



United Nations

FCCC/SBI/ICA/2022/TASR.1/RWA*



Framework Convention on
Climate Change

Distr.: General
21 March 2023

English only

Technical analysis of the first biennial update report of Rwanda submitted on 29 December 2021

Summary report by the team of technical experts

Summary

According to decision 2/CP.17, paragraph 41(a), Parties not included in Annex I to the Convention, consistently with their capabilities and the level of support provided for reporting, were to submit their first biennial update report by December 2014. As mandated, the least developed country Parties and small island developing States may submit biennial update reports at their discretion. This summary report presents the results of the technical analysis of the first biennial update report of Rwanda, conducted by a team of technical experts in accordance with the modalities and procedures contained in the annex to decision 20/CP.19.

* Reissued for technical reasons on 25 July 2023.



Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AD	activity data
AFOLU	agriculture, forestry and other land use
AR	Assessment Report of the Intergovernmental Panel on Climate Change
BUR	biennial update report
CGE	Consultative Group of Experts
CH ₄	methane
CO	carbon monoxide
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
EF	emission factor
ETF	enhanced transparency framework under the Paris Agreement
GEF	Global Environment Facility
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
HWP	harvested wood products
ICA	international consultation and analysis
IPCC	Intergovernmental Panel on Climate Change
IPCC good practice guidance	<i>Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories</i>
IPCC good practice guidance for LULUCF	<i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i>
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
MRV	measurement, reporting and verification
N ₂ O	nitrous oxide
NA	not applicable
NC	national communication
NDC	nationally determined contribution
NE	not estimated
NIR	national inventory report
NMVO	non-methane volatile organic compound
NO	not occurring
non-Annex I Party	Party not included in Annex I to the Convention
NO _x	nitrogen oxides
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
Revised 1996 IPCC Guidelines	<i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i>
SF ₆	sulfur hexafluoride
TTE	team of technical experts
UNFCCC guidelines for the preparation of NCs from non-Annex I Parties	“Guidelines for the preparation of national communications from Parties not included in Annex I to the Convention”
UNFCCC reporting guidelines on BURs	“UNFCCC biennial update reporting guidelines for Parties not included in Annex I to the Convention”

I. Introduction and process overview

A. Introduction

1. The process of ICA consists of two steps: a technical analysis of the submitted BUR and a facilitative sharing of views under the Subsidiary Body for Implementation, resulting in a summary report and a record, respectively.
2. According to decision 2/CP.17, paragraph 41(a), non-Annex I Parties, consistently with their capabilities and the level of support provided for reporting, were to submit their first BUR by December 2014. The least developed countries and small island developing States may submit at their discretion.
3. Further, according to paragraph 58(a) of the same decision, the first round of ICA is to commence for non-Annex I Parties within six months of the submission of the Parties' first BUR. The frequency of developing country Parties' participation in subsequent rounds of ICA, depending on their respective capabilities and national circumstances, and the special flexibility for small island developing States and the least developed country Parties, will be determined by the frequency of the submission of BURs.
4. This summary report presents the results of the technical analysis of the first BUR of Rwanda, undertaken by a TTE in accordance with the provisions on the composition, modalities and procedures of the TTE under ICA contained in the annex to decision 20/CP.19.

B. Process overview

5. In accordance with the mandate referred to in paragraph 2 above, Rwanda submitted its first BUR on 29 December 2021 as a stand-alone update report. In its BUR, the Party clarified that, as a least developed country Party, it submitted its first BUR at its discretion.
6. The technical analysis of Rwanda's BUR was conducted from 29 August to 2 September 2022 in Libreville 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: Rehab Ahmed Hassan (former member of the CGE from the Sudan), Juliana Bempah (Ghana), Ménouèr Boughedaoui (former member of the CGE from Algeria), Akram Hamza (Tunisia), Gervais Ludovic Itsoua Madzous (member of the CGE from the Congo), Mwangi James Kinyanjui (Kenya), Traute Koether (Austria), Rocio Lichte (former member of the CGE from Germany), Giorgi Machavariani (Georgia), Philippe Missi Missi (Cameroon), Sandra Boitumelo Motshwanedi (former member of the CGE from South Africa), Sekai Ngarize (Zimbabwe) and Alexander Valencia (Colombia). Rocio Lichte and Sekai Ngarize were the co-leads. The technical analysis was coordinated by Gopal Joshi and Pedro Torres (secretariat).
7. During the technical analysis, in addition to the written exchange, in the virtual team room, to provide technical clarifications on the information reported in the BUR, the TTE and Rwanda engaged in consultation¹ on the identification of capacity-building needs for the preparation of BURs and participation in the ICA process. Following the technical analysis of Rwanda's first BUR, the TTE prepared and shared a draft summary report with Rwanda on 7 December 2022 for its review and comment. Rwanda, in turn, provided its feedback on the draft summary report on 2 March 2023.
8. The TTE responded to and incorporated Rwanda's comments referred to in paragraph 7 above and finalized the summary report in consultation with the Party on 16 March 2023.

¹ The consultation was conducted via videoconferencing.

II. Technical analysis of the biennial update report

A. Scope of the technical analysis

9. The scope of the technical analysis is outlined in decision 20/CP.19, annex, paragraph 15, according to which the technical analysis aims to, without engaging in a discussion on the appropriateness of the actions, increase the transparency of mitigation actions and their effects and shall entail the following:

(a) The identification of the extent to which the elements of information listed in paragraph 3(a) of the ICA modalities and guidelines (decision 2/CP.17, annex IV) have been included in the BUR of the Party concerned (see chap. II.B below);

(b) A technical analysis of the information reported in the BUR, specified in the UNFCCC reporting guidelines on BURs (decision 2/CP.17, annex III), and any additional technical information provided by the Party concerned (see chap. II.C below);

(c) The identification, in consultation with the Party concerned, of capacity-building needs related to the facilitation of reporting in accordance with the UNFCCC reporting guidelines on BURs and to participation in ICA in accordance with the ICA modalities and guidelines, taking into account Article 4, paragraph 3, of the Convention (see chap. II.D below).

10. The remainder of this chapter presents the results of each of the three parts of the technical analysis of Rwanda's BUR outlined in paragraph 9 above.

B. Extent of the information reported

11. The elements of information referred to in paragraph 9(a) above include the national GHG inventory report; information on mitigation actions, including a description of such actions, an analysis of their impacts and the associated methodologies and assumptions, and information on progress in their implementation; information on domestic MRV; and information on support needed and received.

12. According to decision 20/CP.19, annex, paragraph 15(a), in undertaking the technical analysis of the submitted BUR, the TTE is to identify the extent to which the elements of information listed in paragraph 11 above have been included in the BUR of the Party concerned. The TTE considers that the reported information is mostly consistent with the UNFCCC reporting guidelines on BURs. Specific details on the extent of the information reported for each of the required elements are provided in the tables included in annex I.

C. Technical analysis of the information reported

13. The technical analysis referred to in paragraph 9(b) above aims to increase the transparency of information reported by the Parties on mitigation actions and their effects, without engaging in a discussion on the appropriateness of those actions. Accordingly, the focus of the technical analysis was on the transparency of the information reported in the BUR.

14. For information reported on national GHG inventories, the technical analysis also focused on the consistency of the methods used for preparing those inventories with the appropriate methods developed by the IPCC and referred to in the UNFCCC reporting guidelines on BURs. Rwanda submitted an NIR as a stand-alone document and, further to consultations with the TTE, requested a more detailed analysis and documentation of the findings contained in the NIR to be undertaken using the agreed GHG inventory tool.

15. The results of the technical analysis are presented in the remainder of this chapter.

1. Information on national circumstances and institutional arrangements relevant to the preparation of national communications on a continuous basis

16. As per the scope defined in paragraph 2 of the UNFCCC reporting guidelines on BURs, the BUR should provide an update to the information contained in the most recently submitted NC, including information on national circumstances and institutional arrangements relevant to the preparation of NCs on a continuous basis. In their NCs, non-Annex I Parties report on their national circumstances following the reporting guidance contained in decision 17/CP.8, annex, paragraphs 3–5, and they could report similar information in their BUR, which is an update of their most recently submitted NC.

17. Rwanda reported in its first BUR information on its national circumstances, including a description of national and regional development priorities, objectives and circumstances, including features of geography, climate and economy that might affect the Party's ability to deal with mitigating and adapting to climate change, as well as information regarding national circumstances and constraints on the specific needs and concerns arising from the adverse effects of climate change and/or the impact of the implementation of response measures, as referred to in Article 4, paragraph 8, and, as appropriate, Article 4, paragraphs 9–10, of the Convention.

18. In addition, Rwanda provided a summary of relevant information regarding its national circumstances in tabular and graphical format.

