constructing the FREL/FRL. During the TA, Samoa explained that, when the national team started the LULUCF assessment, the country had not yet decided on the reference period. Samoa acknowledged the trend towards shorter reference periods in many REDD+ submissions but explained that it would prefer to use a 10-year reference period instead. Samoa also indicated that, although it conducted a full analysis of the data for a 22-year period, it did not use the data from outside the selected reference period and only considered the data for 2013–2022 in constructing its FREL/FRL. The AT noted that Samoa omitted a comprehensive uncertainty assessment of both emissions and removals in its original submission. The Party reported sampling error uncertainty estimates for the AD, but did not report uncertainty estimates for emissions or removals, and hence no uncertainty estimates were reported for the final emission and removal estimates. The AT notes that the omission of uncertainty estimates has implications for the accuracy of the FREL/FRL. The AT provided additional guidance to the Party regarding methods used for calculating uncertainty, namely the guidance from the 2006 IPCC Guidelines. In its modified submission, Samoa undertook a full uncertainty assessment of its FREL/FRL following the tier 1 error propagation approach described in the 2006 IPCC Guidelines by propagating the AD and EF uncertainties to the emissions and removals included in the FREL/FRL and reported the combined uncertainty of the emissions and removals used to construct its FREL/FRL. The AT commends Samoa for its efforts to conduct an uncertainty assessment of the parameters used in constructing its FREL/FRL (see also para. 12 above).	The AT notes that the Party reported AD from outside the reference period in its FREL/FRL submission, which may negatively impact the transparency of the FREL/FRL, and that reporting only the data used in constructing the FREL/FRL is an area for future technical improvement of the FREL/FRL.
4	2(c) Transparency and accuracy – emission and removal factors	(a) Data for developing EFs: the AT noted that the data used by Samoa to quantify the EFs might not be accurate as the Party relied on default EFs from the 2006 IPCC Guidelines for estimating emissions from deforestation and forest degradation. Although Samoa conducted an NFI in 2013, data from the NFI were not used for calculating the EFs. The AT notes that using IPCC default values for the	(a) The AT notes that Samoa's NFI can be a valuable source of data, and that the Party should consider reprocessing the raw NFI data to correct past errors in order to produce country-specific EFs. The AT also

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		EFs might not be as accurate as using country-specific data to develop EFs following an IPCC tier 2 or tier 3 approach. During the TA, Samoa explained that the results on forest biomass from the NFI conducted in 2013 were inconsistent with the IPCC default values. For example, the NFI provides an above-ground biomass value of 70.4 t/ha for the category tropical rainforest, while the 2006 IPCC Guidelines provide a value of 300 t/ha (vol. 4, chap. 4, tables 4.12 and 4.4). In addition, the above-ground biomass value for tropical rainforest reported in the NFI is similar to the IPCC default value for grassland. Samoa also compared the biomass values for similar forest types in Papua New Guinea, which were over 223 t/ha, with the 2013 NFI data. Owing to the differences between the estimates from Papua New Guinea for tropical rainforest and the NFI data, Samoa decided to use the IPCC default values for above-ground biomass for all forest classes. Further, owing to the inconsistencies identified in the NFI data, Samoa decided to use the IPCC default removal factors for estimating removals from post-deforestation regrowth and carbon stock enhancement. The AT asked Samoa why it decided not to use the 2019 Refinement to the 2006 IPCC Guidelines in addition to the 2006 IPCC Guidelines for calculating forest biomass values (e.g. the ratio of above- to below-ground biomass). During the TA, Samoa indicated that it will review and take into consideration the updated information on calculating forest biomass values in the 2019 Refinement to the 2006 IPCC Guidelines in addition to the 2006 IPCC Guidelines for forest land in future FREL/FRL submissions. (b) EFs for estimating emissions from forest degradation: the AT noted that the data used by the Party for developing the EFs for estimating emissions from forest degradation were derived from data on previously logged areas in Papua New Guinea and that these may not be applicable to Samoa, where logging is considered a minor driver of forest degradation. During the TA, Samoa agreed to note this as an area for future improvement. (c) Removal factors used for the activity enhancement of forest carbon stocks: in the modified submission, the AT noted that Samoa did not use the proposed removal factor (i.e. 25.85 t CO_2 eq/ha/year) reported in table 6-10 of the submission to estimate removals from forest plantations. Samoa explained that, as data on the actual areas of forest plantations were not available, it used a simple removal factor instead, representing forest carbon stocks minus non-forest carbon stocks. In response to this clarification, the AT noted that this approach could lead to an overestimation of removals, as the removal factor represents the difference between two land-use categories over time and does not represent the annual increment of forest growth. For example, on the basis of this approach, a removal factor of 256.4 t CO_2 eq/ha/year was applied to calculate the carbon stock enhancement when cropland returns to a state of degraded secondary forest. The AT notes that this value	notes that this should be prioritized as an area for future technical improvement of the FREL/FRL. (b) The AT further notes that using appropriate EFs for estimating emissions from forest degradation that take into account the drivers of forest degradation in the country is an area for future technical improvement of the FREL/FRL. (c) The AT notes that using accurate country-specific removal factors for estimating carbon stock enhancement is essential to avoid overestimating removals and should be prioritized as an area for future technical improvement of the FRL.

