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Technical analysis of the third biennial update report of Armenia submitted on 17 May 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 third biennial update report of Armenia, 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
EEA	European Environment Agency
EF	emission factor
EMEP	Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe
ETF	enhanced transparency framework under the Paris Agreement
F-gas	fluorinated gas
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	greenhouse gas
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*
IPPU	industrial processes and product use
LEAP	Low Emissions Analysis Platform
LULUCF	land use, land-use change and forestry
MRV	measurement, reporting and verification
N_2O	nitrous oxide
NA	not applicable
NC	national communication
NDC	nationally determined contribution
NE	not estimated
NIR	national inventory report
NO	not occurring
non-Annex I Party	Party not included in Annex I to the Convention
PFC	perfluorocarbon
PV	photovoltaic
QA/QC	quality assurance/quality control
Revised 1996 IPCC Guidelines	*Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*
SF_6	sulfur hexafluoride
TTE	team of technical experts
UNDP	United Nations Development Programme

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. 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. Armenia submitted its second BUR on 5 May 2018, which was analysed by a TTE in the third round of technical analysis of BURs from non-Annex I Parties, conducted from 20 to 24 August 2018. After the publication of its summary report, Armenia participated in the third workshop for the facilitative sharing of views, convened in Bonn on 19 June 2019.

5. This summary report presents the results of the technical analysis of the third BUR of Armenia, 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, Armenia submitted its third BUR on 17 May 2021 as a stand-alone update report. The submission was made within three years and one month from the submission of the second BUR. During the technical analysis, Armenia explained that it submitted the BUR more than two years after the submission of the previous BUR owing to challenges arising from the coronavirus disease 2019 pandemic.

7. A desk analysis of Armenia's BUR was conducted remotely from 30 September to 26 November 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: Ahmad Wafiq Aboelnasr (Egypt), Ana-Maria Danila (former member of the Consultative Group of Experts from the European Union), Andres B. Espejo (Spain), Reza Fallah (Islamic Republic of Iran), Domenico Gaudioso (Italy), Olga Gavrilova (Estonia), Agustín José Inthamoussu (Uruguay), Traute Koether (Austria), Juan Luis Martin Ortega (El Salvador), Stanford Mwakasonda (former member of the Consultative Group of Experts from the United Republic of Tanzania), Diana Camila Rodríguez Vargas (Colombia), Raúl Salas Reyes (Mexico), Caroline Tagwireyi (Zimbabwe) and Alexander Zahar (Australia). Ms. Gavrilova and Mr. Salas Reyes were the co-leads. The technical analysis was coordinated by Nalin Srivastava, Nashib Kafle, and Pedro Torres (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 Armenia 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 Armenia's third BUR, the TTE prepared and shared a draft summary report with Armenia

[1] The consultation was conducted via videoconferencing.

on 23 February 2022 for its review and comment. Armenia, in turn, provided its feedback on the draft summary report on 29 April 2022.

9. The TTE responded to and incorporated Armenia's comments referred to in paragraph 8 above and finalized the summary report in consultation with the Party on 18 May 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 Armenia'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 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.

14. The current TTE noted improvements in the reporting in Armenia's third BUR compared with that in its second BUR. Information on the GHG inventory, mitigation actions and their effects, needs and support, and other areas identified by the TTE reported in the Party's third 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 second BUR.

15. Regarding the areas for enhancing understanding of the extent of the information reported in the BUR noted by the previous TTE in the summary report on the technical analysis of the Party's second BUR, Armenia identified the areas that were not addressed in its third BUR. They include reporting emissions from HWP; explaining why biological treatment of solid waste is a negligible source of emissions; clearly reporting on international

market mechanisms regarding the Party's registered CDM projects; and specifying whether technology development and transfer needs were nationally determined.

C. Technical analysis of the information reported

16. 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.

17. 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. Armenia 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.

18. 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

19. 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.

20. In its third BUR, Armenia provided an update 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.

21. In addition, Armenia provided a summary of relevant information in tabular format and information on its national circumstances in graphical format.

22. Armenia transparently reported updated information on its existing and planned 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.

23. The Ministry of Environment is the statutory entity with overall responsibility for coordinating the development of the Party's GHG inventories, NCs and BURs and establishing the MRV system. A climate change policy division was established within the Ministry in 2015 to coordinate the preparation of NCs and BURs. Other institutions, such as the Statistical Committee, Public Services Regulatory Commission and Ministry of Economy, have specific roles with respect to the institutional arrangements for national GHG inventories. The Inter-agency Coordinating Council on Climate Change, established in 2012, is responsible for ensuring that Armenia fulfils requirements under the UNFCCC, including developing low-carbon and climate-resilient policies and reporting under the Paris Agreement.

24. Armenia provided an update on its domestic MRV arrangements, including the legal mandates established for updating the arrangements relating to the national Government and

defining the roles and responsibilities of key stakeholders. The MRV arrangements are designed at the national level and cover the GHG inventory system, mitigation, adaptation, climate finance (support received) and QA/QC. The Ministry of Environment has overall responsibility for establishing the MRV system, with the Inter-agency Coordinating Council on Climate Change acting as a horizontal inter-institutional coordination and verification mechanism that validates and approves national reports prior to submission to the UNFCCC. The system is being developed and builds on the existing systems, processes and infrastructure, rendering it cost-effective.

25. Armenia reported in its BUR (chap. 5) information on its current initiatives for enhancing its institutional arrangements for compliance with requirements under the ETF, including arrangements pertaining to preparation of biennial transparency reports. The initiatives relate to the Capacity-building Initiative for Transparency and other cooperation projects, and the legal processes for establishing the institutional arrangements. 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, Armenia 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. Armenia submitted its third BUR in 2021 and the GHG inventory reported is for 2017, which is consistent with the requirements for the reporting time frame.

28. Armenia submitted an NIR in conjunction with its third 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 1990–2017 inventories were estimated using a combination of tier 1, 2 and 3 methodologies from the 2006 IPCC Guidelines, including country-specific methodologies developed by national experts. Emissions of precursor gases were estimated mostly using the methodology provided in the *EMEP/EEA air pollutant emission inventory guidebook 2016*. The Party clarified during the technical analysis that the Revised 1996 IPCC Guidelines were used only for estimating CH_4 emissions from domestic and commercial wastewater. The Party used tier 3 methodologies for several categories across all sectors. The TTE commends Armenia for using methodologies from the 2006 IPCC Guidelines.

