United Nations

FCCC/SBI/ICA/2021/TASR.2/PAN

Framework Convention on Climate Change

Distr.: General
18 March 2022

English only

Technical analysis of the second biennial update report of Panama submitted on 27 March 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. Further, paragraph 41(f) of that decision states that Parties not included in Annex I to the Convention shall submit a biennial update report every two years, either as a summary of parts of their national communication in the year in which the national communication is submitted or as a stand-alone update report. 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 second biennial update report of Panama, conducted by a team of technical experts in accordance with the modalities and procedures contained in the annex to decision 20/CP.19.

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AD	activity data
AFOLU	agriculture, forestry and other land use
AR	Assessment Report of the Intergovernmental Panel on Climate Change
BUR	biennial update report
CDM	clean development mechanism
CH_4	methane
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	*Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*
IPCC good practice guidance for LULUCF	*Good Practice Guidance for Land Use, Land-Use Change and Forestry*
LULUCF	land use, land-use change and forestry
MRV	measurement, reporting and verification
N_2O	nitrous oxide
NA	not applicable
NAMA	nationally appropriate mitigation action
NC	national communication
NDC	nationally determined contribution
NIR	national inventory report
NO	not occurring
non-Annex I Party	Party not included in Annex I to the Convention
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
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)
Revised 1996 IPCC Guidelines	*Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*
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"
Wetlands Supplement	*2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*

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. In addition, paragraph 41(f) of that decision states that non-Annex I Parties shall submit a BUR every two years, either as a summary of parts of their NC in the year in which the NC is submitted or as a stand-alone update report.

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. Panama submitted its first BUR on 18 April 2019, which was analysed by a TTE in the thirteenth round of technical analysis of BURs from non-Annex I Parties, conducted from 27 to 31 May 2019. After the publication of its summary report, Panama participated in the ninth workshop for the facilitative sharing of views, convened virtually on 25 November 2020.

5. This summary report presents the results of the technical analysis of the second BUR of Panama, 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

6. In accordance with the mandate referred to in paragraph 2 above, Panama submitted its second BUR on 27 March 2021 as a stand-alone update report. The submission was made within two years from the submission of the first BUR.

7. A desk analysis of Panama's BUR was conducted remotely from 28 June to 2 July 2021 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: Zuelclady Maria Fernanda Araujo Gutierrez (Mexico), Bertha Iris Argueta Tejeda (Honduras), Luis Caceres Silva (former member of the Consultative Group of Experts from Ecuador), Carlos Fuller (former member of the Consultative Group of Experts from Belize), Liviu Gheorghe (Romania), Liudmila Hristova Naydenova (Netherlands), Marcela Itzel Olguin-Alvarez (Mexico), Elisabeth Pagnac-Farbiaz (France), Jose Manuel Ramirez Garcia (Spain), Juan José Rincón Cristóbal (Spain), Raul Salas Reyes (Mexico), Alexander Valencia (Colombia) and Iván Darío Valencia (Colombia). Ms. Pagnac-Farbiaz and Mr. Salas Reyes were the co-leads. The technical analysis was coordinated by Karen Ortega Marin (secretariat).

8. 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 Panama engaged in consultation[1] on the identification of capacity-building needs for the preparation of BURs and participation in the ICA process. Following the technical analysis of Panama's second BUR, the TTE prepared and shared a draft summary report with Panama on 23 September 2021 for its review and comment. Panama, in turn, provided its feedback on the draft summary report on 14 December 2021.

[1] The consultation was conducted via videoconferencing.

9. The TTE responded to and incorporated Panama's comments referred to in paragraph 8 above and finalized the summary report in consultation with the Party on 25 February 2022.

II. Technical analysis of the biennial update report

A. Scope of the technical analysis

10. 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).

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

B. Extent of the information reported

12. The elements of information referred to in paragraph 10(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.

13. 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 12 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.

14. The current TTE noted improvements in the reporting in Panama's second BUR compared with that in its first BUR. Information on the GHG inventory, mitigation actions and their effects, and needs and support reported in the Party's second BUR demonstrates that it has taken into consideration the areas for enhancing the transparency of the extent of information reported noted by the previous TTE in the summary report on the technical analysis of the Party's first BUR.

C. Technical analysis of the information reported

15. The technical analysis referred to in paragraph 10(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.

16. 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.

17. 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

18. 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.

19. In its second BUR, Panama provided an update on its national circumstances, including a description of its geography, topography, political and administrative structure, climate, hydrology, land cover, biodiversity, population, social and economic development, ethnic composition, education system, economic structure and natural resources, that might affect the Party's ability to deal with mitigating and adapting to climate change, as referred to in Article 4, paragraph 8, and, as appropriate, Article 4, paragraphs 9–10, of the Convention. As a country of 75,517 km^2 with coasts on the Caribbean Sea and the Pacific Ocean, Panama has 65.4 per cent forest land cover and a biodiversity corridor with 3.3 per cent of global plant species and significant mangrove and coral reef ecosystems. The population as at 1 July 2018 was estimated to be 4,158,783 inhabitants and the country reported a Human Development Index of 0.795 for 2018. The economy is dominated by the services sector (60 per cent of gross domestic product), while the highest growth has been observed in copper concentrate mining. Overall economic growth was 3 per cent in 2019. Panama reported high potential for renewable energy, primarily hydro, wind, solar, geothermal, marine and biomass energy.

20. In addition, Panama provided a summary of relevant information regarding its national circumstances in tabular format.