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		is almost 10 times larger than the proposed original value, which could result in an overestimation of removals. (d) Removal factor used for estimating removals from post-deforestation regrowth: after reviewing Samoa's land-use change matrix, the AT noted that it was unclear where post-deforestation regrowth was included in the matrix. The AT therefore requested additional information on the removal factor used. During the TA, Samoa stated that all previously deforested areas were classified as regrowth. The AT was able to identify how the removals from regrowth were calculated in worksheets shared with the AT. However, in the modified submission, it was unclear how the regrowth and subsequent removals were calculated. In its submission, Samoa stated that the removal factor for post-deforestation regrowth was estimated as 7.28 t CO_2 eq/ha/year, as presented in table 6-12. However, the AT notes that the value of 133.42 t CO_2 eq/ha/year presented in table 6-13 for average above- and below-ground biomass in post-deforestation land use was actually used as the removal factor for carbon stocks for post-deforestation regrowth, which does not represent the mean annual increment of post-deforestation regrowth.	
5	2(c) Transparency, completeness, consistency and accuracy – AD	(a) Application of new tools: during the TA, Samoa indicated that it used very-high-resolution satellite imagery (e.g. from QuickBird and WorldView) as well as airborne optical data provided by the Japan International Cooperation System for estimating AD. The Forestry Division of the Ministry of Natural Resources and Environment previously used MapInfo, part of SamFRIS 2013, which the Ministry considered to be an old tool. The AT asked if the newly introduced tools replaced the older tool, or if the former were used alongside the latter. Samoa clarified that the new tools did not replace the old tool (i.e. MapInfo), which is still used for other work of the Ministry of Natural Resources and Environment, but the new tools allow the Party to conduct consistent land-use assessment and monitoring. (b) Point sampling for AD: Samoa collected the AD through remote sensing point sampling. The Party used the FAO Open Foris Collect Earth tool as the data-collection platform for its LULUCF assessment. The AT noted that, in the original submission, Samoa did not include sufficient information on the distribution of sample points per forest class to indicate the efficacy of the sampling methodology used. In its modified submission, Samoa provided information on the distribution of sample points in the various tables and figures on AD. The AT commends the Party for enhancing the transparency of its submission through the provision of such information on the assessment of AD. (c) Overlapping or unclear definitions of land-use categories: in its submission, Samoa provided information on the thresholds for forest cover for closed forest (greater than 65–70 per cent) and medium dense forest (less than 65–70 per cent).	(a) The AT notes that developing standard operating procedures to support the accurate quantification of land-use change transitions, especially for forest plantations and forest degradation, is an area for future technical improvement of the FREL/FRL. (b) The AT notes that undertaking ground-truthing surveys in support of land-cover change mapping would improve the estimates of AD and considers that this should be prioritized as an area for future technical improvement of the FREL/FRL. (c) The AT notes that validating the estimates of the areas of afforestation and reforestation, including data from tree planting campaigns, is an area for future technical improvement of the FREL/FRL. (d) The AT notes that improving the information reported on tree