30. Information on AD and EFs and description of methodologies used were provided in the BUR. AD were generally drawn from national statistics or other sources, including energy balances, natural gas balances and industrial production data at the individual plant level. Both country-specific EFs and default values provided in the 2006 IPCC Guidelines were used, sometimes taking into account information for countries with similar national circumstances.

31. Information on the Party's total GHG emissions by gas for 2017 is outlined in table 1 in Gg CO_2 eq. It shows a decrease in emissions of 58.9 per cent without LULUCF since 1990 (15,231.52 Gg CO_2 eq).

Table 1
Greenhouse gas emissions by gas of Armenia for 2017

Gas	*GHG emissions (Gg CO_2 eq) including land and HWP[a]*	*% change 1990–2017*	*GHG emissions (Gg CO_2 eq) excluding land and HWP[a]*	*% change 1990–2017*
CO_2	5 160.07	–75.2	5 631.08	–73.9
CH_4	3 249.81	–1.0	3 249.81	–1.0
N_2O	1 055.24	1.8	1 054.93	1.8

[2] https://unfccc.int/documents/274258.

Gas	*GHG emissions (Gg CO_2 eq) including land and HWP[a]*	*% change 1990–2017*	*GHG emissions (Gg CO_2 eq) excluding land and HWP[a]*	*% change 1990–2017*
HFCs	685.34	NA	685.34	NA
PFCs	NO	NA	NO	NA
SF_6	2.59	NA	2.59	NA
Other	NA	NA	NA	NA
Total	10 153.06	–59.6	10 623.75	–58.9

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

32. Information on other emissions was clearly reported, including 13.27 Gg nitrogen oxides, 34.01 Gg carbon monoxide and 10.03 Gg non-methane volatile organic compounds. GHG emissions by gas for the base year (1990), or for any other year of the time series, were not clearly reported in the BUR. During the technical analysis, Armenia explained that emissions by gas for the entire time series (1990–2017) were included in the NIR in graphical format (figure 3.2, p.37) and provided the TTE with tables containing the required information.

33. Armenia 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. As suggested by the previous TTE in the summary report on Armenia's second BUR, the Party included in the NIR (table 2.2, pp.28–31) an explanation of its use of notation keys.

34. In its NIR (table 4.51, p.141), Armenia 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. The Party reported the annual carbon stock change for the main LULUCF subcategories (e.g. forest land remaining forest land and land converted to forest land).

35. The NIR does not include land area per category or annual change in carbon stocks by pool (e.g. living biomass and soils), which are included in the tables in annex 3A.2 to the IPCC good practice guidance for LULUCF, and the reason for this was not clear to the TTE.

36. The shares of emissions that different sectors contributed to the Party's total GHG emissions excluding land (category 3.B), as reported by the Party, in 2017 are reflected in table 2.

Table 2
Shares of greenhouse gas emissions by sector of Armenia for 2017

Sector	*GHG emissions (Gg CO_2 eq)*	*% share[a]*	*% change 1990–2017*
Energy	7 087.39	66.7	–68.8
IPPU	950.51	8.9	50.6
AFOLU	1 494.49	18.5	–28.3
Livestock (category 3.A)	1 065.58	10.0	–17.8
Land (category 3.B)	–470.69	NA	36.1
Aggregate sources and non-CO_2 emissions sources on land (category 3.C)	899.60	8.5	14.0
HWP and other emissions (category 3.D)	NE	NA	NA
Waste	620.68	5.8	48.2

[a] Share of total without 2006 IPCC Guidelines AFOLU category 3.B (land).

37. Armenia reported information on its use of global warming potential 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 clearly reported on GHG emissions, methodological tier levels, AD and their sources, EFs, key categories, notation keys used and other information specific to the sector. Emissions from fuel consumption in road transport (1.A.3.b), electricity and heat production (1.A.1.a) and residential sources (1.A.4.b) as well as fugitive emissions (1.B.2.b) were the main sources of GHG emissions for the sector. Emissions from all the source categories have decreased from their 1990 level owing primarily to a decrease in activity following Armenia's transition to a market economy in the 1990s; emissions from fuel combustion in electricity and heat production and transport accounted for the most significant decreases. The Party used a combination of tier 1, 2 and 3 methodologies from the 2006 IPCC Guidelines to estimate emissions for the sector, specifically, tier 3 for CO_2 emissions from electricity generation; tier 2 for CO_2 emissions from both stationary and mobile combustion of natural gas; tier 2 for fugitive CH_4 emissions of natural gas; tier 1 for CO_2 emissions from liquid and solid fuel combustion; and tier 1 for CH_4 and N_2O emissions from fuel combustion.

39. For the IPPU sector, information was clearly reported on GHG emissions, methodological tier levels, AD and their sources, EFs, key categories, notation keys used and other information specific to the sector. Product uses as substitutes for ozone-depleting substances (2.F) and the mineral industry (2.A) were the categories with the most significant shares of emissions in the IPPU sector: 72.1 and 27.1 per cent, respectively. Emissions for the sector increased in 1990–2017 mainly owing to an extremely large, significant increase in F-gas emissions from product uses as substitutes for ozone-depleting substances: 17,032.5 per cent in 2000–2017. The increase in F-gas emissions in turn stemmed from a significant increase in emissions from refrigeration and air conditioning attributable to the continued use of HFCs as the main substitutes for ozone-depleting substances, chlorofluorocarbons and hydrochlorofluorocarbons (which are controlled under the Montreal Protocol). The increase in F-gas emissions was offset to some extent by a decrease in emissions of 59.0 per cent from the mineral industry. The Party used methodologies from the 2006 IPCC Guidelines to estimate emissions for the sector, applying higher-tier methodologies for the key categories CO_2 emissions from cement production (tier 3) and HFC emissions from refrigeration and air conditioning (tier 2), and tier 1 methods for the remaining categories.