21. Panama transparently reported in its second BUR an update 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, roles of other institutions and experts, mechanisms for information and data exchange, QA/QC procedures, and provisions for public consultation and other forms of stakeholder engagement. Panama reported the creation of the Directorate of Climate Change in the Ministry of Environment in 2018 and the creation of the Sustainable Panama: Reduce your Footprint programme for the management and monitoring of low-carbon development in Panama. The second BUR was produced mainly by internal personnel of the Ministry of Environment, which has increased its capacity in recent years. The Ministry of Environment coordinates the preparation of reports under the Convention, while the National Climate Change Committee, comprising 27 entities, reviews and validates the reports. Executive decree 100 of 2020 provides the legal basis for the institutional arrangements of the Sustainable System for National Greenhouse Gas Inventories, the Registry of Emissions and Mitigation Actions, the Registry of Means of Implementation, and the National System for the Monitoring and Update of the National Strategy for Low Carbon Economic and Social Development.

22. Regarding vulnerability and adaptation, Panama indicated that in April 2021 executive decree 135 of the Presidency of the Republic and the Ministry of Environment was enacted, establishing the National Data System for Adaptation to Climate Change and the National System of Monitoring, Evaluation and Reporting of Adaptation; activating the national adaptation fund; and creating the national Build your Resilience programme. The objective of the National Data System is to generate strategic information about Panama's vulnerability to and risk of suffering adverse impacts of climate change to be used in

designing adaptation responses in climate change policy. It will be used to produce and update climate change scenarios and climate risk maps at the national level, as well as for the climate change vulnerability index. Furthermore, the Ministry of Environment is to design a monitoring and evaluation platform for adaptation, which will be part of the transparency portal of the NDCs.

23. Panama reported information on its cross-cutting MRV system, which covers GHG emissions, resulting in a GHG inventory; mitigation actions, which are evaluated before and after implementation; and means of implementation, whereby the transfer of climate technology, finance flows and the creation and strengthening of capacity are tracked.

24. In paragraph 21 of the summary report on the technical analysis of Panama's first BUR, the previous TTE noted areas where the transparency of the reporting on institutional arrangements could be further enhanced. The current TTE noted the improvements referred to in paragraph 21 above and commends the Party for enhancing the transparency of its reporting.

25. Panama reported in its BUR (chap. 1, sections 2.3, 3.2 and 4) information on its current initiatives for enhancing its institutional arrangements for compliance with requirements under the ETF. The initiatives relate to the mapping of actors and the institutionalization of responsibilities as predicated by executive decree 100, including the Registry of Means of Implementation, and to climate change and gender. 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

26. As indicated in table I.1, Panama 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.

27. Panama submitted its second BUR in 2021 and the GHG inventory reported is for 1994–2017. The GHG inventory is consistent with the requirements for the reporting time frame. During the technical analysis, Panama clarified that significant efforts were made to improve the completeness of the inventory compared with that previously submitted. The TTE commends the Party for its efforts to report more complete and accurate information in its GHG inventory.

28. Panama submitted an NIR in conjunction with its second BUR. The relevant sections of the NIR were referenced in the BUR and the document was made publicly available on the UNFCCC website.[2]

29. GHG emissions and removals for the BUR covering the 1994–2017 inventories were estimated using tier 1 and 2 methodologies from the 2006 IPCC Guidelines across all sectors.

30. Information on AD and EFs used and their sources was clearly reported in the BUR, including information on the methodologies used. The TTE noted that Panama expressed a need for additional training and capacity-building to facilitate generating and using higher-tier methodologies, especially for key categories.

31. Information on AD for all years of the time series for the LULUCF sector was reported in Panama's BUR and NIR. Panama expressed additional capacity-building needs for generating data for all years of the time series and applying methodologies for specific categories of the LULUCF sector.

32. Information on the Party's total GHG emissions by gas for 1994–2017 is outlined in table 1 in Gg CO_2 eq. It shows an increase in emissions of 110.7 per cent without land and HWP since 1994 (equal to 9,388.7 Gg CO_2 eq) and a decrease of 35.2 per cent with land and HWP (equal to 5,299.01 Gg CO_2 eq). Information on HFCs, PFCs and SF_6 and the use of notation keys was reported. However, information on HFCs was available only for 2012 onward.

[2] https://unfccc.int/BURs.

Table 1
Greenhouse gas emissions by gas of Panama for 1994–2017

Gas	*GHG emissions (Gg CO_2 eq) including land and HWP[a]*	*% change 1994–2017*	*GHG emissions (Gg CO_2 eq) excluding land and HWP[a]*	*% change 1994–2017*
CO_2	–15 867.83	17.9	11 844.04	172.7
CH_4	4 740.68	34.9	4 680.02	37.3
N_2O	914.25	20.6	893.05	22.5
HFCs	454.15	NA	454.15	NA
PFCs	NO	NA	NO	NA
SF_6	NO	NA	NO	NA
Other	NO	NA	NO	NA
Total	–9 758.75	–35.2	17 871.44	110.7

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

33. Information on other emissions was reported, including GHG precursors for some categories of the agriculture sector (nitrogen oxides and carbon monoxide). Panama explained that data were not available to prepare calculations and report estimates for all sectors and other gases (including non-methane volatile organic compounds, sulfur oxides and ammonia).

34. Panama applied notation keys in tables where numerical data were not provided. The use of notation keys was consistent with the UNFCCC guidelines for the preparation of NCs from non-Annex I Parties.

35. Panama reported comparable information addressing the tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF and the sectoral reporting tables annexed to the Revised 1996 IPCC Guidelines. Information was provided on the stratification of most categories of land use and on annual changes in carbon stock for most carbon pools.

36. Information on annual changes in carbon stock was not reported for some subcategories of the LULUCF sector in Panama's BUR (i.e. wetlands converted to forest land, settlements converted to forest land, other land converted to forest land, wetlands converted to farmland, settlements converted to farmland, other land converted to farmland, wetlands converted to grassland, settlements converted to grassland, other land converted to grassland, farmland converted to wetlands, grassland converted to wetlands, settlements converted to wetlands, wetlands converted to settlements, other land converted to settlements, and land converted to other land).

37. The shares of emissions that different sectors contributed to the Party's total GHG emissions excluding LULUCF, as calculated by the TTE using information from the BUR, in 2017 are reflected in table 2.