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		The AT noted that there appears to be an overlap in the thresholds for these two forest classes. During the TA, Samoa explained that the vegetation cover percentages were based on past assessments conducted under SamFRIS 2003. Samoa revised the definition of the thresholds for these forest classes in its modified submission to greater than 70 per cent for closed forest and less than 70 per cent for medium dense forest. The AT noted that this reclassification of the thresholds improved the accuracy and transparency of the submission. The AT noted that mangroves appeared to be included in both wetlands and forest classes and requested the Party to provide clarification on the apparent duplication, as this has implications on the potential accuracy and consistency of the submission. During the TA, Samoa explained that mangroves meeting the forest definition are classified as forest land. The Party also explained that areas of wetlands with mangrove vegetation that do not meet the forest definition are classified as wetlands. The AT also noted that it may be difficult to differentiate between the two land-use classes forest plantations and cropland comprising plantations, and requested Samoa to provide further clarification on this matter. Samoa explained that interpreting areas with forest plantations was challenging. However, the national team of interpreters used their local expert knowledge to identify these particular areas. The AT further noted that in the modified submission the term plantation is sometimes used without specifying whether it refers to forest plantation or agriculture plantation (e.g. coconut plantations). In addition, the AT noted some unlikely land-use transitions between certain land-use classes reported by the Party and asked Samoa to provide clarification. These land-use transitions include grassland to mangroves, afforestation to secondary forest, afforestation to secondary forest degraded and afforestation to forest plantation degraded. Samoa acknowledged that some of the land-use transitions may be unlikely. The Party undertook a review of the land-use transitions and identified that the transition from grassland to mangroves was an error and corrected it to grassland remaining grassland in the modified submission. Regarding the other transitions noted by the AT, the Party explained the challenge faced in distinguishing between already degraded and newly degraded land use and acknowledged this as an area for future improvement to improve the overall accuracy of the FREL/FRL. (d) Remote sensing and ground truthing: in accordance with paragraph 1(d)(i) of decision 4/CP.15, developing country Parties should use a combination of remote sensing and ground-based forest carbon inventory approaches for estimating forest-related GHG emissions by sources and removals by sinks and forest carbon stocks. The AT therefore requested clarification from the Party as to why ground-based data were not used.	planting campaigns by providing explicit aerial estimates of tree planting activities will enhance the transparency and accuracy of the estimates of removals and should be prioritized as an area for future technical improvement of the FREL/FRL. (e) The AT considers it essential to ensure the correct calculation of areas under afforestation and reforestation to ensure the accuracy of estimates. Collecting geospatial data identifying the locations of tree planting campaigns could significantly improve the process of quantifying the AD associated with removals and is an area for future technical improvement of the FREL/FRL. (f) The AT notes that clarifying whether the term plantation refers to forest plantation or agriculture plantation could improve the clarity and transparency of future submissions. (g) The AT notes that validating the estimates for areas of forest degradation to distinguish already degraded and newly degraded land use should be prioritized as an area for future technical improvement of the FREL/FRL.

