



United Nations

FCCC/SBI/ICA/2019/TASR.2/GHA*



Framework Convention on
Climate Change

Distr.: General
4 September 2019

English only

Technical analysis of the second biennial update report of Ghana submitted on 19 February 2019

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 report at their discretion. This summary report presents the results of the technical analysis of the second biennial update report of Ghana, conducted by a team of technical experts in accordance with the modalities and procedures contained in the annex to decision 20/CP.19.

* Second reissue for technical reasons (13 September 2019)

GE.19-15108(E)



* 1 9 1 5 1 0 8 *

Please recycle 



Contents

	<i>Paragraphs</i>	<i>Page</i>
Abbreviations and acronyms		3
I. Introduction and process overview.....	1–9	5
A. Introduction	1–5	5
B. Process overview	6–9	5
II. Technical analysis of the biennial update report	10–75	6
A. Scope of the technical analysis	10–11	6
B. Extent of the information reported.....	12–15	6
C. Technical analysis of the information reported.....	16–72	6
D. Identification of capacity-building needs.....	73–75	16
III. Conclusions	76–81	16
Annexes		
I. Extent of the information reported by Ghana in its second biennial update report		18
II. Documents and information used during the technical analysis		24

Abbreviations and acronyms

2006 IPCC Guidelines	<i>2006 IPCC Guidelines for National Greenhouse Gas Inventories</i>
AD	activity data
AFOLU	agriculture, forestry and other land use
BUR	biennial update report
CBIT	Capacity-building Initiative for Transparency
CDM	clean development mechanism
CER	certified emission reduction
CGE	Consultative Group of Experts
CH ₄	methane
CO	carbon monoxide
COP	Conference of the Parties
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
DTU	Technical University of Denmark
EF	emission factor
FAO	Food and Agriculture Organization of the United Nations
F-gas	fluorinated gas
FOLU	forestry and other land use
GEF	Global Environment Facility
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
ICA	international consultation and analysis
IPCC	Intergovernmental Panel on Climate Change
IPCC good practice guidance	<i>Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories</i>
IPCC good practice guidance for LULUCF	<i>Good Practice Guidance for Land Use, Land-Use Change and Forestry</i>
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
MRV	measurement, reporting and verification
NA	not applicable
NAMA	nationally appropriate mitigation action
NC	national communication
NDC	nationally determined contribution
NE	not estimated
NIR	national inventory report
NMVOC	non-methane volatile organic compound
NO	not occurring
non-Annex I Parties	Parties not included in Annex I to the Convention
NO _x	nitrogen oxides
N ₂ O	nitrous oxide
PFC	perfluorocarbon
POA	programme of activities
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	<i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i>
SF ₆	sulfur hexafluoride

SO _x	sulfur oxides
TNA	technology needs assessment
TTE	team of technical experts
UNDP	United Nations Development Programme
UNEP	United Nations Environment 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 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. Ghana submitted its first BUR on 21 July 2015, which was analysed by a TTE in the third round of technical analysis of BURs from non-Annex I Parties, conducted on 16–18 November 2015. After the publication of its summary report, Ghana participated in the first workshop for the facilitative sharing of views, convened in Bonn on 20–21 May 2016.
5. This summary report presents the results of the technical analysis of the second BUR of Ghana, 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, Ghana submitted its second BUR on 2 October 2018 as a stand-alone update report and resubmitted it on 19 February 2019. The submission was made more than two years after the submission of the first BUR. In its BUR, the Party clarified that this was owing to a delay in securing funds from the GEF immediately after submitting the first BUR.
7. The technical analysis of the BUR took place from 25 February to 1 March 2019 in Bonn 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: Michinobu Aoyama (member of the CGE from Japan), Luis Edmundo Caeres Silva (Ecuador), Ruleta Camacho Thomas (former member of the CGE from Antigua and Barbuda), Lisa Hanle (United States of America), Jenny Mager (Chile), Dingane Sithole (Zimbabwe), Tian Wang (member of the CGE from China) and Brian Zutta (Peru). Ms. Hanle and Ms. Mager were the co-leads. The technical analysis was coordinated by Anna Sikharulidze and Karen Ortega (secretariat).
8. During the technical analysis, in addition to the written exchange, through the secretariat, to provide technical clarifications on the information reported in the BUR, the TTE and Ghana engaged in consultation¹ on the identification of capacity-building needs for the preparation of BURs and participation in the ICA process. Following the technical analysis of Ghana's second BUR, the TTE prepared and shared a draft summary report with Ghana on 28 May 2019 for its review and comment. Ghana, in turn, provided its feedback on the draft summary report on 9 August 2019.
9. The TTE responded to and incorporated Ghana's comments referred to in paragraph 8 above and finalized the summary report in consultation with the Party on 21 August 2019.