Table 2
Shares of greenhouse gas emissions by sector of Panama for 1994–2017

Sector	*GHG emissions (Gg CO_2 eq)*	*% share*[a]	*% change 1994–2017*
Energy	11 245.90	62.9	161.3
Industrial processes and product use	1 256.80	7.0	619.4
Agriculture	3 463.20	19.4	5.3
LULUCF	–27 629.20	NA	–17.4
Waste	1 904.90	10.7	4.6

[a] Share of total emissions without LULUCF.

38. Panama reported information on its use of GWP values consistent with those provided by the IPCC in its AR5 based on the effects over a 100-year time-horizon of GHGs. The Party identified improvements in the information reported, such as closing information gaps and generating a more consistent, comparable, complete, accurate and transparent time series.

39. For the energy sector, information was clearly reported on GHG emissions, methodological tier level (tier 1 for all categories), AD and their sources (from national statistics), EFs (default), key categories and notation keys used. The key categories are energy industries, manufacturing industries and construction, and transport, in particular owing to the use of fossil fuels (diesel and gasoline) in road transportation.

40. For the industrial processes sector, information was clearly reported on GHG emissions (CO_2, PFCs and HFCs), methodological tier levels (tier 1 for category 2.D (non-energy products from fuels and solvent use) and tier 2 for category 2.A (mineral industry)), AD and their sources (from national statistics and industry), EFs (default), key categories, notation keys used and other information specific to the sector. The key categories are cement production, and refrigeration and air conditioning. Panama did not report HFC emissions for the entire series, having started reporting them only from 2012 onwards. The Party explained in the BUR that the situation is due to lack of data.

41. For the solvent and other product use sector, information was clearly reported on GHG emissions, methodological tier level (tier 1), AD and their sources (a combination of data from national statistics and import and export databases), EFs (default), key categories, notation keys used and other information specific to the sector. As explained in the BUR, the production of solvents does not occur in the country, and the use only includes lubricants. In 2017, the emissions were 37.5 kt CO_2 eq, which is 2.8 per cent of the sectoral total.

42. For the agriculture sector, enteric fermentation (CH_4) and agricultural soils (N_2O) were identified as key categories and the most relevant emissions sources in the sector, representing 72.9 and 19 per cent, respectively, of the sectoral emissions in 2017. Panama used EFs from the 2006 IPCC Guidelines.

43. Information was not reported on N_2O emissions from crop residues returned to soils or indirect N_2O emissions from mineralized nitrogen resulting from loss of soil organic carbon stocks in mineral soils through land-use change or management practices. Additionally, prescribed burning of savannahs was reported under the LULUCF sector, under the subcategory grassland remaining grassland, owing to the lack of a clear definition of savannah in the national context, which makes the disaggregation of data on the burned areas of savannah difficult.

44. For the LULUCF sector, Panama reported annual GHG emissions and removals for 1994–2017. Overall, the net removals from the LULUCF sector fluctuated between –23,234.10 kt CO_2 eq in 2000 and –28,397.2 kt CO_2 eq in 2013. Forest land and pastures were the categories that contributed the most to the emissions balance in 2017, representing 87.9 and 8.8 per cent, respectively.

45. For the waste sector, information was clearly reported on GHG emissions (CO_2, CH_4 and N_2O), methodological tier level (tier 1), AD and their sources (from national statistics), EFs (default), key categories, notation keys used and other information specific to the sector. The key categories are solid waste disposal, and wastewater treatment and discharge.

46. Information on biological treatment of solid waste, and incineration and open burning of waste was not reported in Panama's BUR, but the BUR includes relevant explanation. Panama indicated in its BUR that it plans to improve the reporting on waste in future GHG inventories.

47. The BUR provides an update to all GHG inventories reported in the Party's first BUR. The information reported provides an update of the Party's first BUR, which addressed anthropogenic emissions and removals for 2013. The update was carried out for 1994–2017 using the methodologies contained in the 2006 IPCC Guidelines, thus generating a consistent 23-year time series. The Party reported that it recalculated emissions for all categories for the entire time series owing to changes in methodology (applying the 2006 IPCC Guidelines) and GWP values (applying those from the AR5). The recalculations resulted in a decrease in estimated emissions for 2013 of 172.9 per cent. The GHG inventories for 1994–2017 reported in the BUR are consistent.

48. Panama described in its BUR the institutional framework for the preparation of its 2017 GHG inventory. The Party reported that the Ministry of Environment is the governmental body responsible for its climate change policy and GHG inventory, which was

prepared with the support of the United Nations Development Programme, which assisted Panama in designing its GHG inventory system. The Party identified improvements in the information reported, such as including more categories in the GHG inventory (e.g. non-energy products from fuels and solvent use).

49. Panama reported that a key category analysis was performed for the level of emissions and the trend in emissions. The analysis shows that category 4.A.1 (forest land remaining forest land) is the major contributor (59 per cent), followed by categories 1.A.3.b (road transportation), 4.C.2 (land converted to grassland), 3.A.1.b (enteric fermentation – other cattle), 1.A.1 (energy industries) and 1.A.2 (manufacturing industries and construction), accounting for a cumulative total of more than 85 per cent in the overall level assessment.

50. The BUR provides information on QA/QC measures for all sectors. The information reported includes, with regard to QA, who reviewed the procedures and results, the suggestions resulting from the review and the corrections made; and, with regard to QC, details on the management of AD, EFs and (calculation) worksheets and report sheets. General inventory-level information and information on source-specific procedures was provided. The Party identified the need to develop and implement a QA/QC and verification system within the framework of the Sustainable National GHG Inventory Management System.