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		During the TA, Samoa explained that it conducted some ground-truthing surveys using a drone in order to promote a common understanding of land-use transitions among the interpreters of satellite imagery. However, owing to budgetary and human resource constraints, the surveys were not planned and implemented comprehensively at a statistically valid level. Samoa explained that ground-truthing surveys were conducted to the extent possible, given current national capacities, and that conducting a comprehensive ground-truthing survey has been identified as an area for future improvement of its FREL/FRL. (e) Areas under the activity enhancement of forest carbon stocks: the AT noted that Samoa did not provide an overview of how forest carbon stocks relating to the activity enhancement of forest carbon stocks were estimated. During the TA, Samoa explained that afforestation and reforestation were assessed for non-forest areas converted to forest land using high-resolution satellite imagery (e.g. Google Earth or Bing Maps) and a time series of satellite imagery (i.e. cloud-free Landsat imagery) for the area during the reference period. Samoa noted that its field officers were aware of the areas included in tree planting campaigns and were able to use local expert knowledge to assist with interpreting satellite images of afforestation and reforestation areas. Samoa included this information in the modified submission, which improved the transparency of the FRL. In addition, the AT asked Samoa if it has recorded data on its tree planting campaigns, such as the areas and locations of planted trees, as these data can be used to validate the data on assessed areas of afforestation and reforestation. Samoa responded that there are no such recorded data as the tree planting campaigns are still under way. In the modified submission, Samoa explained that over 2 million trees have been planted by various non-governmental organizations since 2020. However, the AT noted that the areas of afforestation and reforestation for 2020 were estimated as not occurring or not applicable. The AT notes that the reason for not estimating areas of afforestation and reforestation was not clearly explained. (f) Areas of forest degradation: the AT requested additional information on the methodology used to assess forest degradation. During the TA, Samoa indicated that the national team initially attempted to detect signs of disturbance using very-high-resolution imagery, but such imagery was not always available. Hence, for the land-change analysis the team relied primarily on time-series data using medium-resolution satellite imagery, which provided information on the timing and extent of forest degradation for the reference period. Additionally, the team incorporated local knowledge of the areas of forest degradation to enhance its analysis. The team also used existing map information, but for reference only. The assessment was effectively implemented using the online Collect Earth tool and the team made its best efforts to identify areas of forest degradation. The AT noted that the monitoring	

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		system implemented by Samoa would benefit from developing a detailed standard operating procedure that supports the monitoring of long-term forest degradation. (g) Reasons for outliers: in its submission, Samoa explained that deforestation increased rapidly in 2014, when about 2,706.42 ha of forest land was converted to other land uses. The AT requested clarification on what occurred in 2014 to cause the increase in deforestation. In addition, the AT noted that the reported value for the area of forest degradation for 2013 was also atypically high and requested further details regarding the possible reasons for these increases. During the TA, Samoa indicated that deforestation in 2014 was primarily driven by the impact of Tropical Cyclone Heta, which hit Samoa in that year. In the modified submission, Samoa clarified the reasons for the atypical values for areas with very high deforestation or degradation that resulted from the impact of Tropical Cyclone Heta in 2014. The AT notes that this improved the transparency of the submission.	
6	2(c) Subnational FREL/FRL	Pursuant to paragraph 71(b) of decision 1/CP.16, Samoa developed a national FREL and FRL that covers its entire territory.	
7	2(d) Description of relevant policies and plans, as appropriate	The Party reported in its submission that the Samoa Climate Change Policy 2020–2030 and Agriculture and Fisheries Sector Plan are the key relevant national policies and plans. In addition, Samoa is aiming to increase overall forest coverage by 2 per cent and mangroves by 5 per cent, and to expand agroforestry by 5 per cent. In particular, Samoa highlighted the ongoing Three Million Trees campaign and its plan to increase the coverage of protected areas from 15 to 30 per cent as key efforts relevant to REDD+ implementation. Samoa made an upward adjustment to its proposed FREL, as it considers itself to be a high-forest, low-deforestation country. During the TA, Samoa explained that its motivation behind the adjustment is to ensure benefits for the country, as the level of deforestation has been low to date and forest carbon stocks are well conserved. In addition, Samoa is a small island developing State, and because its forest area is not as large as that of other countries, it is aiming to increase the future benefits and incentives for conserving trees and forests by making an upward adjustment of the FREL. The AT noted that, in accordance with the ART–TREES guidelines (version 2), Samoa does not qualify as having high-forest, low-deforestation status. After the TA, Samoa decided to use the GCF scorecard guidance for REDD+ results-based payments to make the adjustment, which it considered to be less prescriptive. The AT also noted that the adjustment to the current FREL value would continue to be applicable if the country maintains its status as a high-forest, low-deforestation country. Moreover, the AT noted that additional information on how national circumstances were considered should be provided to clarify that the country's high-forest, low-deforestation status is being maintained.	The AT notes that providing data and information, such as annual data on forest cover and deforestation rates, the monitoring methodology applied and how national circumstances are taken into consideration to justify the Party's status as a high-forest, low-deforestation country over time, is an area for future technical improvement of the FREL/FRL.