¹ The consultation was conducted via teleconferencing.

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 chapter 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 chapter 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 chapter II.D below).

11. The remainder of this chapter presents the results of each of the three parts of the technical analysis of Ghana'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 the progress made 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 annex I.

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

15. Regarding the areas for enhancing transparency noted by the previous TTE in the summary report on the technical analysis of the first BUR that were not fully addressed in the second BUR, Ghana identified them as areas for enhancing national capacity. These include reporting a category-level uncertainty analysis (para. 32 of the summary report on the technical analysis of the first BUR) and conducting regular surveys to determine the completeness of all categories (para. 38 of the summary report on the technical analysis of the first BUR).

C. Technical analysis of the information reported

16. The technical analysis referred to in paragraph 10(b) above aims to increase the transparency of 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.

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 second BUR, Ghana provided an update on its national circumstances, including a description of national and sectoral development priorities, objectives and circumstances, information on features of geography, climate and economy that might affect the ability to deal with mitigating and adapting to climate change, as well as information regarding key policies relevant to climate change. In addition, Ghana provided a summary of relevant information regarding its national circumstances in tabular format.

21. Ghana transparently described in its BUR the 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, such as the legal status, roles and responsibilities of the overall coordinating entity, which is the Environmental Protection Agency under the Ministry of Environment, Science, Technology and Innovation of Ghana, the involvement and roles of other institutions and stakeholders, mechanisms for information and data exchange, climate finance tracking by the Ministry of Finance, new adopted GHG manuals and a QA/QC plan, and training of experts on mitigation and GHG inventory preparation. During the technical analysis, Ghana clarified that the plan to integrate MRV information on climate change into the national annual progress report system, which has been legislated as the main monitoring and evaluation framework for monitoring development policies in Ghana, is under way.

22. Ghana reported on its proposed enhanced domestic MRV system, which will be developed with the support of the GEF through a CBIT project to enhance the transparency of its MRV. It is designed at the national level and covers four main areas: (a) establishing an effective institutional arrangement to plan, implement and report climate actions; (b) putting in place a centralized national infrastructure for improved data access and information management; (c) mainstreaming five climate change indicators, namely climate, ecosystem, water resources, energy mix and vulnerable population, into the medium-term development framework; and (d) testing and piloting a domestic transparency framework in the energy and transport sectors. The system will build on the existing MRV systems, processes and infrastructure, and further entrench the culture of reporting within the government structures. During the technical analysis, Ghana informed the TTE that the CBIT project has been approved by the GEF and is ready to be implemented.

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

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

24. Ghana submitted its second BUR in 2018, and the GHG inventory reported is for 1990–2016, which is consistent with the requirements for the reporting time frame. GHG

emissions and removals for the BUR covering the 1990–2016 inventories were estimated using mainly a tier 1 methodology from the 2006 IPCC Guidelines.

25. Ghana submitted an NIR in conjunction with its second BUR. The relevant sections of the NIR were referenced in the BUR and the document was also made publicly available on the UNFCCC website.²

26. With regard to the methodologies used, information was clearly reported, including that a tier 1 method was applied for all categories, with the exception of CO₂ and PFC emissions from category 2.C.3 (aluminium), CO₂ emissions from category 3.B (land) and CH₄ emissions from category 4.A (solid waste disposal), for which higher-tier methods were used. AD are collected from a variety of national sources in the energy, IPPU and AFOLU sectors, from some companies (e.g. cement and aluminium) and, where no alternative information is available, from international statistics (e.g. FAO and the International Energy Agency). The TTE commends Ghana for its transparent reporting of a complete time series of AD and EFs in its NIR, noting that in some sectors (e.g. energy) the information is presented at an even more detailed level than as contained in the annex to decision 17/CP.8. The TTE further commends the Party for using the more recent 2006 IPCC Guidelines and its efforts to apply higher-tier methods.

27. Information on the Party's total GHG emissions by gas for 2016 is outlined in table 1 in Gg CO₂ eq. It shows an increase in emissions of 66.4 per cent since 1990 (25,340 Gg CO₂ eq). Information on SF₆ emissions was not reported. During the technical analysis, the Party clarified that emissions of this gas were not reported owing to lack of data. The different data tables in the BUR and the NIR present information in multiple units, and referring to different sectors. For example, in the summary tables (annex 1.1 to the BUR and the NIR) F-gases are reported only in CO₂ eq, while other gases are presented on a mass basis. Similarly, while most data tables provide totals with and without category 3.B (referred to in the totals as with and without FOLU (table 16 of the NIR) or with and without land (e.g. BUR table 7)), other tables (e.g. tables 17–21) present information only with AFOLU (i.e. categories 3.A (livestock) and 3.C (aggregate sources and non-CO₂ emission sources on land), in addition to category 3.B (land)). The TTE notes that reporting the F-gases on a mass basis in the summary tables, similar to the way they are presented in table 1 of the annex to decision 17/CP.8, could facilitate better understanding of the information reported.