19. Rwanda transparently reported in its first BUR information on its existing institutional arrangements relevant to the preparation of its NCs and BURs on a continuous basis. The description covers key aspects of the institutional arrangements, including the legal status and roles and responsibilities of the overall coordinating entity and the involvement and roles of other institutions and experts providing information and data and participating in the validation process of the reports. The Ministry of Environment is the key institution responsible for formulating policies, strategies and programmes related to the environment and climate change. The Rwanda Environment Management Authority, under the Ministry of Environment, has the legal mandate to supervise and monitor environmental management in Rwanda and to ensure that issues relating to the environment are included in national development plans. It is also responsible for the preparation of NCs and BURs.

20. Rwanda reported in its first BUR information on its existing and planned domestic MRV arrangements. Under the existing domestic MRV arrangements, the Rwanda Environment Management Authority chairs the environment and climate change thematic subsector working groups. It plays a key technical role in the preparation of the international reports (e.g., national GHG inventory reports, NCs, BURs, NDCs) and evaluation of the progress indicators. Various governmental and non-governmental institutions contribute by providing key information and data used in the preparation of NCs and BURs and by validating draft and final thematic reports.

21. Rwanda reported in its BUR (section 1.4.2) information on its current initiatives for enhancing the capacity of institutions for compliance with requirements under the ETF. Rwanda is planning to build a robust NDC MRV system to track progress towards the targets defined in the NDC and report on them transparently in the biennial transparency report. The NDC MRV system is being designed at the national level and covers five main areas: NDC finance, the GHG inventory, capacity-building and technology, mitigation and adaptation. The Ministry of Environment, through the Rwanda Environment Management Authority, will provide oversight of and implement the NDC MRV system. The Rwanda Environment Management Authority will chair and coordinate a climate change and environment thematic working group and an NDC MRV technical committee. The Ministry of Finance and Economic Planning will oversee the data collection, calculation of and reporting on indicators relating to finance, while the National Institute of Statistics of Rwanda will oversee the data collection, calculation of and reporting on indicators relating to GHG inventories, capacity-building, mitigation, adaptation and technology. Relevant ministries and other institutions will contribute to developing indicators and collecting data. The system will build on the existing systems, processes and infrastructure, rendering it cost-effective.

22. Under the project to strengthen the capacity of institutions in Rwanda to fulfil the transparency requirements of the Paris Agreement, funded by the GEF, the Party aims to (1)

strengthen the national GHG inventory system, (2) build the capacity of key stakeholders to collect, process and feed data into the GHG inventory system and validate prepared reports and (3) develop a data-integration platform for data-sharing, policymaking and decision-making. The existing institutional arrangement under which the Rwanda Environment Management Authority coordinates the GHG inventory will be strengthened by enhancing collaboration with other ministries, agencies and departments at the national and district level. The TTE commends the Party for the clear and comprehensive reporting on its proactive approach to preparing for ETF implementation.

2. National greenhouse gas emissions by sources and removals by sinks

23. As indicated in table I.1, Rwanda reported information on its GHG inventory in its BUR mostly in accordance with paragraphs 3–10 of the UNFCCC reporting guidelines on BURs and paragraphs 8–24 of the UNFCCC guidelines for the preparation of NCs from non-Annex I Parties, contained in the annex to decision 17/CP.8.

24. Rwanda submitted its first BUR in 2021 and the GHG inventory reported is for 2006–2018. The GHG inventory is consistent with the requirements for the reporting time frame.

25. Rwanda submitted an NIR as a stand-alone document following the submission of its first BUR. The relevant sections of the NIR were referenced in the BUR and the document was made publicly available on the UNFCCC website.²

26. GHG emissions and removals for the BUR covering the 2006–2018 inventories were estimated using tier 1 and tier 2 methodologies from the 2006 IPCC Guidelines. The TTE commends Rwanda for using the 2006 IPCC Guidelines. During the technical analysis, the Party clarified that it faced challenges in developing and applying higher-tier methodologies (tier 2 or tier 3) for key categories across all sectors.

27. Information on AD and EFs used and their sources was reported in the BUR, including the process for collecting and cross-checking data, filling data gaps and the list of institutions engaged in data collection and validation. AD used in developing the GHG inventory were mainly obtained from the various sectoral reports, the official national statistical yearbooks from the National Institute of Statistics of Rwanda, research published within Rwanda and in international journals, annual and technical reports from various research institutions and recent surveys conducted by the Rwanda Environment Management Authority. These data were further cross-checked by relevant institutions working in the respective sectors. Rwanda used the default EFs provided in the 2006 IPCC Guidelines. During the technical analysis, the Party stressed that it faced significant challenges in collecting data, addressing the gaps and cross-checking with national and international data sets.

28. Information on the Party's total GHG emissions by gas for 2006–2018, as calculated by the TTE on the basis of the information reported in the BUR, is outlined in table 1 in Gg CO₂ eq. The TTE noted that the total national emissions for all gases excluding land and HWP are 7,722.47 Gg CO₂ eq for 2018. However, the TTE also noted that the Party reported 6,755.68 Gg CO₂ eq for the total national emissions for all gases excluding land and HWP, for 2018 in the BUR. During the technical analysis, the Party revised the total calculation as noted by the TTE, which reflects an increase of 91.4 per cent without land and HWP since 2006 (4,034.54 Gg CO₂ eq).

Table 1
Greenhouse gas emissions by gas of Rwanda for 2006–2018

<i>Gas</i>	<i>GHG emissions (Gg CO₂ eq) including land and HWP^a</i>	<i>% change 2006–2018</i>	<i>GHG emissions (Gg CO₂ eq) excluding land and HWP^a</i>	<i>% change 2006–2018</i>
CO ₂	–3 209.21	29.1	1 883.50	232.7
CH ₄	4 727.26	50.4	4 727.26	50.4
N ₂ O	1 102.49	238.2	1 102.14	238.1
HFCs	9.57	2 292.5	9.57	2 292.5
PFCs	NE	NA	NE	NA

² <https://unfccc.int/documents/576196>.

<i>Gas</i>	<i>GHG emissions (Gg CO₂ eq) including land and HWP^a</i>	<i>% change 2006–2018</i>	<i>GHG emissions (Gg CO₂ eq) excluding land and HWP^a</i>	<i>% change 2006–2018</i>
SF ₆	NE	NA	NE	NA
Other	NA	NA	NA	NA
Total	2 630.11	167.9	7 722.47	91.4

^a 2006 IPCC Guidelines AFOLU category 3.B (land) and, if reported, 3.D (HWP (3.D.1) and other emissions (3.D.2)).

29. Information on other emissions was reported for NO_x (2.61 Gg) and CO (43.55 Gg) in the AFOLU sector for 2018. These precursors were identified as emissions from prescribed fires in the forests of Akagera National Park reported since 2013 and were therefore assigned to category 3.C.1 (biomass burning).

30. Information on other emissions for NMVOCs, NO_x and CO was not reported. During the technical analysis, Rwanda clarified that, at the time of preparing its BUR, it lacked the capacity and human resources to apply the tier methodologies and collect the data to estimate other emissions.

31. Rwanda reported HFC emissions as 9.57 Gg CO₂ eq for 2018 but PFC and SF₆ emissions as “NO” and “NA”, respectively, in its BUR. The Party provided relevant clarification in its BUR (table 2.8) and in the NIR (chap. 4.6.10) that PFC and SF₆ emissions were not estimated owing to a lack of data and resources.

32. Information on HFC, PFC and SF₆ emissions was not clearly reported in Rwanda’s BUR. HFCs were not reported in disaggregated form by chemical expressed in units of mass. In addition, information was not provided on the assumed lifetime of the equipment, the EFs for installed equipment or the percentage of equipment destroyed at end of life. PFCs were not included in summary table 2.3 in the NIR or table 2.4 in the BUR but an explanation was provided in narrative format. The Party reported that the Rwanda Environment Management Authority collected data to estimate emissions from PFCs but the data were not used owing to a lack of verification procedures. The Party reported emissions from PFCs as “NO” instead of “NE”. It also reported emissions from category 2.G.2 (SF₆ and PFCs from other product uses) as “NO” for 2006 and 2015–2018 in its NIR (table 2.1), even in instances where some of the AD were available. During the technical analysis, Rwanda explained that it encountered difficulties in establishing a robust assessment of HFC, PFC and SF₆ emissions. The Party further clarified that its use of notation keys will be improved for future reporting when the QA/QC system has been fully developed.

33. Rwanda applied notation keys in tables where numerical data were not provided. The use of notation keys was mostly consistent with the UNFCCC guidelines for the preparation of NCs from non-Annex I Parties and the UNFCCC reporting guidelines on BURs. The TTE observed that emissions for some categories were not estimated and instead were reported using notation keys. However, the appropriate notation key was not used, as referred to in paragraphs 32 above and 39 and 41 below.