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		In its modified submission, Samoa calculated an upward adjustment of 17,400 t CO_2 eq following the GCF scorecard guidance for REDD+ results-based payments, which was calculated as 0.1 per cent of the total forest carbon stocks in 2022 divided by the number of years included in the crediting period (five years) that it intends to adopt in the future. Samoa also explained in its modified submission that it will continue to promote policies on sustainable management of forests, thereby maintaining its status as a high-forest, low-deforestation country.	
8	2(f) Pools	The deadwood, litter and soil organic carbon pools were not included. According to paragraph (c) of the annex to decision 12/CP.17, reasons for omitting a pool in constructing the FREL/FRL should be provided, noting that significant pools should not be excluded. With regard to emissions from deadwood, litter and soil organic carbon, the AT requested clarification on the reasons for omitting the pools. In response, Samoa explained that data from its 2013 NFI could potentially have been used for estimating emissions from these pools but it lacked confidence in the accuracy or validity of the relevant NFI data for these pools. However, as Samoa decided not to use the NFI data for estimating carbon stocks and emissions from above-ground biomass, it also decided not to use the NFI data for the other pools in order to maintain consistency in the estimates across all pools. In addition, with regard to emissions from soil organic carbon, Samoa clarified that the NFI data for soil organic carbon are four to five times higher than those for above- and below-ground biomass, indicating a potential overestimation of carbon stocks and the unreliability of the data. The Party noted that this requires further investigation. In the modified submission, Samoa provided qualitative information on why these pools were not included in constructing its FREL/FRL. However, the AT considers that the submission does not provide sufficient assessment of the significance of excluded pools and notes that Samoa could consider using the NFI data or the tier 1 approach (default EFs) from the 2006 IPCC Guidelines for estimating emissions from all the excluded carbon pools. Using the IPCC tier 1 approach and default EFs, Samoa could also assess the significance of these carbon pools in terms of emissions. If the emissions are found to be significant, Samoa could use this information as a basis for improving future estimates and could develop country-specific EFs to enhance the accuracy of future FRELs/FRLs.	The AT considers the treatment of emissions from deadwood, litter and soil organic carbon (i.e. including the pool or providing more information justifying its omission based on its significance) to be an area for future technical improvement of the FREL/FRL.
9	2(f) Gases	CO_2 is the only GHG included in the FREL/FRL. Non-CO_2 gases were excluded owing to a lack of data. The Party considers non-CO_2 gases as insignificant because large-scale forest fires are not common in Samoa. No data on the distribution of organic soils and their drainage were provided in the submission. However, Samoa acknowledged that it has no quantitative data or information available to validate the insignificance of non-CO_2 gases and included this explanation in the modified	The AT considers the treatment of non-CO_2 gases by providing quantitative information that justifies the omission of these non-CO_2 gases to be an area for future technical improvement of the FREL/FRL.