40. For the AFOLU sector, information was clearly reported on methodological tier levels, EFs, key categories, the time series, uncertainty assessment, notation keys used and other information specific to the sector. For this sector, Armenia reported GHG emissions for the categories livestock (3.A), land (3.B) and aggregate sources and non-CO_2 emissions sources on land (3.C). Emissions from AFOLU (including land) increased in 1990–2017, mainly owing to a decrease in removals from land of 36.1 per cent and an increase in emissions from aggregate sources and non-CO_2 emissions sources on land of 10.8 per cent. The increase in AFOLU emissions resulting from these changes was offset to some extent by a 17.8 per cent decrease in emissions from livestock.

41. For the agriculture subsector, comprising categories 3.A and 3.C, CH_4 emissions from enteric fermentation of cattle (3.A.1.a) and other livestock (3.A.1.b–j) and direct and indirect N_2O emissions from managed soils (3.C.5 and 3.C.6, respectively) were identified as key categories. The Party used tier 2 methods for estimating CH_4 emissions from enteric fermentation and manure management for cattle, buffalo and sheep, while using tier 1 methods for the remaining categories.

42. A tier 2 approach and country-specific data on performance parameters were applied to estimate emissions from enteric fermentation of cattle, buffalo and sheep. However, the Party provided the data on performance parameters used for estimating enteric fermentation CH_4 EFs only for cattle (by subcategory) for 2016–2017 and not for buffalo or sheep, and the reason for this was not clear to the TTE. During the technical analysis, the Party provided the TTE with the data on performance parameters used to calculate enteric fermentation CH_4 EFs for buffalo and sheep for 2017.

43. The Party used a tier 2 method to estimate CH_4 emissions from manure management for cattle, buffalo and sheep. However, AD on manure management allocation by system type were not transparently reported in the NIR. During the technical analysis, Armenia clarified that such data for 2017 were derived from expert judgment but it lacks relevant statistical data for 1990–2017.

44. The Party did not report estimates of direct and indirect N_2O emissions due to nitrogen mineralization associated with loss of organic matter for cropland remaining cropland or grassland remaining grassland and the reason for this was not clear to the TTE.

45. For the forestry and other land use subsector, comprising categories 3.B (land) and 3.D (HWP), forest land remaining forest land (CO_2) (3.B.1.a) and land converted to other land (CO_2) (3.B.6.b) were identified as key categories. The Party used tier 2 methods for CO_2 emissions and removals from forest land remaining forest land, while using tier 1 methods for the remaining categories. In its NIR (section 4.3.5.1, p.126), Armenia reported that the national land-use classification system does not match with the IPCC categories and clarified that it is making efforts to align the national land-use classification with the land-use categories in the 2006 IPCC Guidelines by using a national procedure. The Party reported the results of efforts to harmonize the two systems for 2017 in the NIR (table 4.44, pp.128–129). The TTE commends Armenia for providing this information.

46. For forest land remaining forest land, the Party clarified in the NIR (section 4.3.5.2.1.1, p.133) that changes in carbon stocks were estimated only for above-ground and below-ground biomass, while those for deadwood, litter and soil organic matter were not estimated owing to a lack of complete and reliable data on the recent changes in forest land, since a national forest inventory has not been conducted for 20 years.

47. The Party did not report CO_2 emissions from HWP and the reason for this was not clear to the TTE.

48. For the waste sector, information was clearly reported on GHG emissions, methodological tier levels, AD and their sources, EFs, key categories, the time series, uncertainty assessment, notation keys used and other information specific to the sector. Solid waste disposal (4.A) and wastewater treatment and discharge (4.D) had the most significant shares of waste sector emissions in 2017: 68.7 and 28.0 per cent, respectively. Emissions for the waste sector increased in 1990–2017, owing mainly to increases in emissions from solid waste disposal (64.3 per cent) and wastewater treatment and discharge (25.4 per cent). Solid waste disposal (CH_4) and wastewater treatment and discharge (CH_4 and N_2O) were identified as key categories. The Party used tier 2 methods for estimating CH_4 emissions from solid waste disposal and tier 1 methods for the remaining categories.

49. The Party did not report emissions from biological treatment of waste (4.B) or incineration of medical waste (4.C.a) because it deemed these categories to be insignificant sources and lacked AD.

50. The NIR provides an update to the GHG inventories reported in the Party's previous NCs and BURs. The information reported provides an update of the Party's NC4 and second BUR, which addressed anthropogenic emissions and removals for 1990–2016 and 1990–2014, respectively. The update was carried out for 1990–2017 using the methodologies contained in the 2006 IPCC Guidelines, thus generating a consistent 28-year time series. The Party reported that it recalculated emissions from all sectors for the entire time series (1990–2017) owing to the availability of new data sets and the addition of categories. The Party also reported that the recalculations resulted in an increase of estimated emissions for 1990 and 2014 of 0.3 and 1.1 per cent, respectively. The GHG inventories for 1990–2017 reported in the BUR are consistent.

51. The TTE noted that, although recalculations were carried out for the entire time series for all sectors, activity levels were reported for all years for only the energy and IPPU sectors. During the technical analysis, Armenia clarified that, while it has data on activity levels, which it used as a basis for the recalculations, it did not report them in the NIR for the entire time series.

52. Armenia did not submit summary information tables of inventories for previous submission years, which the TTE noted are important for assessing the impact of

recalculations. During the technical analysis, the Party provided summary information for the GHG inventories for 2012 and 2014.

53. Armenia 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 UNDP. The Party identified improvements made to its GHG inventory reporting, such as estimating SF_6 emissions for the first time, including GHG emissions for six additional subcategories, using higher-tier estimation approaches for five subcategories, performing key category analysis by both level and trend, assessing uncertainties for all subcategories of emissions and removals, and recalculating emission estimates for the entire time series.

54. Armenia clearly reported that a key category analysis was performed for the level of emissions (for 2017) and the trend in emissions (for 2000–2017). The Party identified improvements in its reporting; for instance, of the 19 categories identified as key, 12 were estimated using tier 2 or 3 methods.

55. The BUR provides information on QA/QC measures for all sectors, including the Party's general inventory QC checks, category-specific QC procedures and QA reviews. The TTE commends Armenia for providing information in accordance with the IPCC good practice guidance. The Party identified improvements in its QC processes, such as the close collaboration between the GHG inventory development experts and the specialists responsible for developing the energy balance in performing cross checks and ensuring the consistency of the data used for both the GHG inventory and the energy balance.