34. Rwanda reported partly comparable information addressing the tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF and the sectoral report tables annexed to the Revised 1996 IPCC Guidelines. The Party reported comparable information addressing only table 7A (Summary report for national greenhouse gas inventories) annexed to the Revised 1996 IPCC Guidelines. The Party reported in its NIR (tables 5.23–5.28) information on the land-use change matrices showing areas of transition from one land-use class to another over the reporting period and the carbon stock characteristics of forest land subcategories. During the technical analysis, Rwanda clarified that this information was interpolated from the two land-use maps that were available for 2009 and 2019, complemented with data collected on forest areas at district level. The Party also clarified that there is inconsistency in the land-use classes used by various institutions in the country. Further, no central institution is responsible for merging all geographic information system data to harmonize the monitoring of land-use information, which would facilitate the consistent estimation of emissions from land-use changes.

35. Information was not reported for annual changes in carbon stocks for living biomass, dead organic matter and soils for various land-use change categories and the sectoral reporting tables 1–6 annexed to the Revised 1996 IPCC Guidelines. During the technical analysis, the Party clarified that it faced challenges in terms of lack of data and resources to compile and report the required information for the LULUCF sector.

36. The shares of emissions that different sectors contributed to the Party’s total GHG emissions excluding land and HWP (category 3.B and, if reported, 3.D), as calculated by the TTE using information from the BUR, in 2018 are reflected in table 2.

Table 2

Shares of greenhouse gas emissions by sector of Rwanda for 2006–2018

<i>Sector</i>	<i>GHG emissions (Gg CO₂ eq)</i>	<i>% share^a</i>	<i>% change 2006–2018</i>
Energy	2 354.84	30.5	159.0
IPPU	151.41	2.0	276.1
AFOLU	–793.29	NA	51.7
Livestock (category 3.A)	3 332.27	43.2	31.7
Land (category 3.B)	–5 092.36	NA	38.1
Aggregate sources and non-CO ₂ emissions sources on land (category 3.C)	966.80	12.5	52.1
HWP and other emissions (category 3.D)	NE	NA	NA
Waste	917.15	11.8	65.2

^a Share of total without 2006 IPCC Guidelines AFOLU category 3.B (land) and, if reported, 3.D (HWP (3.D.1) and other emissions (3.D.2)).

37. Rwanda reported information on its use of GWP values consistent with those provided by the IPCC in its AR2 based on the effects over a 100-year time-horizon of GHGs.

38. For the energy sector, information was reported on GHG emissions, methodological tier levels, AD and their sources, EFs, key categories, notation keys used, source-specific planned improvements and recommendations, and other information specific to the sector. The Party used mainly tier 1 methodology from the 2006 IPCC Guidelines for estimating emissions in the energy sector owing to the lack of country-specific EFs. However, a combination of tier 1 and tier 2 methodologies from the 2006 IPCC Guidelines was used for subcategories 1.A.3.b (road transportation – liquid fuels), 1.A.3.d (waterborne navigation – liquid fuels) and 1.A.3.e (other transportation – liquid fuels). The default EFs from the 2006 IPCC Guidelines were used. In 2018, the main sources of emissions in the energy sector were fuel combustion activities in category 1.A.3 (transportation), contributing 57.1 per cent of the total sectoral emissions, followed by categories 1.A.4 (other sectors) (21.8 per cent), 1.A.1 (energy industries) (11.8 per cent) and 1.A.2 (manufacturing industries and construction) (9.3 per cent). The significant increase in emissions in the energy sector in 2018 compared with the baseline 2006 level (159 per cent) was attributed to an increasing use of fossil fuels in transportation, power generation and industries.

39. Information on CO₂, CH₄ and N₂O emissions for subcategory 1.B.1.c (solid fuel transformation) and category 1.B.2 (fugitive emissions from oil and natural gas) was reported as “NO” in Rwanda’s BUR. However, the Party provided relevant clarification in its BUR (table 2.8) and in the NIR (table 1.9) that those emissions were not estimated owing to a lack of data and resources. The TTE noted that these emissions should have been reported as “NE” based on the information reported in the BUR. The Party reported in its BUR (section 2.4.3) that a combination of tier 1 and tier 2 methodologies from the 2006 IPCC Guidelines was used for CO₂ emissions for subcategory 1.A.1.a.i (electricity generation). However, the TTE noted that only tier 1 methodology was used for this subcategory. During the technical analysis, the Party clarified that the use of notation keys and the description of the methodology applied will be improved for future reporting when the QA/QC system has been fully developed.

40. For the IPPU sector, information was reported on GHG emissions, methodological tier levels, AD and their sources, EFs, key categories, notation keys used, source-specific

planned improvements and recommendations, and other information specific to the sector. The Party used mainly tier 1 methodology from the 2006 IPCC Guidelines for estimating emissions in the IPPU sector, considering the national context and data availability. Tier 2 methodology from the 2006 IPCC Guidelines was used for CO₂ emissions for category 2.D.1 (lubricant use) and HFC emissions for subcategories 2.F.1.a (refrigeration and stationary air conditioning) and 2.F.1.b (mobile air conditioning). In 2018, the main sources of emissions in the IPPU sector were activities in category 2.A (mineral industry), contributing 89.1 per cent of total sectoral emissions, followed by categories 2.F (product uses as substitutes for ozone-depleting substances) (6.3 per cent), 2.C (metal industry) (2.5 per cent) and 2.D (non-energy products from fuels and solvent use) (2.1 per cent). The significant increase in emissions in the IPPU sector in 2018 compared with the baseline 2006 level (276.1 per cent) was attributed to an increase in (1) production and use of cement for construction activities, (2) imports of HFCs for refrigeration and stationary air conditioning and (3) consumption of lubricants for vehicles.

41. Emissions for categories 2.D.3 (other – solvent use) and 2.G.3 (N₂O from product uses) were reported as “NA” and “NA/NE” respectively in Rwanda’s BUR. However, the Party provided relevant clarification in its BUR (table 2.4) and in the NIR (chap. 4.6) that those emissions were not estimated owing to a lack of data or the appropriate calculation tool. The TTE noted that these emissions should have been reported as “NE” instead of “NA” based on the information reported in the BUR. During the technical analysis, the Party clarified that the use of notation keys will be improved for future reporting when the QA/QC system has been fully developed.

42. For categories 3.A (livestock) and 3.C (aggregate sources and non-CO₂ emissions sources on land), enteric fermentation (CH₄) and direct N₂O emissions from managed soils (N₂O) were identified as key categories and the most relevant emissions sources in the sector. The three categories contributing the most were category 3.A.1 (enteric fermentation) (3,196.97 Gg CO₂ eq, or 75.4 per cent of the combined emissions for categories 3.A and 3.C) followed by categories 3.C.4 (direct N₂O emissions from managed soils) (405.92 Gg CO₂ eq, or 9.6 per cent of the combined emissions for categories 3.A and 3.C) and 3.C.7 (rice cultivation) (280.74 Gg CO₂ eq, or 6.6 per cent of the combined emissions for categories 3.A and 3.C). Rwanda used tier 2 methodology from the 2006 IPCC Guidelines for dairy cattle and tier 1 methodology for other subcategories. AD (such as areas of savannah burning, lime production, amount of fertilizer used, areas of rice cultivation and number of livestock) were provided by the National Institute of Statistics of Rwanda, the Rwanda Agriculture and Animal Resources Development Board and other organizations. The TTE commends Rwanda for using highly disaggregated data, including the application of country-specific EFs, to allow for higher-tier reporting.

43. For category 3.B (land), Rwanda reported annual GHG emissions and removals for 2006–2018. Overall, the net removals for category 3.B fluctuated between a minimum of 3,657.06 Gg CO₂ eq in 2007 and a maximum of 5,030.22 Gg CO₂ eq in 2018. In 2018, forest land was the greatest net sink (7,090.75 Gg CO₂ eq), while cropland was a net emitter (1,609.57 Gg CO₂ eq). Minor emissions were also reported for grassland, wetlands, settlements and other land.

44. For the waste sector, information was reported on GHG emissions, methodological tier levels, AD and their sources, EFs, key categories, notation keys used, source-specific planned improvements and recommendations, and other information specific to the sector. The Party used mainly tier 1 methodology from the 2006 IPCC Guidelines for estimating emissions in the waste sector, considering the national context and data availability. Default EFs from the 2006 IPCC Guidelines were used together with some country-specific data available on waste composition. In 2018, the main sources of emissions in the waste sector were activities in category 4.A (solid waste disposal), contributing 48.7 per cent of total sectoral emissions, followed by categories 4.D (wastewater treatment and discharge) (33.6 per cent), 4.B (biological treatment of solid waste) (15.4 per cent) and 4.C (incineration and open burning of waste) (2.3 per cent). The significant increase in emissions in the waste sector in 2018 compared with the baseline 2006 level (65.2 per cent) was attributed to an increasing population and change in the mode of waste generation and management.