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		submission. The AT notes that the 2006 IPCC Guidelines provide methods and default EFs for estimating these non-CO_2 emissions, which could be a useful reference for Samoa.	
10	2(f) Activities	Samoa did not include the activities sustainable management of forests and conservation of forest carbon stocks in its submission. Pursuant to paragraph (c) of the annex to decision 12/CP.17, reasons for omitting an activity in constructing the FREL/FRL should be provided, noting that significant activities should not be excluded. Samoa explained that its FREL/FRL primarily focuses on activities where area changes occur. It considered that the activities sustainable management of forests and conservation of forest carbon stocks affect existing forest carbon stocks, but do not result in a change of land area. During the TA, Samoa clarified that there are no data available for it to differentiate between activities that result in a change of area and activities that affect existing forest carbon stocks. Hence, the FREL/FRL focuses on the three other activities included in paragraph 70 of decision 1/CP.16. Samoa provided this information in the modified submission, which improved the clarity and transparency of the submission. During the TA, Samoa provided the following additional definitions for the REDD+ activities included in the submission: (1) reducing emissions from deforestation: the conversion of forest to another land use or the long-term reduction of the tree canopy cover below the minimum 10 per cent threshold; (2) reducing emissions from forest degradation: the long-term reduction of the overall potential supply of forest-related benefits, including carbon, wood, biodiversity and other goods and services, while maintaining a tree canopy cover above 10 per cent; and (3) enhancement of forest carbon stocks: the creation or improvement of carbon pools and reservoirs and their ability to sequester and capacity to store carbon. In addition, Samoa noted that forest management activities such as restoring existing but degraded forests and increasing forest cover through environmentally appropriate afforestation and reforestation are a key component of the national REDD+ strategy. On the basis of the information provided by the Party, the AT acknowledges that Samoa included in its FREL/FRL the most significant activities, namely reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks, 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 other activities could also be significant, in particular conservation of forest carbon stocks, as Samoa adjusted its FREL. The AT acknowledges the Party's intention to incorporate these activities in future FREL/FRL submissions when new and adequate data and better information become available as part of the stepwise approach and commends Samoa for these efforts. The AT concludes that the modified submission includes adequate definitions of the included REDD+ activities, which further enhance the clarity of the submission. The	The AT considers the treatment of emissions and removals from sustainable management of forests and conservation of forest carbon stocks to be an area for future technical improvement of the FREL/FRL.

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		AT commends Samoa for enhancing the transparency and clarity of its FREL/FRL submission.	
11	2(g) Definition of forest	Samoa provided in its submission the definition of forest used in constructing its FREL/FRL. The definition states that forest land has a minimum area of 1 ha, a tree height of 5 m or more and at least 10 per cent canopy cover. Samoa's forest definition includes human-made plantation forests, mangrove forests and other natural forests with varying canopy densities.	The AT notes that maintaining consistency in the definition of forest between the FREL/FRL and its GHG inventory is an area for future technical improvement of the FREL/FRL.
		During the TA and in its modified submission, Samoa clarified that the definition is the same as that used for its reporting to FAO for the Global Forest Resources Assessment (2010).	In accordance with paragraph 2(g) of the annex to decision 13/CP.19, if the forest definition differs from the one used in the national GHG inventory or from the one reported to other international organizations, Samoa may wish to consider providing clearer descriptions of the forest definitions applied and how the definitions were chosen in future FREL/FRL submissions, as well as in its biennial transparency reports or NCs to enhance the transparency and consistency of the definitions applied.
		During the TA, Samoa also clarified that the definition is the same as that used for its national GHG inventory reported in its first BUR. Nevertheless, the AT was unable to verify the forest definition used for the Party's latest GHG inventory reported in its first BUR. In addition, the AT noted that the Party used different terms for forest types in the GHG inventory (see table 3.10 of the GHG inventory reported in the first BUR). Samoa also stated that it used data from the 2013 NFI for preparing its national GHG inventory, but did not use these data in constructing the FREL/FRL. Hence, the AT was unable to assess whether the forest definition used in constructing the FREL/FRL is different from or consistent with the definition used for the national GHG inventory. The AT notes that, according to paragraph 2(g) of the annex to decision 13/CP.19, if the definitions for both submissions are different, the Party should state why and clarify how the definition used was chosen.	
12	2(h) Inclusion of future changes to policies	Samoa did not include assumptions about future changes to domestic policies in constructing its FREL and/or FRL.	
13	2(i) Consistency of the FREL/FRL with the provided information	During the TA, Samoa provided the AT with an updated calculation sheet containing the data used in constructing its FREL/FRL and included additional information on its selected REDD+ activities in its modified submission. The AT acknowledges the corrections made by Samoa in response to errors in the reporting of areas of forest degradation, ensuring consistency between the calculation sheet and its modified submission. However, the AT notes that the submission would benefit from further clarifications regarding the use of existing information and data pertaining to enhancement of forest carbon stocks, which would improve the traceability of estimation procedures and address the inconsistencies noted.	The AT notes that organizing the information and data used in constructing the FREL/FRL and maintaining these as part of Samoa's institutional memory could enhance the transparency and consistency of the reporting and is an area for future technical improvement of the FREL/FRL.
		While reviewing the calculation sheets, the AT noted some inconsistencies in terminology between the modified submission and the supporting documents, which occasionally limited its ability to fully trace how Samoa calculated its FREL/FRL.	The AT notes that strengthening the quality assurance/quality control system would help to avoid the calculation errors identified during the TA, such as the application of different factors to estimate removals in the
		For example, a removal factor for post-deforestation regrowth (7.28 t CO_2 eq/ha/year) was provided in table 6-12, but was not used in calculating post-	