28. In addition, the TTE noted an inconsistency in table 16 of the NIR regarding total CH₄ emissions with and without FOLU. According to annex 1.1 to the BUR there are no CH₄ emissions from category 3.B; however, table 16 reports CH₄ emissions with FOLU of 6.51 Mt CO₂ eq (6,510 Gg CO₂ eq) and CH₄ emissions without FOLU as 3.97 Mt CO₂ eq (3,970 Gg CO₂ eq). Ghana clarified that total CH₄ emissions both with and without FOLU are equal to 6.51 Mt CO₂ eq (6,510 Gg CO₂ eq) in 2016, resulting in total emissions of 42,200 Gg CO₂ eq with FOLU and 29,270 Gg CO₂ eq without FOLU in 2016. The TTE notes that ensuring consistency in the values reported across tables in the BUR and the NIR could facilitate better understanding of the information reported on GHG emissions.

Table 1

Greenhouse gas emissions by gas of Ghana for 1990–2016

<i>Gas</i>	<i>GHG emissions (Gg CO₂ eq including FOLU)</i>	<i>% change 1990–2016</i>	<i>GHG emissions (Gg CO₂ eq excluding FOLU)</i>	<i>% change 1990–2016</i>
CO ₂	27 290	62.1	14 410	
CH ₄	6 510	55.0	6 510	
N ₂ O	7 710	88.5	7 710	
HFCs	610		610	
PFCs	30	–85.0	30	
SF ₆				
Other				
Total	42 150	66.4	29 270	158.7

² <https://unfccc.int/documents/193160>.

29. Other emissions reported for 2016 include 117.68 Gg NO_x, 1,116.04 Gg CO, 92.56 Gg NMVOCs and 6.10 Gg black carbon.

30. Ghana applied notation keys in most tables where numerical data were not provided. Notation keys were used in most background tables in the individual sector chapters of the NIR. However, they were not used in the summary tables presented in annexes 1.1–1.6 of the NIR (the Party reported “-” instead of a notation key for all cells where values were not reported). In addition, the use of notation keys was not always consistent with the UNFCCC guidelines for the preparation of NCs from non-Annex I Parties; for example, table 19 shows CH₄ emissions from IPPU as “NA”. CH₄ emissions from this sector are possible but do not occur in Ghana and should be reported using the notation key “NO”. In another example, in table 20, Ghana reported PFC emissions as “NE” for 2003–2004 and 2007–2010, explaining in the accompanying text that the aluminium plant which is the source of these emissions was not operating in 2003, 2009 and 2010; therefore, these emissions should have been reported as “NO” for those years. In the waste sector, Ghana reported CO₂ emissions from all categories except waste incineration as “NO”; however, as these industries exist in the country, but no emissions occur, “NA” should be reported. The TTE notes that using notation keys consistently with the UNFCCC guidelines for the preparation of NCs from non-Annex I Parties could facilitate a better understanding of the information reported.

31. Ghana did not report comparable information addressing the tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF. The Party provided detailed tables in its NIR on the areas remaining in specific land areas and lands converted to other land areas, but information was not provided at a level comparable to table 3.A.2 of the IPCC good practice guidance for LULUCF for reporting annual changes in carbon stocks by land-use category. During the technical analysis, Ghana explained that it held the view that presenting information in the form stipulated in annex 3.A.2 was potentially redundant since sections 5.9.1.2 (category 3.B (land)) and 5.4.1.2.2 of the NIR cover this information. The TTE notes that reporting the information on annual changes in carbon stocks for different land uses and land-use conversions in the BUR could facilitate a better understanding of the information reported.

32. The shares of emissions that different sectors contributed to the total GHG emissions as reported by the Party in 2016 are reflected in table 2.

Table 2

Shares of greenhouse gas emissions by sector of Ghana in 1990–2016

<i>Sector</i>	<i>GHG emissions (Gg CO₂ eq)</i>	<i>Share (%)</i>	<i>Change (%) 1990–2016</i>
Energy	15 020	35.6	302.7
AFOLU	22 920	54.4	14.0
IPPU	1 040	2.5	112.2
Waste	3 170	7.5	210.8

33. Ghana reported information on its use of GWP values consistent with those provided by the IPCC in its Second Assessment Report based on the effects over a 100-year time-horizon of GHGs.