45. Rwanda reported in its BUR (section 2.1) that it used tier 2 methodology from the 2006 IPCC Guidelines for various categories of the waste sector. However, the TTE noted in table 2.2 of the BUR that tier 1 methodology was used for all categories in the waste sector. During the technical analysis, the Party clarified that there was an error in the information reported in BUR section 2.1 and that the information reported in table 2.2 is correct.

46. The BUR provides an update to some of the GHG inventories reported in the Party's previous NCs. The information reported provides an update of Rwanda's NC3, which addresses anthropogenic emissions and removals for 2006–2015. The update was carried out for 2006–2015 using the methodologies contained in the 2006 IPCC Guidelines, thus generating a consistent 10-year time series. The Party reported that it recalculated emissions for all sectors, except the IPPU sector, for 2006–2015 owing to the improved methodology applied and the availability of more reliable and disaggregated data. This included the development of country-specific EFs for enteric fermentation, use of updated data on manure management systems, availability of data from the 2019 land-cover map and waste composition data collected by the Rwanda Environment Management Authority, among others. The Party also reported the impacts of the recalculations on the estimated emissions for 2006–2015. During the technical analysis, the Party clarified that the recalculation of emissions for the IPPU sector was not conducted owing to the lack of data and human resources. The GHG inventories for 2006–2018 reported in the BUR are consistent excluding the IPPU sector.

47. Information on the update to the GHG inventories covering the time series 1990–2005, as reported in the Party's NC1 and NC2, was not reported in Rwanda's BUR and the reason for this was not clear to the TTE. During the technical analysis, the Party clarified that the lack of available data and human resources was the main reason for the missing information.

48. Rwanda described in its BUR the institutional framework for the preparation of its 2006–2018 GHG inventory. The Party reported that the Ministry of Environment is the key institution responsible for formulating policies, strategies and programmes related to the environment and climate change. The Rwanda Environment Management Authority is the national focal point for the UNFCCC and is, therefore, the central body responsible for the preparation of NCs, NIRs and BURs in fulfilment of reporting requirements under the Convention. It prepared the GHG inventory with the support of the United Nations Environment Programme, which assisted Rwanda in using various methodological tools. The Rwanda Environment Management Authority coordinated the national inventory thematic working groups for all sectors and other ministries, local government authorities and other relevant stakeholders to prepare the GHG inventory. Technical staff at the Rwanda Environment Management Authority provided support to the thematic working groups in preparing the GHG inventory. The national inventory thematic working groups were responsible for estimating GHG emissions and removals; performing the key category analysis, QA/QC activities and uncertainty assessment; and documenting and archiving all information related to the GHG inventory preparation process. The National Climate Change Committee, which comprises various stakeholders representing national institutions, was responsible for supervising the inventory preparation process, including evaluating the national GHG inventory reports.

49. Rwanda clearly reported that a key category analysis was performed for the level and trend in emissions. The Party identified key categories and related gases based on the tier 1 (approach 1) methodology of the 2006 IPCC Guidelines. Sixteen key source and sink categories were identified for both the level and trend assessment. The top three key categories identified for the level assessment were 3.A.1 (enteric fermentation) (CH₄), 1.A.3.b (road transportation) (CO₂) and 3.B.2.b (land converted to cropland) (CO₂). The top three key categories identified for the trend assessment were 3.B.1.a (forest land remaining forest land) (CO₂), 3.A.1 (enteric fermentation) (CH₄) and 3.B.2.a (cropland remaining cropland) (CO₂).

50. The BUR provides information on QA/QC measures for all sectors. The information reported includes activities undertaken for QC, namely (1) conducting routine cross-checks to identify errors; (2) using approved standardized procedures for calculations, measurements and documentation in accordance with the 2006 IPCC Guidelines; (3) using official data; and

(4) sharing data and information with relevant experts and stakeholders. The TTE commends Rwanda for providing information on QA/QC measures.

51. Rwanda reported information on CO₂ fuel combustion emissions using both the sectoral and the reference approach. The comparison of emissions estimated using the sectoral and reference approach was presented in graphical format and the difference between the estimates calculated using the two approaches ranges from –1.4 to 1.17 per cent for 2007–2018. The Party clarified that the observed differences were due to uncertainties in the source data used and are within the range provided in the 2006 IPCC Guidelines to confirm the accuracy of the results using the sectoral approach. During the technical analysis, the Party underlined that it still faces challenges in improving its reporting of CO₂ fuel combustion emissions using both the sectoral and the reference approaches.

52. Information was clearly reported on emissions from international aviation. Emissions from international aviation increased from 5.13 Gg CO₂ eq in 2006 to 131.43 Gg CO₂ eq in 2018 and was attributed to an increase in the number of international flights. The Party reported emissions from marine bunker fuels as “NO” under the memo items for 2006–2018 in its NIR (table 2.1).

53. Information on the emissions from marine bunker fuel was not estimated and the reason for this was not clear to the TTE. During the technical analysis, the Party explained that emissions from ship and boat movements on lakes and rivers were considered under domestic waterborne navigation.

54. Rwanda reported information on the uncertainty assessment (level) of its national GHG inventory. The uncertainty analysis was based on approach 1 of the 2006 IPCC Guidelines and covers all source categories and all direct GHGs. The results obtained, as reported in the BUR, reveal that the level uncertainty for emissions is 9.9 per cent and the trend uncertainty is 13.5 per cent. The TTE noted that most of the GHG estimates were calculated using tier 1 methodology and default EFs from the 2006 IPCC Guidelines and therefore did not allow for the development of country-specific uncertainty estimates for EFs. In a similar way, some of the uncertainty assessment values reported for emissions from forest land were quite high (30 per cent), implying low confidence in the reported values. In its BUR and during the technical analysis, the Party clarified that the high level of uncertainty for forest land was due to data gaps, use of extrapolated data, assumptions and approximation methodologies, and default EFs. Rwanda further clarified that it faced challenges in developing more country-specific uncertainty estimates for AD and EFs based on category- or country-specific circumstances.

55. The TTE noted that the transparency of the information reported on GHG inventories could be further enhanced by addressing the areas noted in paragraphs 28, 30, 32, 35, 39, 41, 45, 47 and 53 above, which could facilitate a better understanding of the information reported on GHG inventories.

56. Rwanda reported in its BUR (table 2.8) and in its NIR (table 1.9) information on a range of planned improvements and capacity-building needs for enhancing its GHG inventory reporting for compliance with requirements under the ETF. The planned improvements and capacity-building needs relate to improvements in methodology (including QA/QC, uncertainty assessment and completeness at the sectoral level), information-sharing and strategies for long-term improvement of GHG inventory reporting.

3. Mitigation actions and their effects, including associated methodologies and assumptions

57. As indicated in table I.2, Rwanda reported in its BUR, mostly in accordance with paragraphs 11–13 of the UNFCCC reporting guidelines on BURs, information on mitigation actions and their effects, to the extent possible.

58. The information reported provides a clear and comprehensive overview of the Party’s mitigation actions and their effects. In its BUR, Rwanda reported information on its national context and framed its national mitigation planning and actions in the context of the National Environment and Climate Change Policy (2019); Vision 2050; the National Strategy for Transformation (2017–2024); the Green Growth and Climate Resilience Strategy; the 2030

Agenda for Sustainable Development; Agenda 2063: The Africa We Want; the East African Community Vision 2050; the national action plan on the United Nations Convention to Combat Desertification; the national adaptation programme of action; the technology needs assessment; nationally appropriate mitigation actions; and NDCs. Rwanda reported that climate change has been mainstreamed and integrated into its development plans, including mitigation actions. Most of the mitigation actions are in the energy and agriculture sectors. Further, the implemented mitigation actions have contributed to estimated emission reductions of 6.27 Mt CO₂ eq for 2014–2020, with the energy sector being the main source of emission reductions. Rwanda also reported that, if all activities in all sectors are sustained, the anticipated GHG emission reduction is expected to be 50.34 Mt CO₂ eq for 2020–2030.

59. Rwanda updated its NDC in May 2020 to include two different contributions, namely an emission reduction of 16 per cent relative to the ‘business as usual’ level in 2030 (equivalent to an estimated emission reduction of 1.9 Mt CO₂ eq) through domestically supported and implemented mitigation measures and policies; and an additional emission reduction of 22 per cent relative to the ‘business as usual’ level in 2030 (equivalent to an estimated emission reduction of 2.7 Mt CO₂ eq) based on the provision of international support and funding. The combined contribution is therefore a 38 per cent reduction in GHG emissions compared with the ‘business as usual’ level in 2030 (equivalent to an estimated emission reduction of 4.6 Mt CO₂ eq). The updated NDC contains mitigation actions and policies in the energy, IPPU, AFOLU and waste sectors. The TTE acknowledged the information, which is presented in this summary report as contextual, without assessing the completeness and transparency of the information.