56. Armenia clearly reported information on CO_2 fuel combustion using both the sectoral and the reference approach. The information reported indicates that the combustion emissions estimated under the sectoral and the reference approach for 2017 are 5,361.3 and 5,616.0 Gg CO_2, respectively. The difference between the estimates calculated using the two approaches was reported as 4.8 per cent for 2017, which is not significant.

57. Information was clearly reported on international aviation. According to the Party, emissions from international marine bunker fuels do not occur in the country.

58. Armenia reported information on the uncertainty assessment of the level (2017) and trend (2000–2017) of its national GHG inventory. The uncertainty analysis was based on the tier 1 approach and covers all source categories and all direct GHGs. The results obtained, as reported in the BUR, reveal that the level uncertainty (2017) for emissions is 17.9 per cent (17.9 per cent excluding the land category (3.B)) and the trend uncertainty (2000–2017) is 16.7 per cent (16.4 per cent excluding the land category (3.B)).

59. The TTE noted that the transparency of the information reported on GHG inventories could be enhanced by addressing the areas noted in paragraphs 32, 35, 42, 43, 44, 47, 51 and 52 above, which could facilitate a better understanding of the information reported on GHG inventories.

60. In paragraph 49 of the summary report on the technical analysis of the Party's second BUR, the previous TTE noted areas where the transparency of the reporting on GHG inventories could be further enhanced, namely, fugitive emissions; AD for cement production; sources of the data on the food and beverage industry; reasons for reporting emissions from the chemical industry as "NO"; the possibility of other emissions occurring from the consumption of HFCs, PFCs and SF_6; explaining livestock statistics used as AD; emissions from manure management for rabbits; land classification; emissions from HWP and biological treatment of solid waste; recalculated emissions for 1994–1999; GHG inventory documentation and archiving; and total uncertainty of the GHG inventory. The current TTE noted the improvements referred to in paragraphs 33, 38, 39, 45, 48, 50 and 58 above and commends the Party for enhancing the transparency of its reporting.

61. Armenia reported in its BUR (table 4.2, pp.84–86) and NIR (e.g. section 4.3.5.2.1, p.137; and section 4.4.7, p.164) information on its areas for improvement for future BURs. The areas identified include conducting a nationwide forest inventory and improving AD on GHG emissions from domestic and commercial wastewater. The TTE commends the Party for its clear reporting on its proactive approach to identifying areas for improvement.

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

62. As indicated in table I.2, Armenia 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.

63. The information reported provides a clear and comprehensive overview of Armenia's mitigation actions and their effects. In its BUR, Armenia reported information on its national context and framed its national mitigation planning and actions in the context of the national strategy, whereby the Party aims to ensure energy security and provision of affordable and reliable energy by investing in renewable energy and improving energy efficiency in all sectors.

64. Most of the mitigation actions are in the energy sector and address both energy generation, such as by promoting renewable power generation, and demand management, including by improving energy efficiency in industry, buildings and transportation. Mitigation actions in the waste, IPPU, and AFOLU sectors were also reported in the BUR, including information on progress in achieving GHG emission reduction targets. Armenia reported that the key role of the energy sector is highlighted in its Energy Sector Development Strategic Program to 2040.

65. Armenia approved its NDC for a 10-year implementation period (2021–2030), setting an unconditional mitigation target of reducing emissions by 40 per cent below the 1990 level by 2030.

66. Armenia reported projections of GHG emissions for up to 2030 under several scenarios based on the latest strategic papers on the development of the energy sector. Four scenarios were modelled using LEAP: a 'without measures' scenario, excluding all policies and measures implemented since 2012; a 'with measure 1' scenario, accounting for all measures and assuming commissioning of 1,000 MW solar PV power plants by 2030; a 'with measure 2' scenario, accounting for all measures and assuming commissioning of 700 MW solar PV power plants by 2030; and a 'with additional measures' scenario, taking into account the additional actions reported in the BUR (table 3.2). The Party reported that emission reductions by 2030 could amount to 2,512, 2,250 and 3,524 Gg CO_2 eq/year under the 'with measure 1', 'with measure 2' and 'with additional measures' scenarios, respectively. The TTE commends Armenia for presenting the information on projections. The Party mentioned that it needs to build its capacity to develop non-energy sector projections using LEAP or other suitable software.

67. Armenia reported on the gender aspects of mitigation actions in the energy sector, including the significant benefits of clean and renewable energy measures for non-gasified rural communities, such as alleviating the burden of family chores, reducing energy costs and thus freeing up resources for children's education. The TTE commends Armenia for providing such information.

68. Armenia reported a summary of its mitigation actions in tabular format in accordance with decision 2/CP.17, annex III, paragraph 11, including measures associated with promoting renewable energy, energy efficiency, low-carbon transportation, green buildings, sustainable agriculture and waste management. Armenia also provided information on mitigation actions in the energy sector in narrative format.

69. Consistently with decision 2/CP.17, annex III, paragraph 12(a), Armenia clearly reported the names of mitigation actions or groups of actions, coverage (sector and gases) and progress indicators in the BUR (tables 3-1–3-2). Clear description of mitigation actions and information on quantitative goals were provided in the BUR. Armenia reported that its mitigation measures were derived from projects that are implemented, ongoing or planned.

70. Armenia reported information on methodologies and assumptions, objectives and steps taken or envisaged to achieve the actions for all mitigation actions in the energy, IPPU, AFOLU and waste sectors.

71. The mitigation actions on the generation side of the energy sector focused mainly on promoting renewable energy sources such as solar and hydropower and were reported as

completed, ongoing or planned. The Party reported the results of implementing its mitigation actions as emission reductions, with the construction of a large utility-scale solar PV power plant (planned action with total capacity of 400 MW) and the commissioning of solar PV power plants with capacity of up to 5 MW (ongoing action with total capacity of 315 MW) accounting for the most significant estimated emission reduction, of, respectively, 176 Gg CO_2 eq/year (from 2024) and 277 Gg CO_2 eq/year (by 2029). Among other important mitigation measures relating to power generation, Armenia reported on an ongoing project for upgrading the efficiency of electricity distribution networks, which started in 2016 and is due to be completed by 2027. The emission reduction expected to be achieved is 298 Gg CO_2 eq/year by 2028.