51. Panama clearly reported information on CO_2 fuel combustion using both the sectoral and the reference approach. For 2017, the information reported indicates that the combustion emissions estimated under the sectoral and the reference approach are 11,035.00 and 11,138.50 Gg CO_2 eq, respectively. The difference between the estimates calculated using the two approaches was reported as 103.60 Gg CO_2 eq (0.9 per cent), resulting from the conversion of fuels and statistical adjustments. The figures provided by Panama for 1994, 2000, 2005, 2010, 2013, 2016 and 2017 illustrate a decrease in the percentage difference in estimates between the two approaches, from 4.0 per cent in 1994 to 4.8 per cent in 2000 and 0.9 per cent in 2017.

52. Information was clearly reported on international aviation and marine bunker fuels.

53. Panama reported information on the uncertainty assessment (level) of its national GHG inventory. The uncertainty analysis was based on the error propagation approach for most sectors, except for the LULUCF sector, for which a national methodology based on the 2006 IPCC Guidelines was applied, and covers all source categories for 2017 and 1994 and all direct GHGs. The results obtained, as reported in the BUR, reveal that the level uncertainty for emissions is ±58.0 per cent for 2017 and the trend uncertainty is ±17.3 per cent.

54. Information on underlying assumptions and uncertainties was not clearly reported in Panama's BUR. During the technical analysis, the Party clarified that all assumptions are based on the 2006 IPCC Guidelines and identified a capacity-building need for the country's GHG inventory team to improve the uncertainty estimation.

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 43 and 53 above, which could facilitate a better understanding of the information reported on GHG inventories.

56. In paragraph 44 of the summary report on the technical analysis of the Panama's first BUR, the previous TTE noted areas where the transparency of the reporting on GHG inventories, particularly on the time series, could be enhanced. The current TTE noted the improvements referred to in paragraphs 38 and 48 above and commends the Party for enhancing the transparency of its reporting.

57. Panama reported in its BUR (section 9.2) information on areas for improvement for future BURs for compliance with requirements under the ETF, including enhancing capacity to estimate emissions for most categories, including by developing EFs for higher-tier methodologies. The TTE commends the Party for the clear and comprehensive reporting on its proactive approach to preparing for ETF implementation.

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

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

59. The information reported provides a clear and comprehensive overview of the Party's mitigation actions and their effects. In its BUR, Panama reported information on its national context and framed its national mitigation planning and actions in the context of its National Climate Change Policy 2050, Economic and Social Development Low Carbon Strategy 2050 and National Climate Action Plan 2050. In 2015, in the light of the adoption of the Paris Agreement, Panama developed a portfolio of NAMAs. In 2018 Panama created the Directorate of Climate Change in the Ministry of Environment. In 2020 it passed the General Environmental Law on Mitigation of Global Climate Change and established the Reduce your Footprint programme. Panama reported that climate change has been mainstreamed in and integrated into its development plans, including for mitigation.

60. Panama presented information on its initial NDC and updated NDC. The updated NDC includes 29 commitments covering 10 sectors and strategic areas of the economy. Panama is committed to reducing GHG emissions from the energy sector by 11.5 per cent by 2030 and by 24 per cent by 2050. Panama also reaffirmed its commitment to ensuring that, by 2050, 30 per cent of electricity is produced from renewable sources, such as wind and solar. Regarding forests, the National Forest Restoration Plan will be implemented by 2025, signifying the achievement of the established goal of restoring 50,000 ha forest land throughout the country. The Party is also committed to implementing sectoral planning and management instruments in relation to energy, forests, integrated management of hydrographic basins, marine-coastal system, biodiversity, agriculture, livestock and sustainable aquaculture, resilient human settlements, public health, sustainable infrastructure and circular economy so that, in the medium term, every initiative integrates climate as an intrinsic variable from its conception. In addition, Panama is in the initial stages of formulating a national long-term climate strategy for 2020–2050.

61. Regarding the information on NDCs presented in the BUR, the TTE acknowledged the information, which is presented in this summary report as contextual without assessing the extent and transparency of the information.

62. The Party 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.

63. Consistently with decision 2/CP.17, annex III, paragraph 12(a), Panama clearly reported mitigation actions in the energy, LULUCF, agriculture, industrial processes and waste sectors at the national and municipal level, including the name and nature of the actions, coverage (mainly CO_2, CH_4, N_2O, HFCs, SF_6 and nitrogen trifluoride) and progress indicators in the BUR (tables 3.28–3.9). Most of the mitigation actions are in the energy sector. A clear description of mitigation actions, as well as information on quantitative goals, was provided in the BUR. Panama reported its mitigation actions at the national level and, in a separate section, on mitigation actions in the Panama Canal Zone managed by the Panama Canal Authority.

64. Panama clearly reported information on methodologies and assumptions, and the objectives of the actions and steps taken and envisaged to achieve those actions for all mitigation actions in the energy, LULUCF, agriculture, waste and industrial processes sectors. The Party reported in its BUR that implementation of the actions was delayed as a result of the coronavirus disease 2019 pandemic but is expected to commence in 2022.

65. Panama estimates that it will reduce its emissions by 10 Mt CO_2 eq between 2022 and 2030 and by 60 Mt by 2050 in the energy sector. Mitigation actions focused mainly on hydrocarbons and electricity and will be undertaken through 14 projects and programmes. These will be accomplished by implementing an energy transition strategy targeting energy generation, manufacturing, construction and transportation. A national electric mobility strategy is already being implemented. Sustainable building regulations are also being

implemented to improve the energy efficiency of buildings. Energy efficiency standards and labelling for appliances are being implemented. Another project to install solar water heaters is being implemented, which will achieve emission reductions of 130,568 t CO_2 eq by 2030, 884,285 t CO_2 eq by 2040 and 2,229,697 t CO_2 eq by 2050.