60. Rwanda reported a summary of its mitigation actions in tabular format in accordance with decision 2/CP.17, annex III, paragraph 11. The Party also reported information on its mitigation actions in narrative format.

61. Consistently with decision 2/CP.17, annex III, paragraph 12(a), Rwanda clearly reported the names and descriptions of its mitigation actions and provided information on their coverage (sector and gases), nature and progress indicators in the BUR. Information on quantitative goals was provided for most of the mitigation actions in the BUR.

62. Information on quantitative goals (targets for indicators) for some mitigation actions in the energy sector (such as energy-efficient brick kilns, energy efficiency in agroprocessing industries, energy efficiency in the cement industry, vehicle fuel economy standards, public transportation measures, off-grid solar electrification and domestic on-farm biodigesters) was not reported in Rwanda’s BUR and the reason for this was not clear to the TTE. During the technical analysis, the Party clarified that these targets are to be set by the institutions concerned and capacity-building would be required for reporting this information.

63. Rwanda did not report information on the methodologies and assumptions for all mitigation actions in the energy, IPPU, AFOLU and waste sectors. During the technical analysis, the Party clarified that it lacked the capacity and human resources to collect the corresponding information and data.

64. Consistently with decision 2/CP.17, annex III, paragraph 12(c), the Party clearly reported information on the objectives of the actions and steps taken or envisaged to achieve those actions for all mitigation actions in the energy, IPPU, AFOLU and waste sectors.

65. The mitigation actions in the energy sector focus mainly on promoting renewable energy sources (such as grid-connected hydropower, solar mini grids, rooftop solar systems, off-grid solar electrification, solar pumping and on-farm biodigesters), improving energy efficiency (for street lights, cookstoves, brick kilns, agroprocessing industries, the cement industry, mining and vehicles) and promoting environmentally friendly transportation (electric vehicles and public transportation). Of the 16 mitigation actions reported for this sector, 6 were reported as ongoing, while the status of the remaining 10 actions was unknown as the Party did not report any information. The Party also reported the results of implementing its mitigation actions as estimated outcomes or estimated emission reductions. The GHG emission reductions achieved from implementing mitigation actions amount to 6.08 Mt CO₂ eq for 2015–2018. The highest share of GHG emission reductions achieved in the energy sector was from disseminating efficient cookstoves (64 per cent), followed by implementing solar mini grids (34 per cent). Rwanda reported that, if all mitigation actions

in the energy sector are sustained, the anticipated total GHG emission reduction is 14.93 Mt CO₂ eq for 2020–2030. The Party also reported on the expected co-benefits of these mitigation actions, including a reduction in imports of fossil fuels, improved health conditions thanks to improved air, land and water quality, and job creation.

66. Information on the progress of implementation for most of the mitigation actions in the energy sector (such as the mitigation actions referred to as E03–06, E06, E08–12 and E14 in table 3.2 of the BUR) was not clearly reported in Rwanda’s BUR. Using the information reported, the TTE was unable to understand whether the mitigation actions were ongoing, completed or planned. During the technical analysis, Rwanda clarified that the above-mentioned mitigation actions are ongoing.

67. The mitigation actions in the IPPU sector focus mainly on introducing more climate-friendly technologies in the cement industry (substitution of clinker with pozzolanas) and the gradual replacement of fluorinated gases with fewer polluting substitutes in air conditioning and refrigeration. Two mitigation actions were reported as ongoing. Rwanda reported on the preparation of various actions to curb HFCs and promote climate-friendly technologies in industries as progress for the above-mentioned mitigation actions. According to the Party’s BUR, these mitigation actions are expected to reduce GHG emissions by 0.14 Mt CO₂ eq in 2030 and the total effect is anticipated to be 1.86 Mt CO₂ eq for 2020–2030. The Party also reported on the expected co-benefits of these mitigation actions, including new job opportunities and reduced dependence on fossil fuels.

68. The mitigation actions in the AFOLU sector focus mainly on facilitating soil and water conservation and efficient nutrient use, promoting production and use of compost manure, improving livestock fodder and livestock breeding, using an agroforestry approach, managing livestock manure and promoting sustainable forest and landscape management. Rwanda reported 13 mitigation actions in the AFOLU sector, most of which are either ongoing or planned. Rwanda reported some progress relating to the above-mentioned mitigation actions, such as rehabilitation, planting or protection of forest on approximately 21,930 ha and implementation of agroforestry activities on 57,293 ha. The GHG emission reduction achieved from implementing the mitigation actions in the AFOLU sector amounts to 0.19 Mt CO₂ eq for 2014–2020. According to the Party’s BUR, these mitigation actions are expected to reduce GHG emissions by 3.39 Mt CO₂ eq in 2030 and the total effect is anticipated to be 23.46 Mt CO₂ eq for 2020–2030. The Party also reported on the expected co-benefits of these mitigation actions, including the creation of new jobs, improved conditions for land, water and air, reduced imports of chemical fertilizers and fossil fuels, better yield of livestock and crops, and prevention of landslides and erosion.

69. The mitigation actions in the waste sector focus mainly on solid waste management improvements such as use of landfill gas, waste-to-energy plants, aerobic biological treatment (composting) and wastewater treatment and reuse. Rwanda reported four mitigation actions for the waste sector, all of which are planned. The Party also reported the inclusion of these mitigation actions in the updated NDC and the formulation of its National Sanitation Policy (2016) as progress in relation to the above-mentioned mitigation actions. According to the Party’s BUR, these mitigation actions are expected to reduce GHG emissions by 0.81 Mt CO₂ eq in 2030 and the total effect is anticipated to be 10.09 Mt CO₂ eq for 2020–2030. The Party also reported on the expected co-benefits of these mitigation actions, including the creation of new jobs, improvements in public health thanks to improved conditions for land, water and air, and reduced imports of chemical fertilizers and fossil fuels.

70. Rwanda provided information on its involvement in international market mechanisms as a Party to the Kyoto Protocol. It reported that only the clean development mechanism and voluntary carbon market are applicable internal market mechanisms in Rwanda. As at December 2020, a total of 2.25 million carbon credits had been issued in the country. Activities under the clean development mechanism contributed to a total of 0.72 million carbon credits and activities under the voluntary carbon market produced 1.53 million carbon credits. Activities related to improved cookstoves contributed the highest carbon credits (87 per cent of total carbon credits issued), followed by activities related to solar photovoltaics (9 per cent) and lighting (4 per cent).

71. Rwanda reported information on its domestic MRV arrangements in accordance with decision 2/CP.17, annex III, paragraph 13. The information reported indicates that the Party has in place a domestic MRV system for mitigation actions. The Rwanda Environment Management Authority coordinates a thematic working group on climate change mitigation to collect, analyse and report key information and data related to mitigation actions. The designated departments and offices provide the necessary data to the ministries through internal report-sharing processes or a data-sharing template. The ministries compile information and data and feed them into the results-based management and evaluation system, management information system and annual reports. The Rwanda Environment Management Authority collects all the necessary data and information from the relevant sources (management information system, results-based management and evaluation system and annual reports) to conduct an assessment of mitigation actions. Rwanda plans to enhance its existing domestic MRV arrangements for mitigation actions so as to track progress towards the NDC. In the short and medium term, Rwanda intends to mandate the ministries to include relevant information and data on mitigation actions in their annual reports, in line with the progress indicator tables in Rwanda's updated NDC. In the long term, the management of the information system and results-based management and evaluation system will be integrated, allowing all information and data to be reported through the management information system. This will enable the Rwanda Environment Management Authority to readily access the information and data necessary to track progress towards the NDC.

72. The TTE noted that the transparency of the information reported on mitigation actions could be further enhanced by addressing the areas noted in paragraphs 62, 63 and 66 above, which could facilitate a better understanding of the information reported on mitigation actions.

4. Constraints and gaps, and related technology, financial, technical and capacity-building needs, including a description of support needed and received

73. As indicated in table I.3, Rwanda reported in its BUR, mostly in accordance with paragraphs 14–16 of the UNFCCC reporting guidelines on BURs, information on finance, technology and capacity-building needs and support received.

74. Rwanda clearly reported information on constraints and gaps, and related financial, technical and capacity-building needs in accordance with decision 2/CP.17, annex III, paragraph 14. In its BUR, Rwanda identified the following constraints and gaps: (1) insufficient data for the national GHG inventory and for tracking the progress of mitigation and adaptation actions; (2) the limited capacity of national experts in implementing climate change activities; (3) the low adaptive capacity of local communities to climate change activities; (4) insufficient funds to deliver on national climate change adaptation and mitigation targets; and (5) the limited involvement of private sector investment in environment and climate change activities. Rwanda reported that its financial, technical and capacity-building needs are primarily in the areas of collecting and analysing data for all sectors in line with the 2006 IPCC Guidelines; training national experts on the national GHG inventory process, climate change mitigation and adaptation technologies; assessing climate change vulnerability; implementing various mitigation and adaptation measures; achieving climate-resilient and low-emission development pathways; and raising awareness among communities of climate change issues.