72. The mitigation actions in the area of energy demand management focused on buildings, lighting, transport, industry and use of renewable energy sources. The measures relating to energy demand management in buildings were reported as completed or ongoing and focused mainly on enhancing energy efficiency in existing buildings. Among the measures reported, a UNDP–GCF project on de-risking and scaling up investment in energy-efficient building retrofits (ongoing action with maximum expected energy savings of 264.3 GWh/year) accounts for the most significant expected emission reduction, of 100 Gg CO_2 eq/year by 2023.

73. The mitigation actions relating to energy demand management in lighting were mainly ongoing actions to enhance the energy efficiency of street lighting. Among the measures reported, the Yerevan street lighting project, aiming to modernize lighting on 28 streets, accounts for the most significant estimated emission reduction, of 27.6 Gg CO_2 eq/year by 2026. Armenia reported on a project implemented in 2013–2019 to promote energy-efficient municipal lighting, which is expected to result in a reduction in emissions of 131.6 Gg CO_2 eq/year by 2030.

74. The mitigation actions relating to energy demand management in transport were reported as ongoing or completed and focused mainly on enhancing energy efficiency by optimizing and upgrading road infrastructure. Among the measures reported, the ongoing improvement of road infrastructure (aiming to reduce traffic congestion in the Yerevan city centre) and the strategy programme for optimizing public transport (aiming to develop new routes) account for the most significant emission reductions, of 55.6 Gg CO_2 eq and 41.8 Gg CO_2 eq, respectively, in 2021. Armenia reported on mitigation actions focused on fleet renewal and fuel switching, including the planned Yerevan bus project, the aim of which is to replace the 1,922 diesel-powered buses currently operating with 845 buses powered by compressed natural gas, and which achieved an emission reduction of 3 Gg CO_2 eq/year in 2020.

75. The mitigation actions relating to energy demand management in industry were reported as ongoing or completed and focused mainly on supporting investment in energy-efficient equipment for small and medium-sized enterprises. Among the measures reported, the ongoing energy efficiency programme for small and medium-sized enterprises accounts for the most significant emission reduction: 139.3 Gg CO_2 eq/year in 2019.

76. The reported ongoing mitigation actions relating to energy demand management in the area of renewable energy focused mainly on increasing the share of electricity generated at solar PV plants on the demand side. Among the actions reported, a mitigation action implementing autonomous power generators (up to 500 kW) accounts for the most significant expected emission reduction: 117.8 Gg CO_2 eq/year by 2023. Armenia reported on ongoing actions with a focus on solar water heaters, such as reducing energy poverty as part of Armenia's non-gasified rural communities project, which has the aim of installing 5,400 solar water heaters with an expected emission reduction of 8.6 Gg CO_2 eq/year by 2022.

77. The mitigation actions in the IPPU sector were focused on improving technology at the Hrazdan Cement Corporation, such as producing a new low-clinker cement type, and account for an expected reduction in process-related emissions of 15.3 Gg CO_2 eq/year by 2022.

78. The mitigation actions in the agriculture subsector of AFOLU were reported as ongoing and focused mainly on cattle-breeding and pasture management. Among them,

reducing CH_4 emissions from enteric fermentation in cattle accounts for the most significant expected emission reduction: 51.3 Gg CO_2 eq/year by 2030.

79. The mitigation actions in the forestry and other land use subsector of AFOLU were reported as completed and focused mainly on decreasing deforestation by improving energy efficiency and promoting renewable energy. Among them, a project for introducing a land management system and restoring degraded pasture, grassland and arable land accounts for the most significant emission reduction: 26 Gg CO_2 eq in 2020.

80. The mitigation actions in the waste sector were reported as ongoing or planned and focused mainly on improving solid waste management and recovering landfill gases. Among them, the ongoing solid waste management project in Yerevan accounts for the most significant expected emission reduction: 140 Gg CO_2 eq/year by 2025.

81. Information on the methodology and assumptions used for estimating expected emission reductions was not clearly reported for some mitigation actions in Armenia's BUR. This includes the amount of energy saved through the action to improve energy efficiency in public buildings in Yerevan; the assumptions used for estimating the impact of promoting fuel switching to electricity in transportation; the separate reporting of heat and electricity savings from de-risking and scaling up investment in energy-efficient building retrofits; the annual power generation of some of the solar PV plants; the methodology used for estimating the grid EF for future years for all electricity-related actions; the methodology used for accounting for exported and imported electricity; the methodology used for estimating the emission reduction resulting from the programme for optimizing municipal transport and improving management efficiency; and the assumptions used to derive the EFs used for estimating the emission reductions resulting from actions in the AFOLU sector. In addition, it was not clear whether the Russian Federation–UNDP Trust Fund for Development regional project, Regulatory Framework to Promote Energy Efficiency in Countries of the Eurasian Economic Union overlaps with some of the reported mitigation projects in the buildings sector.

82. During the technical analysis, the Party clarified the sources of the assumptions used for estimating the impacts of the energy efficiency and fuel switching actions and supplied the required information. The data on the annual power generation of the solar PV plants were sourced from the Party's Energy Strategy Action Plan. The grid EF was derived from the LEAP model, which uses the merit-order approach, and the operational data of the power plants for future years were based on strategic programmes for the development of the energy sector.

83. Regarding the programme for optimizing municipal transport and improving management efficiency, the projected energy savings were estimated on the basis of the reduction in fuel consumption achieved by improving management efficiency, reducing the number of vehicles and introducing new vehicles and machinery. The Party noted that it faced challenges in estimating EFs and emission reductions for actions in the AFOLU sector. Armenia clarified that capacity-building is needed for estimating emission reductions resulting from policy-related actions, including taking into account potential overlap with other types of action.

84. Armenia provided information on its limited involvement in international market mechanisms as a Party to the Kyoto Protocol. The Party documented one CDM project among the mitigation actions reported in the BUR. The CDM project, launched in 2007, is aimed at reducing CH_4 emissions by capturing and combusting landfill gas at the Nubarashen landfill site in Yerevan. During the technical analysis, the Party clarified that five of its six registered CDM projects have not been issued certified emission reductions and were therefore not reported. The Party also clarified that, as stated in its NDC, it is planning to use financial instruments under Article 6 of the Paris Agreement and has capacity-building needs in that area.