Finding ID#	*Aspect of the scope of the TA (decision 13/CP.19, annex, para. 2)*	*Description of the issue, additional information shared by the Party during the TA, and TA by the AT*	*Area for future technical improvement*
		deforestation regrowth. In addition, the terms primary afforestation and secondary afforestation were used in the calculation sheet but were not mentioned in the modified submission. The Party also kept the reference to the ART–TREES guidance in the calculation sheet, despite having decided not to use this guidance for the adjustment of its FREL in the modified submission. The AT notes that this inconsistency could potentially lead to errors and affect the accuracy of the FREL/FRL.	calculation sheets and in the submission, and that this should be prioritized as an area for future technical improvement of the FREL/FRL. The AT notes that quantifying the removals associated with plantations for the activity enhancement of forest carbon stocks is an area for future technical improvement of the FRL.

III. Conclusions

14. The FREL and FRL presented in the modified submission, based on the reference period 2013–2022, correspond to 278,590 t CO_2 eq/year (including an upward adjustment) and –76,896 t CO_2 eq/year respectively.

15. The AT acknowledges that Samoa included in its FREL/FRL the most significant activities, the most important forest types and the most significant pools in terms of emissions from forests. The AT considers that, in doing so, Samoa followed paragraph 70 of decision 1/CP.16, on activities undertaken, and paragraph 10 of decision 12/CP.17, on applying the stepwise approach. The AT commends Samoa for providing information on its ongoing work to improve its estimates that enhance the transparency, accuracy and completeness of its future FRELs/FRLs and to develop FRLs for other activities.

16. As a result of the facilitative interactions with the AT during the TA, Samoa provided a modified submission that took into consideration the technical input of the AT. The AT notes that the transparency and completeness of the information provided were significantly improved in the modified FREL/FRL submission, without having to alter the approach or values used in constructing the FREL/FRL, and commends Samoa on its efforts. The new information provided in the modified submission increased the reproducibility of the FREL/FRL calculations.

17. Pursuant to paragraph 3 of the annex to decision 13/CP.19, the AT identified areas for future technical improvement (see the table above).

18. The information used by Samoa in constructing its FREL/FRL for the activities reducing emissions from deforestation, reducing emissions from forest degradation and enhancement of forest carbon stocks is mostly transparent, mostly complete and mostly in accordance with the guidelines for submissions of information on reference levels.

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

(a) Improve the estimation of areas of forest degradation by addressing the challenges related to the current remote sensing approach;

(b) Improve its capability to distinguish between already degraded and newly degraded forest with a view to increasing the overall accuracy of the estimates of land-use transitions;

(c) Develop country-specific EFs for forest degradation by distinguishing between the different drivers of forest degradation;

(d) Include other carbon pools such as deadwood, litter and soil organic carbon;

(e) Improve the estimation of post-deforestation regrowth, for example by estimating the rates of biomass increment in crops and grasses that cover land after deforestation;

(f) Improve the accuracy of data on removals from tree planting campaigns;

(g) Broaden the scope of the activities covered to include sustainable management of forests and conservation of forest carbon stocks in future FRELs/FRLs.

20. In conclusion, the AT commends Samoa for showing strong commitment to continuously improving its FREL/FRL estimates in line with the stepwise approach. A number of areas for the future technical improvement of Samoa's FREL/FRL have been identified in this report. At the same time, the AT acknowledges that such improvements are subject to national capabilities and policies, and notes the importance of providing adequate and predictable support.[11] The AT also acknowledges that the TA was an opportunity for a rich, open, facilitative and constructive technical exchange of information with Samoa.