75. Rwanda reported information on financial resources, capacity-building and technical support received in accordance with decision 2/CP.17, annex III, paragraph 15. In its BUR, Rwanda reported that the Rwanda Green Fund for Environment mobilized financial resources of USD 167.26 million between 2013 and 2020, which was received from various bilateral, regional and multilateral donors and funding sources. The Party received a total of USD 2.74 billion from the GEF (total co-financing as at May 2020), which included an allocation of USD 852,000 for preparing its first BUR and its NC3. Rwanda also received bilateral and multilateral grants of USD 68.46 million between 2014 and 2020 to implement various climate change activities. The information reported indicates that Rwanda received capacity-building and technical support from the Global Support Programme (through the East and Southern Africa MRV networks), the United Nations Environment Programme, the Belgian NDC support initiative and the Food and Agriculture Organization of the United Nations to

strengthen the capacity of national and sectoral institutions in using methodologies and data management systems for the development of national GHG inventories, mitigation assessments and vulnerability and adaptation assessments. The technical and capacity-building support was provided through regional and national training workshops; guidance materials, publications and training materials and tool; and equipment support. During the technical analysis, the Party clarified that it faced challenges in collecting data, developing appropriate methodologies and coordinating with various actors related to financial support received for climate change activities.

76. Information on technology transfer support received was not reported in Rwanda's BUR and the reason for this was not clear to the TTE. During the technical analysis, the Party clarified that it faced challenges in compiling and reporting information related to technology transfer support received but that certain activities have been implemented in Rwanda (such as the installation of solar-powered systems and an automatic weather station).

77. Rwanda reported information on nationally determined technology needs with regard to the development and transfer of technology in accordance with decision 2/CP.17, annex III, paragraph 16. In its BUR, Rwanda reported that it conducted its first technology needs assessment for the energy and agriculture sectors in 2012 and is currently conducting a second technology needs assessment for the urbanization and industry sectors. The Party identified various barriers to the adoption of climate technologies such as the lack of technical skills. Rwanda is currently implementing policies (e.g. incentives, subsidies and exemption of import and excise duties) and setting up institutional frameworks (e.g. the Cleaner Production and Climate Innovation Centre) to facilitate the adoption of environmentally sound technologies.

78. Information on specific technology needs identified through technology needs assessments was not reported in Rwanda's BUR. The Party provided general examples of technology needs, such as irrigation in agriculture, installation and maintenance of green seeds and green storage systems, designing and planning for the development and diffusion of large solar photovoltaic systems, and wastewater treatment and recycling. During the technical analysis, Rwanda clarified that it faced challenges in compiling data and reporting information related to technology transfer needs.

79. The TTE noted that the transparency of the information reported on needs and support received could be further enhanced by addressing the areas noted in paragraphs 76 and 78 above, which could facilitate a better understanding of the information reported on needs and support received.

5. Any other information

80. Rwanda reported information on the ways that climate change adaptation and mitigation have been integrated into national plans and strategies through the revision of its 2005 National Environment Policy and its Vision 2050. The National Environment and Climate Change Policy promotes ecosystem-based approaches to climate change adaptation in local development agendas, afforestation and reforestation of critically degraded and residential areas, renewable energy to achieve universal access to electricity, and enforcement of air pollution emission standards and regulations.

81. Rwanda also reported that it has significantly strengthened its capacity for weather forecasting services, aviation, climate services and air quality monitoring. The Party established the Rwanda Climate Change Observatory in 2011 in collaboration with the Massachusetts Institute of Technology to understand its climate better and predict changes more accurately. Rwanda also established a nationwide air quality monitoring system.

82. Rwanda reported in its BUR that it communicates climate and environment research findings and other information on the topic through formal, non-formal and informal education, training sessions, workshops, conferences and meetings. The Rwanda Environment Management Authority is working to mainstream environment and climate change topics in the competency-based curriculum.

D. Identification of capacity-building needs

83. In consultation with Rwanda, the TTE identified the following needs for capacity-building that could facilitate the preparation of subsequent BURs and participation in ICA:

- (a) Enhancing capacity for estimating fuel combustion emissions using the reference approach and reporting the difference between the reference and sectoral approaches;
- (b) Enhancing the technical capacity of staff for preparing inventories for emissions of NO_x, NMVOCs, CO and sulfur oxides;
- (c) Enhancing capacity for estimating non-CO₂ emissions from wildfires;
- (d) Enhancing capacity for developing land-use change maps more frequently for monitoring land-cover changes over short time intervals;
- (e) Enhancing capacity for reporting emissions from land-use change to allow the development of a consistent time series and monitoring of the drivers of land-use change;
- (f) Enhancing capacity for developing and applying tier 2 or tier 3 methodologies for key categories across all sectors;
- (g) Enhancing the technical capacity of GHG inventory staff for reporting comparable information addressing tables 1 and 2 for GHG inventories contained in the annex to decision 17/CP.8, the sectoral reporting tables annexed to the Revised 1996 IPCC Guidelines, and the tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF, as mentioned in the UNFCCC reporting guidelines on BURs;
- (h) Enhancing technical capacity for performing recalculations and revisions of GHG emission estimates over the time series reported in previous NCs;
- (i) Enhancing national capacity for performing uncertainty analysis, including developing country-specific uncertainty estimates for AD and EFs based on the category and country-specific circumstances together with the data provider;
- (j) Enhancing national capacity for using GHG inventory tools for preparing and reporting the GHG inventory at the sectoral and national level and undertaking key category, uncertainty and trend analysis;
- (k) Enhancing technical capacity for undertaking QA/QC activities in the emission calculation and NIR preparation processes;
- (l) Enhancing national capacity for collecting data and addressing data gaps, including performing comparisons with international data sets;
- (m) Enhancing the technical capacity of the staff involved in GHG inventory preparation for improving the GHG estimation process for all sectors, including defining data needs, and for coordinating and collaborating with other relevant institutions and the private sector for data collection and data-sharing, in particular for the IPPU sector;
- (n) Enhancing technical capacity for developing methodologies and assumptions for estimating emission reductions for mitigation actions across all sectors;
- (o) Enhancing capacity for setting quantitative goals for mitigation actions (such as efficient brick kilns, average fuel economy for newly registered vehicles, efficient buses and on-farm biodigesters);
- (p) Enhancing capacity for estimating the emission reduction (in t CO₂ eq) achieved by mitigation actions for the energy, waste, AFOLU and IPPU sectors;
- (q) Providing training to enhance the mainstreaming of mitigation actions in national development priorities and planning processes;
- (r) Enhancing national technical capacity for collecting information and developing methodologies to track financial support received, including coordination of the institutional framework for data collection;

(s) Building national capacity for reporting information on technology support needed and received.

84. The TTE noted that, in addition to those identified during the technical analysis, Rwanda reported in its BUR (tables 2.8 and 5.1) several capacity-building needs covering the following areas:

- (a) The national GHG inventory system;
- (b) Information and data collection, documentation and archiving;
- (c) Climate change mitigation and adaptation technologies;
- (d) Awareness among communities of ways to mitigate and adapt to climate change;
- (e) Climate change vulnerability assessments;
- (f) Tracking progress of updated NDC actions.

III. Conclusions

85. The TTE conducted a technical analysis of the information reported in the first BUR of Rwanda in accordance with the UNFCCC reporting guidelines on BURs and concludes that the information reported is mostly consistent. It provides an overview of national circumstances and institutional arrangements relevant to the preparation of NCs on a continuous basis; the national inventory of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol, including an NIR; mitigation actions and their effects; constraints and gaps, and related financial, technical and capacity-building needs, including a description of support needed and received; the level of support received to enable the preparation and submission of BURs; domestic MRV; and any other information relevant to the achievement of the objective of the Convention. The TTE concluded that the information analysed is mostly transparent.

86. Rwanda reported information on institutional arrangements relevant to the preparation of its NCs and BURs on a continuous basis. The Rwanda Environment Management Authority, under the Ministry of Environment, has the legal mandate for national environmental protection and conservation, and the promotion and overall management of environmental matters within the country, including the preparation of NCs and BURs. It coordinates three thematic working groups, on national circumstances and cross-cutting issues, the GHG inventory, and climate change mitigation, to compile the necessary information and data. Rwanda is planning to build a robust NDC MRV system at the national level covering NDC finance, the GHG inventory, capacity-building and technology, mitigation and adaptation. The new system will enable Rwanda to track progress towards the targets defined in the NDC and report on them. The Rwanda Environment Management Authority will coordinate with the various ministries and stakeholders to collect and report information on GHG inventories, capacity-building, mitigation, adaptation and technology. Rwanda is undertaking various initiatives under the project to strengthen the capacity of institutions in Rwanda to fulfil the transparency requirements of the Paris Agreement.