85. Armenia reported information on its domestic MRV arrangements in accordance with decision 2/CP.17, annex III, paragraph 13. The Party reported in the BUR (chap. 5, p.88) that the MRV system comprises the Inter-agency Coordinating Council on Climate Change, which includes representatives of different ministries, the Public Services Regulatory Commission, the Academy of Science and the Statistical Committee and serves as a

horizontal inter-institutional coordination and verification mechanism under the overall coordination of the Ministry of Environment, which validates and approves national reports prior to submission to the UNFCCC. The information reported indicates that Armenia is further developing its domestic MRV system in order to fulfil its obligations under the Convention and other treaties, including the Paris Agreement. Development is due for completion by August 2023 and the system will include arrangements for the regular reporting of GHG inventories and monitoring of mitigation actions. Armenia outlined the steps to be taken to this end, including establishing institutional arrangements and processes for collecting data, defining methodologies, performing calculations and tracking progress and verifying compliance in relation to the NDC.

86. The TTE noted that the transparency of the information reported on mitigation actions could be further enhanced by addressing the areas noted in paragraphs 81–84 above, which could facilitate a better understanding of the information reported on mitigation actions.

87. In paragraph 62 of the summary report on the technical analysis of Armenia's second BUR, the previous TTE noted areas where the transparency of the reporting on mitigation actions could be further enhanced, namely, reporting the quantitative goals of mitigation actions related to GHG emission reduction and reporting on CDM projects in the country. The current TTE noted the improvements referred to in paragraph 69 above and commends the Party for enhancing the transparency of its reporting.

88. Armenia reported in its BUR (chap. 5, pp.84–86) information on its areas for improvement for future BURs for compliance with requirements under the ETF. Addressing these areas for improvement will entail shifting from the current practice of ad hoc reporting to the use of an MRV system that allows the country to continuously track progress against its NDC commitments, as well as to fulfil reporting obligations under the Convention and the Paris Agreement.

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

89. As indicated in table I.3, Armenia 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.

90. Armenia 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 (table 4-2, pp.84–86), Armenia identified constraints and gaps and related needs for BUR reporting in the four thematic areas of cross-cutting issues; GHG inventory preparation; mitigation actions; and finance, technology and capacity-building needs and support. The main constraints are the lack of funding for developing a national MRV system, including institutionalizing data collection; lack of adequate national capacity to collect, analyse and perform QA/QC of GHG inventory data; lack of MRV systems that enable regular reporting on mitigation actions implemented by State and private organizations and on support received for mitigation and adaptation; and lack of adequate capacity of national experts to develop GHG projections for non-energy sectors and identify financial and technology needs for implementing mitigation and adaptation actions.

91. Armenia reported that its financial, technical and capacity-building needs relate primarily to developing and implementing the national MRV system; obtaining reliable and consistent data for the GHG inventory; establishing formal arrangements, building capacity and collecting data for reporting on mitigation actions; and building capacity to identify financial and technological needs for implementing mitigation and adaptation actions and establishing an MRV system for collecting data and reporting on climate-related support received.

92. Armenia 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 (table 4.1, pp.79–83), Armenia reported that it received USD 352,000 from the GEF for preparing its third BUR. The information reported indicates that Armenia received support from a range of bilateral and multilateral sources for projects relating to energy efficiency, clean and renewable energy, public transport, waste

management and environmental governance. Sources included the Asian Development Bank, the European Bank for Reconstruction and Development, the European Investment Bank, the GCF, the GEF, UNDP, the United Nations Industrial Development Organization and the World Bank, as well as several Parties (European Union, Germany, Japan, Lithuania, Romania, Russian Federation and United States of America). Armenia also received capacity-building and technical support from UNDP to strengthen national capacity for implementation of the Paris Agreement and to enhance transparency of reporting on emissions and climate action.

93. Armenia reported one need relating to technology development and transfer, but did not specify whether the need was nationally determined. During the technical analysis, the Party mentioned its lack of capacity for identifying technology needs.

94. The TTE noted that the transparency of the information reported on needs and support received could be enhanced by addressing the areas noted in paragraph 93 above, which could facilitate a better understanding of the information reported on needs and support received.

95. In paragraph 67 of the summary report on the technical analysis of the Party's second BUR, the previous TTE noted areas where the transparency of the reporting on constraints, gaps, needs and support needed and received could be enhanced, namely, the results of Armenia's technology needs assessment or plans to conduct a new one. The current TTE noted the improvements in paragraphs 93 above and commends the Party for enhancing the transparency of its reporting.

96. During the technical analysis, Armenia informed the TTE that a delay in receiving technical assistance from the GEF for formulating the proposal for funding its third BUR contributed to the delay in the submission of the BUR. The Party noted developing national capacity for reporting BURs and NCs as a priority.

5. Any other information

97. Armenia reported information on its adaptation monitoring and evaluation process, which will build on the country's MRV system for climate change mitigation and enhance its reporting on adaptation.

D. Identification of capacity-building needs

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

(a) Setting up and maintaining a regulatory framework with data providers, including cooperation agreements with relevant ministries, agencies and private sector organizations, to ensure regular supply of data in the required format for the national GHG inventory;

(b) Learning about international practices for data collection for the refrigeration and air conditioning category and developing a country-specific data-collection methodology in the light of international practices and Armenia's circumstances;

(c) Collaborating with the Statistical Committee to ensure that natural gas consumption data for the industry sector are consistent with the data provided by the Public Services Regulatory Commission on natural gas balances;

(d) Conducting a survey or study on energy consumption in the industry, road transport, residential and commercial sectors;

(e) Providing national laboratories with equipment for analysing the composition of liquid fuels available on the national market, given data on liquid fuel composition are needed for higher-tier estimation approaches;

(f) Developing a methodology, survey instruments and case studies with a view to evaluating historical and recent data on percentages (fractions) of nitrogen losses due to run-off and leaching during solid and liquid storage of manure and nitrogen that volatilizes as ammonia and nitrogen oxides;