[11] As per decisions 13/CP.19, annex, para. 1(b); and 12/CP.17, para. 10.

Annex I

Summary of the main features of the proposed forest reference emission level and forest reference level based on information provided by Samoa

Main features of the FREL/FRL		*Remarks*
Proposed FREL and FRL	FREL: 261 190 t CO_2 eq/year (before adjustment) FRL: –76 896 t CO_2 eq/year	The FREL includes post-deforestation regrowth in cropland and grassland after deforestation (i.e. removals) and its value represents the net emissions from deforestation. The FRL includes the creation or improvement of carbon pools and reservoirs, which enhance removals. See also paras. 7–8 and finding ID# 2 in the table in this document
Type and reference period of FREL/FRL	FREL/FRL = average of historical emissions and removals in 2013–2022	The proposed FREL/FRL is national in scope and covers all natural forests in the country. See also para. 7 in this document
Application of adjustment for national circumstances	Yes	An adjustment was applied to the FREL, resulting in a value of 278 590 t CO_2 eq/year. See also para. 8 and finding ID# 7 in the table in this document
National/subnational	National	See also para. 7 and finding ID# 6 in the table in this document
Activities included	Reducing emissions from deforestation Reducing emissions from forest degradation Enhancement of forest carbon stocks	The activities sustainable management of forests and conservation of forest carbon stocks were not included. The Party explained that its FREL and FRL primarily focus on activities where area changes occur. See also finding ID# 10 in the table in this document
Pools included	Above-ground biomass Below-ground biomass	Deadwood, litter and soil organic carbon were excluded. See also finding ID# 8 in the table in this document
Gas included	CO_2	Non-CO_2 gases were excluded owing to a lack of data and because the Party considers them as insignificant. See also finding ID# 9 in the table in this document
Forest definition	Included	Forest land is defined as having a minimum area of 1 ha, with a tree height of 5 m or more and at least 10 per cent canopy cover. It includes human-made plantation forests, mangrove forests and other natural forests with varying canopy densities. See also finding ID# 11 in the table in this document
Consistency with latest national GHG inventory	Methods used for estimating the FREL/FRL are not consistent with those used for the latest national GHG inventory (2010)	Overall, Samoa did not maintain consistency, in terms of sources of AD and EFs used for its FREL/FRL, with those used for the national GHG inventory included in its NC2 (2010).

Main features of the FREL/FRL		*Remarks*
		See also finding ID# 1 in the table in this document
Description of relevant policies and plans	Included	Samoa made an upward adjustment to its proposed FREL, as it considers itself to be a high-forest, low-deforestation country. It also explained that it will continue to promote policies on sustainable management of forests, thereby maintaining its status as a high-forest, low-deforestation country. See also finding ID# 7 in the table in this document
Description of assumptions on future changes to domestic policy, if included in constructing the FREL/FRL	Not included	See also finding ID# 12 in the table in this document
Description of changes to previous FREL/FRL	Not applicable	First FREL/FRL submission
Identification of future technical improvements	Included	Several areas for future technical improvement have been identified (see the table in this document)

Annex II

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.

IPCC. 2019. *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.* E Calvo Buendia, K Tanabe, A Kranjc, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html.

B. UNFCCC documents

Original and modified FREL/FRL submissions of Samoa. Available at https://redd.unfccc.int/submissions.html?country=WSM.

First BUR of Samoa. Available at https://unfccc.int/BURs.

"Guidelines and procedures for the technical assessment of submissions from Parties on proposed forest reference emission levels and/or forest reference levels". Decision 13/CP.19, annex. 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". Decision 12/CP.17, annex. Available at https://unfccc.int/sites/default/files/resource/docs/2011/cop17/eng/09a02.pdf#page=19.

NC1 and NC2 of Samoa. Available at https://unfccc.int/non-annex-I-NCs.

C. Other documents

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

Food and Agriculture Organization of the United Nations. 2010. Global Forest Resources Assessment Country Report - Samoa. Rome: Food and Agriculture Organization of the United Nations. Available at https://library.sprep.org/sites/default/files/202_1.pdf.