87. In its first BUR, submitted in 2021, Rwanda reported information on its national GHG inventory for 2006–2018. This included GHG emissions and removals of CO₂, CH₄, N₂O and HFCs for all relevant sources and sinks, as well as the precursor gases NO_x and CO for the AFOLU sector. The inventory was developed on the basis of the 2006 IPCC Guidelines. The total GHG emissions for 2018 were reported as 2,630.11 Gg CO₂ eq (including land and HWP) and 7,722.47 Gg CO₂ eq (excluding land and HWP). A total of 16 key source and sink categories and associated gases were identified for both the level and trend assessment. Categories 3.A.1 (enteric fermentation) (CH₄) and 3.B.1.a (forest land remaining forest land) (CO₂) were identified as the key categories and main gases for the level and trend assessment respectively. Only partial estimates of fluorinated gases were provided and no estimates of fugitive emissions from oil and natural gas, NMVOCs and HWP were provided owing to difficulties in obtaining the necessary data, as clarified by the Party in the BUR.

88. Rwanda reported information on mitigation actions and their effects in both tabular and narrative format, including emission reduction targets, and the baseline and mitigation scenarios for 2020–2030, and framed its national mitigation planning and actions in the context of its the National Environment and Climate Change Policy, which was launched in 2019. Rwanda reported planned, implemented and ongoing actions in the energy, IPPU, AFOLU and waste sectors. The mitigation actions focus on electricity generation; energy efficiency in manufacturing industries, transportation, buildings and agriculture; waste management by waste-to-energy plants, composting and wastewater treatment; clinker substitution; fluorinated gas substitution; soil and water conservation; and sustainable forest and landscape management. The Party reported the progress of implementation of its mitigation actions, including emission reductions and estimated outcomes. The highest estimated emission reduction was reported for the energy sector, namely 6.08 Mt CO₂ eq between 2015 and 2018. Rwanda reported that, if all the mitigation actions are sustained, the cumulative GHG emission reductions achieved will be 50.34 Mt CO₂ eq for 2020–2030. The Party also reported on co-benefits of its mitigation actions. The Party reported information on its involvement in international market mechanisms and on MRV arrangements. Information on methodologies and assumptions was not provided owing to technical capacity and resource constraints, as clarified by the Party during the technical analysis.

89. Rwanda reported information on key constraints, gaps and related needs in the areas of collecting and analysing data, training national experts on the national GHG inventory process, identifying climate change mitigation and adaptation technologies, assessing climate change vulnerability, implementing various mitigation and adaptation measures, achieving climate-resilient and low-emission development pathways, and raising public awareness. Information was reported on the financial, technical and capacity-building support received from various bilateral, regional and multilateral donors and funding agencies for implementing climate change activities, including for preparing the BUR. Rwanda mobilized international funding of USD 167.26 million between 2013 and 2020 through the Rwanda Green Fund for Environment, and received a total of USD 2.74 billion from the GEF as at May 2020 and USD 68.46 million between 2014 and 2020 in the form of bilateral and multilateral grants. The Party also reported that it received financial support of USD 852,000 from the GEF for preparing its BUR and NC3. In addition, Rwanda received technical and capacity-building support from the Global Support Programme, the Belgian NDC support initiative and the Food and Agriculture Organization of the United Nations in the areas of GHG inventories, mitigation assessment, and vulnerability and adaptation assessment. Information on technology needs and support received was not reported owing to challenges in compiling and reporting the relevant information, as clarified by the Party during the technical analysis.

90. The TTE, in consultation with Rwanda, identified the 19 capacity-building needs listed in chapter II.D above and needs for capacity-building that aim to facilitate reporting in accordance with the UNFCCC reporting guidelines on BURs and participation in ICA in accordance with the ICA modalities and guidelines, taking into account Article 4, paragraph 3, of the Convention. Rwanda prioritized the capacity-building needs referred to in paragraph 83(a–g), (i–k), (m–n), (p) and (r–s) above.

Annex I

Extent of the information reported by Rwanda in its first biennial update report

Table I.1

Identification of the extent to which the elements of information on greenhouse gases are included in the first biennial update report of Rwanda

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, paragraph 41(g)	The first BUR shall cover, at a minimum, the inventory for the calendar year no more than four years prior to the date of the submission, or more recent years if information is available, and subsequent BURs shall cover a calendar year that does not precede the submission date by more than four years.	Yes	Rwanda submitted its first BUR in December 2021; the GHG inventory reported is for 2006–2018.
Decision 2/CP.17, annex III, paragraph 4	Non-Annex I Parties should use the methodologies established in the latest UNFCCC guidelines for the preparation of NCs from non-Annex I Parties approved by the Conference of the Parties or those determined by any future decision of the Conference of the Parties on this matter.	Yes	Rwanda used the 2006 IPCC Guidelines.
Decision 2/CP.17, annex III, paragraph 5	The updates of the section on national inventories of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol should contain updated data on activity levels based on the best information available using the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF; any change to the EF may be made in the subsequent full NC.	Yes	
Decision 2/CP.17, annex III, paragraph 6	Non-Annex I Parties are encouraged to include, as appropriate and to the extent that capacities permit, in the inventory section of the BUR:		
	(a) The tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF;	Partly	Rwanda reported limited information in relation to the tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF (such as land-use change matrices and carbon stock characteristics for forest land subcategories in tables 5.22–5.28 of the NIR). However, information on annual changes in carbon stocks for living biomass, dead organic matter and soils for various land-use change categories was not reported.
	(b) The sectoral report tables annexed to the Revised 1996 IPCC Guidelines.	Partly	Rwanda reported comparable information addressing summary table 7A annexed to the Revised 1996 IPCC Guidelines, but comparable information was not reported for sectoral report tables 1–6 annexed to the Revised 1996 IPCC Guidelines.

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, annex III, paragraph 7	Each non-Annex I Party is encouraged to provide a consistent time series back to the years reported in its previous NCs.	Partly	The time series reported in the BUR includes only 2006–2018, covering the time series reported in the NC3 (2006–2015) but not those reported in the NC1 and NC2, namely 1990–2005.
Decision 2/CP.17, annex III, paragraph 8	Non-Annex I Parties that have previously reported on their national GHG inventories contained in their NCs are encouraged to submit summary information tables of inventories for previous submission years (e.g. for 1994 and 2000).	Partly	This information was reported for 2006–2018, covering the years reported in the NC3 (2006–2015) but not those reported in the NC1 and NC2, namely 1990–2005.
Decision 2/CP.17, annex III, paragraph 9	The inventory section of the BUR should consist of an NIR as a summary or as an update of the information contained in decision 17/CP.8, annex, chapter III (National greenhouse gas inventories), including: <ul style="list-style-type: none"> (a) Table 1 (National greenhouse gas inventory of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol and greenhouse gas precursors); (b) Table 2 (National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF₆). 	Partly	Comparable information was reported in table 2.4 of the BUR for CO ₂ , CH ₄ and N ₂ O but those gases were reported in Gg CO ₂ eq. Furthermore, information on CO, NO _x , sulfur oxides and NMVOCs was not reported in the table 2.4, although an explanation regarding CO and NO _x emissions was provided in narrative format.
Decision 2/CP.17, annex III, paragraph 10	Additional or supporting information, including sector-specific information, may be supplied in a technical annex.	Yes	The Party submitted an NIR as an annex to its BUR.
Decision 17/CP.8, annex, paragraph 12	Non-Annex I Parties are also encouraged, to the extent possible, to undertake any key source analysis as indicated in the IPCC good practice guidance to assist in developing inventories that better reflect their national circumstances.	Yes	
Decision 17/CP.8, annex, paragraph 13	Non-Annex I Parties are encouraged to describe procedures and arrangements undertaken to collect and archive data for the preparation of national GHG inventories, as well as efforts to make this a continuous process, including information on the role of the institutions involved.	Yes	Information on procedures and arrangements for data collection and archiving, including the roles of the institutions involved, was reported.
Decision 17/CP.8, annex, paragraph 14	Each non-Annex I Party shall, as appropriate and to the extent possible, provide in its national inventory, on a gas-by-gas basis and in units of mass, estimates of anthropogenic emissions of:		