66. The Party highlighted one of the key mitigation actions related to maritime transport, which is the expansion of the Panama Canal. The Panama Canal Authority has developed the Panama Canal Green Route environmental strategy. It includes managing the operations of the canal efficiently to reduce emissions from the energy sector, conserve water and protect the watershed. It has also developed software to estimate emission reductions from using a shorter route through the canal for shipping. Panama reported that, if all implemented activities in maritime transport are sustained, the anticipated minimum GHG emission reduction is expected to be 160 Mt CO_2 eq by 2025.

67. For the industrial processes sector, Panama reported that a strategy for eliminating HFCs in accordance with the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer is being developed with the aim of reducing HFCs by 80 per cent by 2045. A policy and plan in the air conditioning and refrigeration sector is in the planning stage and will include indicators covering implementation, policy framework and governance.

68. For the AFOLU sector, Panama reported some actions, such as a national forest restoration programme to restore 51,075 ha degraded land by 2050 resulting in the absorption of 2,268,000 t CO_2 eq. A national REDD+ strategy is under development. NAMAs for rice cultivation and low-carbon sustainable cattle are being designed to be implemented over a 10-year period and are awaiting support. The NAMA for cattle is estimated to reduce emissions by 0.78 Mg CO_2 eq over the 10-year period.

69. For the waste sector, Panama reported the Zero Waste Programme 2015–2035, which will reduce emissions in the waste sector through reducing, reusing and recycling solid waste by 30 per cent in 2035 and result in 50 per cent of recyclable material being recycled or reused. A national waste management plan is being developed to reduce CH_4 emissions.

70. For other areas, Panama reported that the Ministry of Environment has developed a voluntary programme for the private sector to reduce its carbon footprint. Emission reductions will be estimated from the 100 private, public and civic organizations registered in the Reduce your Footprint corporate programme using indicators such as the number of organizations, the number of persons trained in the organizations, the annual CO_2 eq emissions, the annual CO_2 eq emissions reduced by scope, and the number of organizations registered in the programme by sector.

71. Panama provided information on its involvement in international market mechanisms as a Party to the Kyoto Protocol. Panama documented 23 CDM projects with an emission reduction potential of 2.6 Mt CO_2 eq approved by its designated national authority, 6 of which verified under the CDM. Information was provided on the total number of projects, sectors covered and quantity of certified emission reductions issued for Panama. Panama also participates in voluntary carbon markets, with two projects registered under the Gold Standard, which will reduce emissions by 518,380 t CO_2 eq, and one under the Verified Carbon Standard with an emission reduction potential of 14,126,091 t CO_2 eq by 2046.

72. Panama reported information on its domestic MRV arrangements in accordance with decision 2/CP.17, annex III, paragraph 13. The information reported indicates that Panama is in the process of designing and developing a domestic MRV system for mitigation actions. It will consist of a registry of emissions at the corporate and municipal level, a registry of mitigation actions, a registry of information for the commercialization of emission reduction units at the national level and a registry of information for the commercialization of certified emission reduction units for the international carbon market. The registry of mitigation actions will include NAMAs, REDD+ activities, CDM projects and a registry for other activities that reduce emissions or enhance sinks. The National Platform for Climate Transparency will host a module for the Registry of Emissions and Mitigation Actions, which will act as the repository of data related to programmes for the management of GHG emissions, reduction in emissions as a result of mitigation actions implemented under

national and international schemes that are measurable, reportable and verifiable, and commercial transactions under international and national carbon markets.

73. In paragraph 53 of the summary report on the technical analysis of Panama's first BUR, the previous TTE noted areas where the transparency of the reporting on mitigation actions, including progress, methodologies and assumptions, could be further enhanced. The current TTE noted the improvements and commends the Party for enhancing the transparency of its reporting.

74. Panama reported in its BUR its current initiatives for enhancing its existing MRV system for compliance with requirements under the ETF. The initiatives relate to establishing the National Platform for Climate Transparency and institutional strengthening. The TTE commends the Party for the clear and comprehensive reporting on its proactive approach to preparing for ETF implementation.

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

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

76. Panama 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, Panama identified as constraints its small size and lack of access to alternative energy; lack of financial resources for developing national EFs; lack of financing for implementing mitigation actions in the agriculture sector; limited capacity in small enterprises, public agencies and municipalities in relation to mitigation; limited knowledge and experience of groundwater research, aquifer recharge and water footprint; limited climate and agroclimatic data for assessing risk and vulnerability in relation to water basins, the agriculture sector, cities, infrastructure and public health; and lack of financing instruments for renewable energy and methodologies for quantifying the cost of implementation of payment-based environmental services.

77. Panama reported that its financial, technical and capacity-building needs are in the areas of researching national EFs, designing NAMAs and implementing agricultural mitigation actions, and tracking the progress of implementation of its mitigation actions and designing financial instruments for renewable energy. Additional capacity-building needs relate to using the Wetlands Supplement, biodiversity and climate change, and training for small enterprises, public institutions and purveyors of information on climate change mitigation policies and planning, GHG management and the Registry of Emissions and Mitigation Actions. Regarding adaptation, Panama reported capacity-building needs related to hydrology and hydrogeology for hydrological balances, characterizing aquifers and developing a technical manual on the artificial recharge of aquifers. Furthermore, the Party reported a need for capacity-building for conducting vulnerability assessment for various sectors.

78. Panama reported information on financial resources, technology transfer, capacity-building and technical support received in accordance with decision 2/CP.17, annex III, paragraph 15. In its BUR, Panama reported that it received USD 74.73 million in climate financing from multilateral and bilateral sources, of which USD 54.14 million was allocated to adaptation, USD 9.42 million to mitigation and USD 11.16 million to cross-cutting. Panama reported receiving funding from the GEF of USD 15.0 million, including USD 852,000 for preparing its second BUR and NC4, USD 9.9 million from the Adaptation Fund, USD 84,900 from the Climate Technology Centre and Network and USD 36.3 million from the Green Climate Fund, of which USD 28.0 million is non-concessional finance for the Productive Investment Initiative for Adaptation to Climate Change.