(g) Developing survey instruments and questionnaires to collect recent data on manure management system allocation and conducting studies and surveys with a view to evaluating historical data thereon;

(h) Developing frameworks and questionnaires for conducting case studies and surveys to collect detailed AD and develop country-specific EFs in order to estimate direct and indirect N_2O emissions from managed soils;

(i) Making arrangements to conduct a national forest inventory on a continuous basis;

(j) Developing a statistical framework for collecting AD on production and trade of various wood commodities and enhancing expertise on modelling emissions and removals associated with HWP;

(k) Setting up a soil monitoring system for collecting data on soil organic carbon stock in order to evaluate how different agricultural practices affect the carbon stocks of cropland and grassland mineral soils and to study carbon emission and removal flows associated with cropland and grassland land-use categories;

(l) Estimating waste generation data at the national level in order to replace default figures that may not adequately reflect the situation in Armenia;

(m) Assessing and quantifying emission reductions resulting from energy efficiency policy actions and the potential overlap of such actions with other measures;

(n) Estimating the impacts of mitigation actions in the AFOLU sector, including by using relevant software for estimating the impacts of agriculture sector mitigation actions and estimating EFs and emission reductions for the mitigation actions in the forestry and other land use subsector;

(o) Using LEAP or other suitable software for projections for non-energy sectors;

(p) Estimating the co-benefits of mitigation actions;

(q) Using the guidelines on financial instruments under Article 6 of the Paris Agreement;

(r) Enhancing MRV of mitigation actions by building national capacity to estimate and report on energy savings in the transport sector;

(s) Enhancing institutional arrangements under the domestic MRV system to allow for better coordination and smoother data- and information-sharing, especially with the private sector;

(t) Organizing workshops and consultancy – in addition to the existing GEF–Capacity-building Initiative for Transparency project – to further support the development and implementation of MRV of mitigation actions so as to enable compliance with requirements under the ETF and assist in tracking progress towards the NDC;

(u) Identifying technology needs related to establishing the MRV system;

(v) Strengthening technical capacity to prepare and submit requests for GEF funding for biennial reporting in accordance with the frequency required by the UNFCCC reporting guidelines on BURs.

99. The TTE noted that, in addition to those identified during the technical analysis, Armenia reported several capacity-building needs covering the following areas:

(a) Cross-cutting issues: developing and implementing the national MRV system; institutionalizing data collection and BUR preparation; and creating continuous funding mechanisms for activities related to reporting;

(b) GHG inventory preparation: collecting inventory data, including setting up and maintaining agreements to ensure regular supply of data;

(c) Mitigation actions: developing the MRV system for continuous reporting on mitigation actions; applying grid EFs for the electricity system; and developing GHG projections for non-energy sectors;

(d) Needs and support: identifying financial and technology needs for implementing mitigation and adaptation actions; quantifying the financial needs for implementing mitigation and adaptation measures; and developing the MRV system for continuous reporting on support received for mitigation and adaptation.

100. In paragraph 69 of the summary report on the technical analysis of Armenia's second BUR, the previous TTE, in consultation with Armenia, identified capacity-building needs. In its third BUR, Armenia reflected that some of those capacity-building needs have been addressed:

(a) Further enhancing national technical capacity to conduct key category analysis trend assessment;

(b) Further strengthening national capacity to conduct uncertainty assessment of emissions and removals.

III. Conclusions

101. The TTE conducted a technical analysis of the information reported in the third BUR of Armenia 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 any other information relevant to the achievement of the objective of the Convention. During the technical analysis, additional information was provided by Armenia on the areas identified by the TTE as requiring technical clarification. The TTE concluded that the information analysed is mostly transparent.

102. Armenia reported an update on the institutional arrangements relevant to the preparation of its BURs. The Ministry of Environment is the statutory entity with overall responsibility for coordinating the development of the Party's GHG inventories, NCs and BURs and for establishing the MRV system. Other institutions, such as the Statistical Committee, Public Services Regulatory Commission and Ministry of Economy, have specific roles with respect to the institutional arrangements. The Party is taking significant steps to establish institutional arrangements that allow for the sustainable preparation of its BURs, such as making organizational improvements and establishing legal mandates to define roles and responsibilities and facilitate sectoral information transfer.

103. In its third BUR, submitted in 2021, Armenia reported information on its national GHG inventory for 2017 and provided information on its 1990–2016 inventories. This included GHG emissions and removals of CO_2, CH_4 and N_2O and F-gases for all relevant sources and sinks as well as the precursor gases. The inventory was developed on the basis of the 2006 IPCC Guidelines. The total GHG emissions for 2017 were reported as 10,623.75 Gg CO_2 eq (excluding LULUCF) and 10,153.06 Gg CO_2 eq (including LULUCF). A total of 19 key categories were identified using the level assessment and 15 using the trend assessment, including CO_2 from energy industries (gaseous fuels) (1.A.1); CO_2 from road transportation (liquid and gaseous fuels) (1.A.3.b); CO_2 from commercial/institutional (gaseous fuels) (1.A.4.a); CO_2 from residential (gaseous fuels) (1.A.4.b); fugitive CH_4 emissions from natural gas transportation and distribution (1.B.2.b); and CH_4 from enteric fermentation (cattle (3.A.1.a) and other livestock (3.A.1.b–j)).

104. Estimates of N_2O emissions from nitrogen mineralization associated with loss of organic matter for cropland remaining cropland, grassland remaining grassland and HWP (3.D.1) were not reported in Armenia's BUR and the reason for this was not clear to the TTE. The Party did not report emissions from biological treatment of waste (4.B) or incineration of medical waste (4.C.a) because it deemed them to be insignificant sources and lacked AD. The Party did not report information on GHG emissions by sector or by gas for the base year

(1990) and other years of the time series; the AD and parameters used to estimate emissions and removals for some livestock categories or AD on manure management allocation by system type, owing to lack of available information; land area per category and annual change in carbon stocks by pool included in the tables in annex 3A.2 to the IPCC good practice guidance for LULUCF; or information on activity levels for all years of the time series or summary information tables of inventories for previous submission years. Estimates of PFC emissions were not provided as they do not occur in the country, as reported by the Party in its NIR.