34. For the energy sector, Ghana reported that the increase in emissions strongly correlated with the increase in fuel consumption in electricity generation and transport. CO₂ emissions from road transportation, electricity generation, manufacturing industries and construction, railways and residential were identified as key categories. Information was clearly reported on the method applied (tier 1) and the types of fuels used in the country, along with the amount of fuel consumed in each IPCC category (table 28 of the NIR). In addition, the specific CO₂, CH₄ and N₂O EFs applied for each subcategory in the energy sector were transparently reported (table 29 of the NIR). The TTE commends the Party for the improvements it has made to its energy sector inventory, including updates to its AD to

reflect revisions in the fuel balance and improved allocation of fuels among different categories in accordance with the 2006 IPCC Guidelines.

35. For the IPPU sector, Ghana reported emissions from categories 2.A mineral industry (cement and other process uses of carbonates), 2.C metal industry (steel and aluminium production), 2.D non-energy products from fuels and solvent use (lubricants) and 2.F product uses and substitutes for ozone-depleting substances (refrigeration and air conditioning). The increase in emissions since 1990 is largely owing to increasing limestone consumption for cement production and, since 2005, reporting of HFC emissions from refrigeration and air conditioning. CO₂ emissions from other process uses of carbonates and aluminium, as well as HFC emissions from refrigeration and air conditioning were identified as key categories. The Party applied primarily tier 1 methods, with the exception of aluminium, for which a tier 2 method was implemented based on data provided by Valco, the aluminium company in Ghana. During the technical analysis, Ghana clarified that there is no production of lime or glass in the country, and that CO₂ emissions from ceramics have not been estimated owing to a lack of AD. The TTE commends the Party for its improvements in this sector, particularly the estimation of HFC emissions from refrigeration and air conditioning.

36. Ghana reported a planned improvement to conduct industrial surveys to identify all possible sources according to the 2006 IPCC Guidelines and ensure data are collected from both formal and informal sources and to track emerging sources (e.g. SF₆ used in electrical equipment). In addition, the Party reported some CO₂ emissions related to the production of cement under categories 2.A.1 (cement production) and 2.A.4 (other process uses of carbonates). The Party confirmed that section 4.3.5.3.3 of the NIR addresses the use of limestone as a flux in the cement and steel industry while section 4.3.5.2 provides additional information on the use of limestone in cement. The TTE notes that including all process emissions related to the production of cement under category 2.A could facilitate a better understanding of the information reported.

37. Emissions from the agriculture sector amounted to 10,050 Gg CO₂ eq in 2016. Ghana reported CH₄ and N₂O emissions from livestock (enteric fermentation and manure management) and CO₂, CH₄ and N₂O emissions from aggregate sources and non-CO₂ emissions sources on land. The increase in emissions since 1990 was driven by increasing populations of all livestock, with the largest influence on emissions being from cattle and goats. Direct and indirect N₂O emissions from managed soils and CH₄ from enteric fermentation, N₂O emissions from manure management and CH₄ and N₂O emissions from biomass burning were identified as key categories and the most relevant emission sources in the sector. The Party applied tier 1 methods for this sector and used EFs from the 2006 IPCC Guidelines. In its NIR, the Party reported that expert judgement had been used to group cattle into dairy and non-dairy cattle (p.206), but in other parts of the NIR, Ghana indicated that emissions from dairy cattle do not occur in Ghana (p.207, footnote 15) and that all cattle in Ghana are assumed to be non-dairy cattle, because the majority of cattle are not reared for milk production (p.234). During the technical assessment the Party clarified that other cattle in the NIR refers to non-dairy cattle. The TTE notes that, as cattle are the largest subcategory of livestock, reporting CH₄ emissions from enteric fermentation and CH₄ and N₂O emissions from manure management from dairy and non-dairy cattle separately would facilitate a better understanding of the information reported.

38. For FOLU, Ghana reported GHG emissions and removals for 1990–2016. Overall, FOLU was a net source of emissions in 2016 (12,870 Gg CO₂ eq). According to the Party, the observed emission patterns tend to be driven by the net changes in the land-use transitions, particularly grassland and cropland. Land classification was based on wall to wall maps published in 1990, 2000, 2010, 2012 and 2015 and on remote sensing and ground truthing techniques. EFs were generated, where possible from data used to generate Ghana's forest reference level, the 2006 IPCC Guidelines and some national studies and were well documented in the NIR. The large effects of recalculations to the LULUCF sector since the previous BUR are due to better classification of land areas into the 2006 IPCC Guidelines classifications, applying improved data collection methods (e.g. remote sensing and ground truthing), update of data sets on roundwood and fuel wood harvest and development of a country-specific EF for teak. These recalculations increased emissions (ranging from 313 to 21,555 per cent across the time series) and for many years changed the sector from a net sink

to a net source. The TTE commends Ghana for its continued efforts to improve the accuracy of emission estimates for this sector.