79. Other financial support was provided by the World Bank, the European Union, including through the EUROCLIMA+ programme, the United Nations Development Programme, the United Nations Environment Programme, the United Nations Economic Commission for Latin America and the Caribbean, the Spanish Agency for International Development Cooperation, the Austrian Development Cooperation, the Inter-American

Development Bank, the NDC Partnership, the Collaborative Instruments for Ambitious Climate Action initiative, the Latin American Energy Organization, the Korea International Cooperation Agency, the World Resources Institute and the Food and Agriculture Organization of the United Nations.

80. The information reported indicates that Panama received 47 instances of capacity-building support, of which 41 relate to mitigation and only 6 to adaptation. Other entities, in addition to those providing financial support, provided capacity-building support, such as the UNFCCC, the United States Forest Service, the Center for International Forestry Research and the Government of Chile. Furthermore, Panama reported receiving technology transfer support from the GEF, the Climate Technology Centre and Network, the Adaptation Fund, the European Union, the Collaborative Instruments for Ambitious Climate Action initiative, the Korea International Cooperation Agency, the Inter-American Development Bank, the Austrian Development Cooperation, the Latin American Energy Organization, the United Nations Environment Programme, the NDC Partnership and the World Bank in various fields such as emission registries, energy information management systems, modelling, solar water heaters, electric mobility, coastal erosion and risk management.

81. Panama 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, Panama reported that the technology needs assessment was nationally determined. The technology needs assessment carried out in 2017 was the basis for the technology needs reported in the BUR; it focused on the energy sector in terms of mitigation and the water resources sector in terms of adaptation. Panama noted that the technology needs assessment has not been updated since then, yet the Party reported new technology needs related to the GHG inventory and early warning systems. Reported technology needs relate primarily to geospatial information processing for land-cover data and emission calculations for the AFOLU sector, as well as to improving the national forest inventory and national fuel EFs. Technical needs for estimating climate change impacts, assessing mitigation policies and conducting vulnerability assessment were also highlighted by Panama.

82. In paragraph 58 of the summary report on the technical analysis of the Party's first BUR, the previous TTE noted areas where the transparency of the reporting on needs and support received could be further enhanced. The current TTE noted the improvements and commends the Party for enhancing the transparency of its reporting.

83. During the technical analysis, Panama informed the TTE that it carries out various international technical cooperation programmes involving cooperation and exchanges with fellow developing countries, namely EUROCLIMA+, the NDC Partnership, the Partnership for Market Readiness, the Alliance of Voluntary Greenhouse Gas Management Programs for Latin America and the Caribbean, the Ibero-American Network of Climate Change Offices, the Latin-American Network on Greenhouse Gas Inventories, the Independent Association of Latin America and the Caribbean, the Global Covenant of Mayors for Climate & Energy and the Pacific Rim Ocean-Climate Action Partnership. The TTE noted that this information could be useful for understanding the circumstances of Panama with regard to support needed and provided.

84. Panama reported in its BUR (section 3.2) information on its initiatives for the continued elaboration of reports for compliance with requirements under the ETF. The initiatives relate to developing the National Platform for Climate Transparency as proposed by the Party with a view to integrating institutional arrangements for the preparation of reports. The TTE commends the Party for the clear and comprehensive reporting on its proactive approach to preparing for ETF implementation.

D. Identification of capacity-building needs

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

(a) Strengthening institutional capacity in a cross-cutting manner related to energy, industrial processes and product use and the environment to improve the collection and systematization of the data necessary to estimate emission reductions;

(b) Understanding the uses of different EFs across different mitigation activities and the GHG inventory;

(c) Developing and implementing a QA/QC and verification system within the framework of the Sustainable National GHG Inventory Management System;

(d) Applying the Wetlands Supplement with a view to including coastal wetlands as a category in future GHG inventories;

(e) Generating information on the different management practices for pastures and agricultural crops used in the country;

(f) Using various methodologies and EFs to estimate carbon in mineral soils for all subcategories;

(g) Generating information for estimating emissions from HWP and planning a road map for estimating the category in future;

(h) Improving QA/QC to ensure consistency with previous GHG inventories;

(i) Generating AD and EFs for the LULUCF sector in order to move to at least a tier 2 estimation methodology for as many categories as possible;

(j) Generating EFs for the agriculture sector in order to move to at least a tier 2 estimation methodology;

(k) Enhancing the capacity of all sectoral teams working on the inventory to conduct uncertainty assessment.

86. The TTE noted that, in addition to those identified during the technical analysis, Panama reported several capacity-building needs, covering:

(a) Researching national EFs;

(b) Establishing a robust methodology for collecting data on forest fires;

(c) Improving the estimation of uncertainty for the GHG inventory;

(d) Arranging for regular (annual) calculation of power grid EFs;

(e) Developing projections of emissions and removals for future BTRs;

(f) Biodiversity and climate change;

(g) Designing NAMAs and implementing agricultural mitigation actions;

(h) Training for small enterprises, public institutions and purveyors of information on climate change mitigation policies and planning, GHG management and the Registry of Emissions and Mitigation Actions;

(i) Establishing mechanisms for assessing the pertinence and implementation feasibility of GHG mitigation policies;

(j) Tracking progress of implementation of mitigation actions and designing financial instruments for renewable energy;

(k) Hydrology and hydrogeology for hydrological balances, characterizing aquifers and developing a technical manual on the artificial recharge of aquifers;

(l) Conducting vulnerability assessment for various sectors.