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
	(a) CO ₂ ;	Partly	Emissions from some categories (such as HWP and charcoal production) were not estimated or reported.
	(b) CH ₄ ;	Partly	Emissions from some categories (such as charcoal production) were not estimated or reported.
	(c) N ₂ O.	Partly	Emissions from some categories (such as charcoal production and N ₂ O from product uses) were not estimated or reported.
Decision 17/CP.8, annex, paragraph 15	Non-Annex I Parties are encouraged, as appropriate, to provide information on anthropogenic emissions by sources of:		
	(a) HFCs;	Yes	
	(b) PFCs;	Yes	Information on PFCs was not included in table 2.4 of the BUR but an explanation was provided in narrative format.
	(c) SF ₆ .	Yes	Information on SF ₆ was reported.
Decision 17/CP.8, annex, paragraph 16	Non-Annex I Parties are encouraged, as appropriate, to report on anthropogenic emissions by sources of other GHGs, such as:		
	(a) CO;	Partly	Information was reported only for category 3.C.1 (biomass burning) in the AFOLU sector.
	(b) NO _x ;	Partly	Information was reported only for category 3.C.1 (biomass burning) in the AFOLU sector.
	(c) NMVOCs.	No	
Decision 17/CP.8, annex, paragraph 17	Other gases not controlled by the Montreal Protocol, such as sulfur oxides, and included in the Revised 1996 IPCC Guidelines may be included at the discretion of Parties.	No	The Party did not report on other gases, such as sulfur oxides.
Decision 17/CP.8, annex, paragraph 18	Non-Annex I Parties are encouraged, to the extent possible, and if disaggregated data are available, to estimate and report CO ₂ fuel combustion emissions using both the sectoral and the reference approach and to explain any large differences between the two approaches.	Yes	The information was reported for both the sectoral and the reference approach, and the differences were also reported.
Decision 17/CP.8, annex, paragraph 19	Non-Annex I Parties should, to the extent possible, and if disaggregated data are available, report emissions from international aviation and marine bunker fuels separately in their inventories:		
	(a) International aviation;	Yes	
	(b) Marine bunker fuels.	Yes	
Decision 17/CP.8, annex, paragraph 20	Non-Annex I Parties wishing to report on aggregated GHG emissions and removals expressed in CO ₂ eq should use the GWP provided	Yes	The Party used the GWP provided in the AR2.

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
	by the IPCC in its AR2 based on the effects of GHGs over a 100-year time-horizon.		
Decision 17/CP.8, annex, paragraph 21	<p>Non-Annex I Parties are encouraged to provide information on methodologies used in the estimation of anthropogenic emissions by sources and removals by sinks of GHGs not controlled by the Montreal Protocol, including a brief explanation of the sources of EFs and AD. If non-Annex I Parties estimate anthropogenic emissions and removals from country-specific sources and/or sinks that are not part of the Revised 1996 IPCC Guidelines, they should explicitly describe the source and/or sink categories, methodologies, EFs and AD used in their estimation of emissions, as appropriate. Parties are encouraged to identify areas where data may be further improved in future communications through capacity-building:</p> <p>(a) Information on methodologies used in the estimation of anthropogenic emissions by sources and removals by sinks of GHGs not controlled by the Montreal Protocol;</p> <p>(b) Explanation of the sources of EFs;</p> <p>(c) Explanation of the sources of AD;</p> <p>(d) If non-Annex I Parties estimate anthropogenic emissions and removals from country-specific sources and/or sinks that are not part of the Revised 1996 IPCC Guidelines, they should explicitly describe:</p> <p>(i) Source and/or sink categories;</p> <p>(ii) Methodologies;</p> <p>(iii) EFs;</p> <p>(iv) AD;</p> <p>(e) Parties are encouraged to identify areas where data may be further improved in future communications through capacity-building.</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>NA</p> <p>Yes</p>	<p>Rwanda used the 2006 IPCC Guidelines. Tier 1 and 2 methodology was used for GHG estimation.</p> <p>Rwanda used the 2006 IPCC Guidelines</p> <p>Rwanda used the 2006 IPCC Guidelines</p>
Decision 17/CP.8, annex, paragraph 22	Each non-Annex I Party is encouraged to use tables 1–2 of the guidelines annexed to decision 17/CP.8 in reporting its national GHG inventory, taking into account the provisions established in paragraphs 14–17. In preparing those tables, Parties should strive to present information that is as complete as possible. Where numerical data are not provided, Parties should use the notation keys as indicated.	Yes	Notation keys were used.
Decision 17/CP.8, annex, paragraph 24	<p>Non-Annex I Parties are encouraged to provide information on the level of uncertainty associated with inventory data and their underlying assumptions, and to describe the methodologies used, if any, for estimating these uncertainties:</p> <p>(a) Level of uncertainty associated with inventory data;</p>	Yes	

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
	(b) Underlying assumptions;	Yes	
	(c) Methodologies used, if any, for estimating these uncertainties.	Yes	

Note: The parts of the UNFCCC reporting guidelines on BURs on reporting information on GHG emissions by sources and removals by sinks in BURs are contained in decision 2/CP.17, paras. 3–10 and 41(g). Further, as per para. 3 of those guidelines, non-Annex I Parties are to submit updates of their national GHG inventories in accordance with paras. 8–24 of the UNFCCC guidelines for the preparation of NCs from non-Annex I Parties, contained in the annex to decision 17/CP.8. The scope of such updates should be consistent with the non-Annex I Party's capacity and time constraints and the availability of its data, as well as the level of support provided by developed country Parties for biennial update reporting.

Table I.2

Identification of the extent to which the elements of information on mitigation actions are included in the first biennial update report of Rwanda

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, annex III, paragraph 11	Non-Annex I Parties should provide information, in tabular format, on actions to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol.	Yes	Rwanda provided information on mitigation actions in tabular format.
Decision 2/CP.17, annex III, paragraph 12	For each mitigation action or group of mitigation actions, including, as appropriate, those listed in document FCCC/AWGLCA/2011/INF.1, developing country Parties shall provide the following information, to the extent possible:		
	(a) Name and description of the mitigation action, including information on the nature of the action, coverage (i.e. sectors and gases), quantitative goals and progress indicators;	Partly	Information on quantitative goals for some of the mitigation actions in the energy sector was not reported.
	(b) Information on:		
	(i) Methodologies;	No	
	(ii) Assumptions;	No	
	(c) Information on:		
	(i) Objectives of the action;	Yes	
	(ii) Steps taken or envisaged to achieve that action;	Yes	
	(d) Information on:		
	(i) Progress of implementation of the mitigation actions;	Partly	Rwanda did not report information on the implementation status for some mitigation actions in the energy sector.
	(ii) Progress of implementation of the underlying steps taken or envisaged;	Yes	
	(iii) Results achieved, such as estimated outcomes (metrics depending on type of action) and estimated emission reductions, to the extent possible;	Yes	Rwanda reported ex ante and/or ex post estimated outcomes or estimated emission reductions for mitigation actions.

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
	(e) Information on international market mechanisms.	Yes	
Decision 2/CP.17, annex III, paragraph 13	Parties should provide information on domestic MRV arrangements.	Yes	

Note: The parts of the UNFCCC reporting guidelines on BURs on the reporting of information on mitigation actions in BURs are contained in decision 2/CP.17, annex III, paras. 11–13.

Table I.3

Identification of the extent to which the elements of information on finance, technology and capacity-building needs and support received are included in the first biennial update report of Rwanda

<i>Decision</i>	<i>Provision of the reporting requirements</i>	<i>Assessment of whether the information was reported</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, annex III, paragraph 14	Non-Annex I Parties should provide updated information on: (a) Constraints and gaps; (b) Related financial, technical and capacity-building needs.	Yes Yes	
Decision 2/CP.17, annex III, paragraph 15	Non-Annex I Parties should provide: (a) Information on financial resources received, technology transfer and capacity-building received; (b) Information on technical support received from the GEF, Parties included in Annex II to the Convention and other developed country Parties, the Green Climate Fund and multilateral institutions for activities relating to climate change, including for the preparation of the current BUR.	Partly Yes	Rwanda did not report information on technology transfer support received.
Decision 2/CP.17, annex III, paragraph 16	With regard to the development and transfer of technology, non-Annex I Parties should provide information on: (a) Nationally determined technology needs; (b) Technology support received.	Partly No	Rwanda reported on ongoing and past technology needs assessments but information on specific technology needs derived from this process was not reported.

Note: The parts of the UNFCCC reporting guidelines on BURs on the reporting of information on finance, technology and capacity-building needs and support received in BURs are contained in decision 2/CP.17, annex III, paras. 14–16.

Annex II

Reference documents

A. Reports of the Intergovernmental Panel on Climate Change

IPCC. 1997. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. JL Houghton, LG Meira Filho, B Lim, et al. (eds.). Paris: IPCC/Organisation for Economic Co-operation and Development/International Energy Agency. Available at <https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html>.

IPCC. 2000. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. J Penman, D Kruger, I Galbally, et al. (eds.). Hayama, Japan: IPCC/Organisation for Economic Co-operation and Development/International Energy Agency/Institute for Global Environmental Strategies. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

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

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

B. UNFCCC documents

First BUR of Rwanda. Available at <https://unfccc.int/BURs>.

NC1, NC2 and NC3 of Rwanda. Available at <https://unfccc.int/non-annex-I-NCs>.