39. In the waste sector, CH₄ from solid waste disposal sites and from wastewater handling are the key categories and increases in emissions from these categories are largely responsible for the overall increase in emissions in the sector. According to table 109 of the NIR, CH₄ emissions from biological treatment of solid waste is also a key category according to the trend of 1990–2016. The TTE commends Ghana for the improvement in applying the first-order decay model using country-specific AD to estimate its emissions from solid waste disposal sites, updating its estimate of per capita waste generation, which affected estimates for solid waste disposal and waste incineration, as well as improvements related to AD collection for both domestic and industrial wastewater. Ghana also reported on challenges encountered in collecting AD from a number of discrete and disparate data sources and its planned improvements to address these challenges, pending funding and additional capacity-building.

40. The NIR provides an update to all GHG inventories reported in previous NCs and BURs. The GHG inventory contains information that provides an update of the information presented in Ghana's NC3/first BUR and the stand-alone GHG inventory report, all submitted in July 2015. NC1 addressed anthropogenic emissions and removals for the period 1990–1996, NC2 for 1990–2006, NC3 and the first BUR for 1990–2012 and the second BUR for 1990–2016. The update was carried out for all years in the period 1990–2016 using the methodologies contained in the 2006 IPCC Guidelines, thus generating a consistent 27-year time series. The previous national inventory was also prepared using the 2006 IPCC Guidelines, but the second BUR estimated emissions from additional categories (e.g. product uses as substitutes for ozone-depleting substances) and applies some higher-tier methods from the 2006 IPCC Guidelines (solid waste disposal).

41. Ghana described in its BUR the institutional framework for the preparation of its 1990–2016 GHG inventory. The Ministry of Environment, Science, Technology and Innovation is the lead for environment and climate change issues and works closely with its Environmental Protection Agency, which leads the preparations of the NCs, BURs and NIRs, based on a legal mandate derived from Environmental Protection Agency Act 490. In addition, more than 20 public, private, academic and other organizations supported the development of the inventory. Financial and technical support for the preparation of the second BUR was provided by the GEF via UNEP with additional support from UNDP through its NDC Support Programme. The TTE commends Ghana for its extensive discussion on the institutional arrangements presented in the BUR and the NIR, including not only the institutions involved, data collection and archiving procedures and efforts to make inventory development a continuous process, as outlined in decision 17/CP.8, but also the information reported on data management and handling procedures, standard operating procedures (e.g. the GHG inventory manual) and inventory timelines.

42. Ghana reported a key category analysis for the level of emissions and the trend in emissions. The level key category analysis presented in the BUR included only those categories that collectively contributed 94.76 per cent of emissions, and not 95 per cent of emissions as included in the 2006 IPCC Guidelines. As a comment to the draft summary report, Ghana clarified that it holds the considered view that using 95 per cent threshold rather than 94.76 per cent would not lead to any material change in the list of key categories. This is because the round-up of the two decimal places comes up to the same 95 per cent. However, the TTE is of the view that that by rounding up to the 95 per cent threshold, Ghana is missing the identification of at least one key category in its analysis. The trend key category analysis presented in the BUR, with the exception of the waste sector, was calculated based on the years 2000–2016, and not 1990–2016, as suggested in the 2006 IPCC Guidelines. Ghana explained that it is able to calculate key categories using a trend analysis back to 1990 but did not do so as it thought this time frame was optional. The TTE notes that including setting a key category threshold to 95 per cent and clearly explaining the reasons for selecting the base year for the trend analysis would facilitate a better understanding of the information reported.

43. The BUR provides information on QA/QC measures for all sectors. The TTE commends Ghana for providing a link to its QA/QC plan and information in accordance with

the 2006 IPCC Guidelines on the general QA procedures undertaken on the inventory, as well as the category-specific QC checks implemented.

44. Ghana reported information on CO₂ fuel combustion using both the sectoral and the reference approach. The difference between the reference and the sectoral approach, by fuel, is well presented in the NIR for all years of the time series, ranging from 0.03 per cent (solid fuels) to 5.47 per cent (liquid fuels) across the time series.