87. In paragraph 60 of the summary report on the technical analysis of Panama's first BUR, the previous TTE, in consultation with Panama, identified and prioritized capacity-building needs. During the technical analysis, Panama reflected that some of those capacity-building needs have been addressed:

(a) Strengthening the national capacity to use the 2006 IPCC Guidelines, in particular for preparing GHG inventories using the best information available, investigating

differences between the sectoral and the reference approach, ensuring time-series consistency, making recalculations, developing and implementing a QA/QC plan, and undertaking key category analyses and uncertainty assessments and using their results for preparing improvement plans;

(b) Establishing the national capacity to estimate GHG precursor, fluorinated gas and other emissions that are currently not estimated in the GHG inventory;

(c) Improving the national capacity to apply the UNFCCC reporting guidelines on BURs, including preparing complete information on mitigation actions in tabular format;

(d) Enhancing the technical capacity of institutions to prepare NCs and BURs on a continuous basis.

88. During the technical analysis, Panama indicated that the following capacity-building needs presented in the summary report on the technical analysis of its first BUR have been partially met:

(a) Enhancing the implementation of sustainable institutional arrangements and reinforcing the capacity of key stakeholders to understand the needs of the GHG inventory and how to perform their roles as data providers and QA experts;

(b) Strengthening the technical capacity of institutions and experts to determine financial, technical, technology and capacity-building needs;

(c) Improving the national capacity to track and report on the progress of implementation of mitigation actions and the underlying steps taken or envisaged to achieve the actions;

(d) Improving the national capacity to design and implement the proposed MRV system;

(e) Strengthening the technical capacity of institutions to define a plan that encompasses all institutions involved and outlines their roles and responsibilities with a view to ensuring the functionality of the proposed MRV system.

89. During the technical analysis, Panama indicated that the following capacity-building need presented in the summary report on the technical analysis of its first BUR has not yet been addressed: improving the national capacity to evaluate the balance between the benefits (development and emission reductions) and costs of proposed mitigation actions.

III. Conclusions

90. The TTE conducted a technical analysis of the information reported in the second BUR of Panama 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, including associated methodologies and assumptions; 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 information on gender and climate change. During the technical analysis, additional information was provided by Panama on assumptions and uncertainty estimations in the GHG inventory being based on the 2006 IPCC Guidelines. The TTE concluded that the information analysed is mostly transparent.

91. Panama reported an update on the institutional arrangements relevant to the preparation of its BURs. The Directorate of Climate Change in the Ministry of Environment was created in 2018. The BUR was produced internally at the Ministry of Environment, as the coordinating entity for the preparation of reports under the Convention, while the National Climate Change Committee reviews and validates the reports. Executive decree 100 of 2020 provides the legal basis for the institutional arrangements of the Sustainable System for National Greenhouse Gas Inventories, the Registry of Emissions and Mitigation Actions, the

Registry of Means of Implementation and the National System for the Monitoring and Update of the National Strategy for Low Carbon Economic and Social Development. Panama has taken significant steps to establish institutional arrangements that allow for the sustainable preparation of its BURs. These include making organizational improvements and establishing knowledge-sharing procedures to facilitate sectoral information transfer.

92. In its second BUR, submitted in 2021, Panama reported information on its national GHG inventory for 1994–2017. This included GHG emissions and removals of CO_2, CH_4 and N_2O for all relevant sources and sinks, while precursor gases were reported only partially and for some categories in the agriculture sector. The inventory was developed on the basis of the 2006 IPCC Guidelines and specific EFs were applied for individual key categories. The total GHG emissions for 2017 were reported as 17,871.44 Gg CO_2 eq (excluding LULUCF) and –9,758.3 Gg CO_2 eq (including LULUCF). Twelve key categories and main gases were identified, namely forest land remaining forest land, road transportation, land converted to grassland, enteric fermentation – other cattle, energy industries, manufacturing industries and construction, solid waste disposal, domestic waterborne navigation, land converted to cropland, other sectors (under energy), direct N_2O emissions from managed soils, and land converted to settlements. Estimates of fluorinated gases were provided for some but not all years included in the inventory (for HFCs); for other fluorinated gases (PFCs and SF_6) the Party explained in its BUR that they were either not occurring in the country or no data were available to estimate them.

93. Panama 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 2015–2050, and framed its national mitigation planning and actions in the context of its national strategy, which was launched in 2015 and revised in 2020. Panama reported planned actions in the energy, LULUCF, agriculture, industrial processes and waste sectors, including by the Panama Canal Authority and the private sector. The mitigation actions focus on energy generation, energy efficiency, transport, buildings, appliances, solar water heaters, reforestation, forest conservation, refrigeration and waste reduction, and the Party has NAMAs only for rice cultivation, but is planning them for cattle rearing. The Party also reported estimated emission reductions of 17 Mt CO_2 eq in 2016–2020 from widening the Panama Canal. Panama reported that, if all the mitigation actions reported in its BUR are implemented, the cumulative GHG emission reductions achieved will be 10 Mt CO_2 eq by 2030 and 62.6 Mt CO_2 eq by 2050. The Party also reported information on its involvement in international market mechanisms through the CDM and the voluntary carbon market, as well as on arrangements for an MRV system covering GHG emissions, mitigation actions and means of implementation.

94. Panama reported information on key constraints, gaps and related needs, including lack of financial resources for developing EFs; limited capacity in small enterprises, public agencies and municipalities in relation to mitigation; limited knowledge and experience of groundwater research; limited climate data for assessing risk and vulnerability; and lack of financing instruments for renewable energy. The related financial, technical and capacity-building needs relate to researching national EFs, tracking the progress of implementation of mitigation actions, designing financial instruments for renewable energy, hydrogeological characterization of aquifers and conducting vulnerability assessment for various sectors. Panama noted that the technology needs assessment has not been updated since 2017; nevertheless, the Party reported new technology needs related to the GHG inventory and early warning systems.

95. Information was reported on technical, technology transfer and capacity-building support received, including USD 74,734,978 in climate financing from multilateral and bilateral sources received between 2018 and 2020. The Party also reported that it received financial support of approximately USD 850,000 from the GEF for preparing its second BUR and NC4. The information reported indicates that Panama received 47 instances of capacity-building support, most of which were related to mitigation. Furthermore, Panama reported receiving technology transfer support in various fields such as emission registries, energy information management systems, modelling, solar water heaters, electric mobility, coastal erosion and risk management.