105. Armenia reported information on mitigation actions and their effects in both tabular and narrative format, including its national mitigation planning and actions in the context of its national strategy and action plan up to 2040. Armenia reported planned, implemented, ongoing and completed actions in the energy, IPPU, AFOLU and waste sectors. The mitigation actions focus on the energy sector and address both power generation, such as by promoting renewable power generation, and energy demand management, including by improving energy efficiency in industry, buildings and transportation. Armenia also reported the progress of implementation of its mitigation actions and the results achieved, including emission reductions or estimated outcomes. The highest potential emission reduction was reported for the energy sector (implementation of existing and additional energy transformation and demand-side measures), of 3,524 Gg CO_2 eq between 2017 and 2030. The Party further reported information on its involvement in international market mechanisms and its MRV arrangements. The BUR does not contain clear information on the methodology and assumptions used for estimating expected emission reductions for some mitigation actions; the overlap of the Russian Federation–UNDP Trust Fund for Development regional project, Regulatory Framework to Promote Energy Efficiency in Countries of the Eurasian Economic Union with some of the reported mitigation projects in the buildings sector; or CDM projects implemented in the country.

106. Armenia reported information on key constraints, gaps and related needs pertaining to cross-cutting issues, GHG inventory preparation, mitigation actions and support. Information was reported on technical, technology transfer and capacity-building support received, including for developing the MRV system, preparing the third BUR, enhancing institutional arrangements and implementing sectoral mitigation actions and policies. The Party reported that it received financial support of approximately USD 352,000 from the GEF for preparing its third BUR. The Party also reported information on technology transfer received, mostly for implementing sectoral mitigation measures. Information on one technology need was reported but it was unclear whether the need was nationally determined.

107. The current TTE noted improvements in the reporting in the Party's third BUR compared with that in its second 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 second BUR. However, improvements are ongoing, and the Party has taken note of outstanding areas for future improvement.

108. The TTE, in consultation with Armenia, identified the 22 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. Armenia prioritized all the capacity-building needs.

Annex I

Extent of the information reported by Armenia in its third biennial update report

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

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	Armenia submitted its third BUR on 17 May 2021; the GHG inventory reported is for 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	Armenia 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.	Partly	Armenia reported in the NIR submitted in conjunction with the third BUR updated activity levels for all sectors for 2017 but only partially updated activity levels for the other years of the time series.
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 the NIR (table 4.51, p.141) at an aggregated level.
	(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	Armenia reported GHG emissions for 2015–2016 in tabular format in its NC4, whereas in the third BUR the emissions were reported only in graphical format, even though they had been recalculated.
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).	No	Armenia did not report summary information tables for the previous submission years 2012 and 2014.

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 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:		
	(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 the BUR (table 2.2).
	(b) Table 2 (National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF_6).	Yes	Comparable information was reported in the NIR (table 2.3, p.31) (PFCs and SF_6 were not included in the table, but relevant information was provided in other parts of the NIR).
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	Armenia reported in its NIR (chap. 1) comprehensive and detailed information on procedures and arrangements for national GHG inventory preparation.
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;	Partly	CO_2 emissions and removals from settlements remaining settlements (3.B.5.a), HWP (3.D.1) and waste incineration (4.C.a) were reported as "NE".
	(b) CH_4;	Partly	CH_4 emissions from biological treatment of waste (4.B) and waste incineration (4.C.a) were reported as "NE".
	(c) N_2O.	Partly	N_2O emissions from biological treatment of waste (4.B) and waste incineration (4.C.a) were reported as "NE".
Decision 17/CP.8, annex, paragraph 15	Non-Annex I Parties are encouraged, as appropriate, to provide information on anthropogenic emissions by sources of:		

Decision	*Provision of the reporting guidelines*	*Assessment of whether the information was reported*	*Comments on the extent of the information provided*
	(a) HFCs;	Yes	
	(b) PFCs;	Yes	PFC emissions were reported as “NO” as they do not occur in the country.
	(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;	Yes	
	(b) Nitrogen oxides;	Yes	
	(c) Non-methane volatile organic compounds.	Yes	
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.	Yes	The Party reported 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	
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	Emissions from marine bunker fuels do not occur in the country.
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 global warming potential provided by the IPCC in its AR2 based on the effects of GHGs over a 100-year time-horizon.	Yes	
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	Yes	Armenia used the 2006 IPCC Guidelines. Tier 2 and 3

Decision	*Provision of the reporting guidelines*	*Assessment of whether the information was reported*	*Comments on the extent of the information provided*
	and removals by sinks of GHGs not controlled by the Montreal Protocol;		methodologies were used for specific categories.
	(b) Explanation of the sources of EFs;	Yes	Armenia used the 2006 IPCC Guidelines. A combination of tiers 1, 2 and 3 methodologies was used for all sectors.
	(c) Explanation of the sources of AD;	Yes	
	(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	Armenia used methodologies proposed by national experts for estimating sulfur dioxide emissions from ferromolybdenum and copper production. Armenia estimated non-methane volatile organic compound emissions from bitumen/asphalt production and use and for solvent use using EFs and methodologies provided in the *EMEP/EEA air pollutant emission inventory guidebook 2016*.
	(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	Notation keys were used.
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;	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 third biennial update report of Armenia

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	
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;	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	The development of Armenia's domestic MRV arrangements is due to be completed in August 2023.

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 third biennial update report of Armenia

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 GCF and multilateral institutions for activities relating to climate change, including for the preparation of the current BUR.	Yes	
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;	Partly	The Party reported one technology need but did not specify whether it was nationally determined.
	(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.

B. UNFCCC documents

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

NC4 of Armenia. Available at https://unfccc.int/non-annex-I-NCs.

Summary reports on the technical analysis of the first and second BURs of Armenia, contained in documents FCCC/SBI/ICA/2016/TASR.1 and FCCC/SBI/ICA/2018/TASR.2, respectively. Available at https://unfccc.int/ICA-reports.

C. Other documents

The following references may not conform to UNFCCC editorial style as some have been reproduced as received:

European Environment Agency. 2016. *EMEP/EEA air pollutant emission inventory guidebook*. Luxembourg: Publications Office of the European Union. Available at https://www.eea.europa.eu/publications/emep-eea-guidebook-2016.