45. Information was reported on international aviation and marine bunker fuels. Ghana reported the total fuel consumption and corresponding CO₂ equivalent emissions separately for aviation and marine bunkers for the period 1990–2016 and transparently described in the NIR its approach to separate liquid fuels used for international aviation and marine bunker fuels from fuels used for domestic transportation activities.

46. Ghana reported information on the uncertainty assessment (level) of its national GHG inventory for the land category (land areas only). The uncertainty analysis was based on country-specific information. The results obtained, as reported in the NIR, reveal that the land-use classes have an overall accuracy of 74 per cent. The Party indicated that it does not have sufficient data to conduct an uncertainty analysis for other categories, and was of the view that to simply apply the IPCC default uncertainty values would be arbitrary. The TTE notes that reporting the results of the tier 1 uncertainty analysis using IPCC defaults for all sectors until Ghana has data to perform a more thorough uncertainty analysis would facilitate a better understanding of the information reported.

47. The TTE notes that the transparency of the information reported on GHG inventories could be further enhanced by addressing the areas noted in paragraphs 27, 28, 30, 31, 36, 37, 42 and 46 above.

48. In paragraphs 32, 36 and 37 of the summary report on the technical analysis of Ghana's first BUR, the TTE had noted areas where the transparency of reporting on the uncertainty analysis, sectoral and reference approaches and country-specific EFs could be enhanced. It noted that Ghana had taken these areas for improvement into consideration in its second BUR and fourth NIR and provided more transparent information on the uncertainty analysis and country-specific EFs for the land category, as well as application of the reference and sectoral approaches. The TTE commends the Party for enhancing the transparency of the information reported.

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

49. As indicated in table 2 in annex I, Ghana reported in its BUR, completely in accordance with paragraphs 11–13 of the UNFCCC reporting guidelines on BURs, information on mitigation actions and their effects. The information reported provides a clear and comprehensive overview of the Party's mitigation actions and their effects. In its BUR Ghana frames its national mitigation planning and actions in the context of its Low Carbon Development Strategy and NDC, which was submitted in 2015. Ghana reported that it has committed to unconditionally lower its GHG emissions by 15 per cent, relative to a 'business as usual' emissions scenario of 73.9 Mt CO₂ eq, by 2030. The Party reported that it has committed to 20 mitigation actions, from which 1 action in the energy sector and 1 in the forestry sector were identified as unconditional.

50. Most of the mitigation actions are in the energy sector. Ghana reported that climate change has been mainstreamed and integrated into its development strategy through the following specific mitigation policies: the Renewable Energy Act, Sustainable Energy for All Action Agenda, LPG Master Plan, National Gas Master Plan, Energy Efficient Laws, National Energy Policy, Forest and Wildlife Policy, REDD+ Strategy, Forest Plantation Development Strategy, National Environmental Sanitation Strategy and National Climate Change Policy. Furthermore, the implemented mitigation actions contributed to estimated emission reductions of 13.7 Mt CO₂ eq in the period 2011–2017, which were attributed to 18 actions in the energy, forestry and waste sectors, with the energy sector being the main source of emission reductions. Ghana also reported that, if all activities are well sustained, the anticipated minimum annual reduction in GHG emissions until 2030 is expected to be 44 Mt CO₂ eq. During the technical analysis the Party clarified that of the 20 mitigation actions

identified, 2 were not currently being implemented, and the remaining 18 actions that were presented in detail in the BUR are at various stages of implementation.

51. The Party reported a summary of its mitigation actions in tabular format in accordance with decision 2/CP.17, annex III, paragraph 11.

52. Consistent with decision 2/CP.17, annex III, paragraph 12(a), Ghana clearly reported the names of mitigation actions and groups of actions, coverage by sector and by gas as well as progress indicators. Table 14 lists the mitigation measures; table 15 shows the mitigation action progress tracker template and section 4.4 gives information on individual mitigation actions and their effects in tabular format. A description of actions and information on quantitative goals was clearly reported in the BUR.