96. The current TTE noted improvements in the reporting in the Party's second BUR compared with that in its first BUR. The information reported demonstrates that the Party has taken into consideration the areas for enhancing the transparency of the information reported noted by the TTE in the summary report on the technical analysis of the first BUR. However, improvements are ongoing and the Party has taken note of outstanding areas for future improvement.

97. The TTE, in consultation with Panama, identified the 23 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. Panama identified the following as priority capacity-building needs:

(a) Generating AD and EFs for the LULUCF sector in order to move to at least a tier 2 estimation methodology for as many categories as possible;

(b) Enhancing the capacity of all sectoral teams working on the inventory to conduct uncertainty assessment;

(c) Training for small enterprises, public institutions and purveyors of information on climate change mitigation policies and planning, GHG management and the Registry of Emissions and Mitigation Actions;

(d) Establishing mechanisms to assess the pertinence and implementation feasibility of GHG mitigation policies.

Annex I

Extent of the information reported by Panama in its second biennial update report

Table I.1
Identification of the extent to which the elements of information on greenhouse gases are included in the second biennial update report of Panama

Decision	*Provision of the reporting guidelines*	*Assessment of whether the information was reported*	*Comments on the extent of the information provided*
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	Panama submitted its second BUR in March 2021; the GHG inventories reported are for 1994–2017.
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	Panama 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;	Yes	Comparable information was reported in tables in annex 3.2 to the NIR.
	(b) The sectoral report tables annexed to the Revised 1996 IPCC Guidelines.	Yes	Comparable information was reported.
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.	Yes	
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).	Yes	This information was reported for 1994–2017.
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:	Yes	

Decision	*Provision of the reporting guidelines*	*Assessment of whether the information was reported*	*Comments on the extent of the information provided*
	(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);	Yes	Comparable information was reported in tables included in annex 3 to the BUR.
	(b) Table 2 (National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF_6).	Yes	Comparable information was reported in tables included in annex 3 to the BUR.
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	
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:		
	(a) CO_2;	Yes	
	(b) CH_4;	Yes	
	(c) N_2O.	Yes	
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	Information on anthropogenic emissions by sources of HFCs was provided for some years of the time series.
	(b) PFCs;	Yes	
	(c) SF_6.	Yes	
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) Carbon monoxide;	Partly	The Party reported for some categories of the agriculture and LULUCF sectors.
	(b) Nitrogen oxides;	Partly	The Party reported for some categories of the agriculture and LULUCF sectors.
	(c) Non-methane volatile organic compounds.	No	Not reported owing to lack of data.

Decision	*Provision of the reporting guidelines*	*Assessment of whether the information was reported*	*Comments on the extent of the information provided*
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	
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	
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 by the IPCC in its AR2 based on the effects of GHGs over a 100-year time-horizon.	Yes	The Party used the GWP values from the AR5.
Decision 17/CP.8, annex, paragraph 21	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:		
	(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;	Yes	Tier 1 methodology was used for most sectors. Tier 2 was used for some sources and sinks under forest land, cropland and grassland in the LULUCF sector and cement and lime production in the industrial processes and product use sector.
	(b) Explanation of the sources of EFs;	Yes	Panama used the 2006 IPCC Guidelines as well as a national methodology for some categories of the LULUCF sector.
	(c) Explanation of the sources of AD;	Yes	Panama used the 2006 IPCC Guidelines.
	(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:	Yes	Panama used the 2006 IPCC Guidelines. Tier 1 and 2 methodology was used for all sectors.

Decision	*Provision of the reporting guidelines*	*Assessment of whether the information was reported*	*Comments on the extent of the information provided*
	(i) Source and/or sink categories;		
	(ii) Methodologies;		
	(iii) EFs;		
	(iv) AD;		
	(e) Parties are encouraged to identify areas where data may be further improved in future communications through capacity-building.	Yes	
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	
Decision 17/CP.8, annex, paragraph 24	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:		
	(a) Level of uncertainty associated with inventory data;	Yes	
	(b) Underlying assumptions;	Partly	Panama did not report clear information on underlying assumptions.
	(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 second biennial update report of Panama

Decision	*Provision of the reporting guidelines*	*Assessment of whether the information was reported*	*Comments on the extent of the information provided*
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	Panama included information 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:		

Decision	*Provision of the reporting guidelines*	*Assessment of whether the information was reported*	*Comments on the extent of the information provided*
	(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;	Yes	
	(b) Information on:		
	(i) Methodologies;	Yes	
	(ii) Assumptions;	Yes	
	(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;	Yes	
	(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	
	(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 second biennial update report of Panama

Decision	*Provision of the reporting requirements*	*Assessment of whether the information was reported*	*Comments on the extent of the information provided*
Decision 2/CP.17, annex III, paragraph 14	Non-Annex I Parties should provide updated information on:		
	(a) Constraints and gaps;	Yes	
	(b) Related financial, technical and capacity-building needs.	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;	Yes	
	(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	Yes	

Decision	*Provision of the reporting requirements*	*Assessment of whether the information was reported*	*Comments on the extent of the information provided*
	relating to climate change, including for the preparation of the current BUR.		
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;	Yes	
	(b) Technology support received.	Yes	

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.

IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva: IPCC. Available at https://www.ipcc.ch/publication/2013-supplement-to-the-2006-ipcc-guidelines-for-national-greenhouse-gas-inventories-wetlands/.

B. UNFCCC documents

First and second BURs of Panama. Available at https://unfccc.int/BURs.

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

Summary report on the technical analysis of the first BUR of Panama, contained in document FCCC/SBI/ICA/2019/TASR.1/PAN. Available at https://unfccc.int/ICA-reports.