53. The information reported for the energy sector includes the methodologies used for estimating the impacts of mitigation actions. Details on the underlying assumptions were also clearly reported in the BUR. The Party reported on 14 actions, which have been grouped as 4 measures: energy efficiency, renewable energy, clean cooking and low-carbon electricity and reduced flaring. The objectives of the mitigation actions and the steps taken to implement them were reported. The Party reported that its mitigation measures were derived from ongoing projects. It also reported information on the results achieved from the implementation of its mitigation actions, as emission reductions and mitigation co-benefits. Ghana reported that by 2017, the ongoing renewable energy penetration programme had achieved 43 MW of installed renewable energy and GHG emission savings of 2.8 kt CO₂ eq/year. Ghana's promotion of clean cooking for the wood-fuel users project so far has achieved emission savings of 642.5 kt CO₂ eq/year. Ghana also reported on its energy efficiency programme, which has achieved GHG emission savings of 5.9 kt CO₂ eq/year. The Party's low-carbon electricity generation and reduced flaring programmes have achieved savings of 1.2 Mt CO₂ eq/year so far, including 775.01 CO₂ eq/year of avoided emissions from reduced natural gas flaring. Ghana also reported on the co-benefits achieved, such as reduced indoor air pollution and associated health benefits, job creation and reduced electricity bills.

54. The Party reported one mitigation action in the waste sector in the area of waste to compost activities and provided a description of the methodology and assumptions. The objective of the ongoing mitigation action and information on the steps taken to implement it were reported. The Party also reported that the implementation of this mitigation action had resulted in estimated emission reductions of 355.9 kt CO₂ eq/year since the project began in 2013. Ghana reported the co-benefits of the programme, including employment created, plastics recycled and compost produced.

55. The information reported for the forestry sector includes the methodologies used for estimating the impacts of the mitigation actions and details of the underlying assumptions. Ghana reported one mitigation action in afforestation/reforestation and two in avoided deforestation. The objectives of the mitigation actions and the steps taken to implement them were reported. The Party reported that its mitigation measures were derived for two ongoing projects and one which is planned. The Party also reported information on the emission reductions resulting from the implementation of its mitigation actions. Ghana's National Forest Plantation Development Programme has achieved reductions of 24 kt CO₂ eq/year since its commencement in 2002. Ghana reported on its Cocoa Forest REDD+ Programme, which is projected to achieve emission reductions of 295.4 Mt CO₂ eq over the 20-year implementation period. The Party also reported that the planned Ghana Shea Landscape REDD+ Programme is expected to achieve 6.135 Mt CO₂ eq in emission reductions and removals over the first 7 years of implementation and a total of 25.24 Mt CO₂ eq over 20 years. Ghana reported the co-benefits of the mitigation activities in the forestry sector, such as strengthened livelihoods and climate resilience, increase in income and jobs and increased food production.

56. The TTE noted inconsistent use of units in reporting the estimated emission reductions for different mitigation actions; for some actions they were reported in units of CO₂ eq/year (promotion of clean cooking for wood-fuel users) and for others in units of C/year (energy efficiency improvements in households, services and industry). During the technical analysis, the Party clarified that CO₂ eq/year was meant to be used everywhere.

57. Ghana provided information on the sectors covered and the status of four planned NAMA projects. It reported that its energy sector project on access to clean energy through the establishment of market-based solutions was prepared under the UNDP Low Emission Capacity Building Programme and is awaiting funding. The Party reported that it has prepared transport and industry sector NAMAs under the Facilitating Implementation and Readiness for Mitigation project implemented by the UNEP DTU Partnership. The bus rapid transit project for the transport sector is undergoing further refinement, after which it will be submitted to the Green Climate Fund, and project preparation for the industry sector project on capacitor banks is complete. Ghana reported that its forestry sector NAMA project is partially developed and additional financial resources are being sought to fund its completion.

58. Ghana provided information on its involvement in international market mechanisms as a Party to the Kyoto Protocol, namely on CDM and POA projects, including the number of projects, sectors covered and quantity of CERs issued and the status of each project. Eight national CDM projects were reported in table 16 of the BUR, four of which have been approved and registered by the Executive Board of the CDM. These are expected to generate total CERs of 3,026 kt CO₂ eq for the first crediting period. Project development of an additional four CDM projects with potential CERs of 2,541 kt CO₂ eq has commenced and the projects are at different stages of validation. Ghana has transparently reported that one of the projects listed was not successfully verified and the CERs for that project will not be realized. The Party also reported on its involvement in 18 POA projects which have potential CERs of 1,544.9 kt CO₂ eq.

59. Ghana reported information on its domestic MRV arrangements in accordance with decision 2/CP.17, annex III, paragraph 13. In its BUR Ghana provided an update on the process to develop the design and operation of its domestic MRV system for the period 2015–2020. Ghana reported that, although some progress has been made, the system faces operational challenges, which the Party has sought financial support from the GEF to help in addressing.

60. Overall, the TTE finds that the information provided on mitigation actions in Ghana's second BUR is well organized, transparent and consistent with UNFCCC reporting guidelines on BURs. The TTE commends the Party for this effort.

61. In paragraphs 43, 45, 46, 52 and 53–55 of the summary report on the technical analysis of Ghana's first BUR, the previous TTE had noted areas where the transparency of reporting on policy context, quantitative goals, descriptions, steps taken and envisaged and estimated emissions reductions could be enhanced. The current TTE noted that Ghana had taken these areas for improvement into consideration in section 4.4 of its second BUR and commends the Party for enhancing the transparency of the information reported.

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

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

63. Ghana 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 Ghana identified inadequate access to resources to meet prioritized financial, technical and capacity-building needs as the main constraint, and other constraints such as inadequate funding in the national budget, duplication of activities and funding, insufficient transparency on non-financial support for training and technical assistance, and gaps in tracking capacity-building and technical assistance.

64. The updated information on related financial needs was reported in chapter 6 of the BUR. The Party stated that financial, technical and capacity-building needs were reported in table ES1 (table 22), expressed mainly as financial needs. Table 21 of the BUR provides information on capacity needs and corresponding capacity support received. In its responses to the draft summary report, Ghana clarified that the capacity needs presented in table 21 still remain, although some support has already been received to cover these needs.

65. Regarding the GHG inventory specifically, Ghana noted that the GEF funding is inadequate to support the full cost of producing it (NIR, p.53). In particular, during the technical analysis, Ghana stated that additional financial support would help the Party to collect the necessary information to enhance the GHG inventory for several activities in the country. Specifically, additional financial support would better enable the collection of AD on limestone used in various industries in Ghana; the development of an enhanced characterization for cattle; the development of country-specific EFs for electricity generation; enabling more frequent data collection and surveys in the energy sector to better understand the pattern and quantity of energy consumed in the various end-use sectors; and the development of country-specific AD and EFs for oil and gas operations.

66. Ghana reported information on financial resources in tables 18 and 19 and more detailed information in annex 2 for the period 2011–2017, and on the capacity-building and technical support in tables 20 and 21 for the period 2014–2017 received in accordance with decision 2/CP.17, annex III, paragraph 15. In its BUR Ghana reported that it had received USD 352,000 from the GEF for compiling its second BUR, but the funding amount did not cover the full cost of its preparation and other partners contributed through technical assistance. In particular, Ghana received non-monetized support in the form of capacity-building and technical assistance and technology from UNDP, UNEP, the secretariat, FAO and international aid agencies to facilitate use of the 2006 IPCC Guidelines to prepare its GHG inventory, alternative energy planning, construction of an NDC baseline and land-use mapping. Information on financial support received was reported over the period 2011–2017.

67. The total amount committed by various donors in the period was worth USD 15.5 billion for the implementation of 101 climate-relevant projects. The financial inflow was counted on a commitment basis without counting the amount of global or multi-country projects and was mobilized through five channels, multilateral, bilateral, the GEF, national and private sector, in modalities of loan, grant and national budget. Among the climate finance received, 97.7 per cent was categorized as climate-relevant and 2.3 per cent as climate-specific. As for the channels, private investment accounts for the largest share of 93.9 per cent. Investments in the energy sector amounted to 98.9 per cent of total support received. During the technical analysis, Ghana indicated that implementation of its plan to collect on climate change expenditure of the Government of Ghana from the Ministry of Finance, which has developed a tool and guidance to account both for the national expenditures and international climate finance, has begun. The information, including national and international climate finance, will be reported in the next BUR.

68. Ghana reported information on nationally determined technology needs in the form of a TNA, conducted first in 2003 and second in 2014 with regard to the development and transfer of technology in accordance with decision 2/CP.17, annex III, paragraph 16. The TNA was the basis for the technology needs reported in the BUR and aligned with Ghana's NDC.

69. Ghana also reported information on support needed for effectively tracking GHG emissions and reporting, which includes the collection of higher-quality AD and EFs for oil/gas activities, road transport, the waste sector, the industry sector, improvement of energy statistics, estimation of mitigation potential in non-energy sectors and development of sustainable biomass production.

70. 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 64 above.

71. In paragraphs 58, 61 and 65 of the summary report on the technical analysis of the Party's first BUR, the TTE had noted areas where the transparency of reporting on constraint and gaps, technology needs and support could be enhanced. The TTE noted that the Party had taken this area for improvement into consideration in chapter 6 of its second BUR and commends the Party for enhancing the transparency of the information reported.

5. Any other information

72. Ghana reported additional information on the just transition framework to green its economy and methodology for obtaining information on its response measures. The Party reported on the initial activities of the Government of Ghana, which include stakeholder

engagement, institutional arrangements, public awareness enhancement and dialogue to harmonize mitigation actions with its national economic diversification and development priorities.

D. Identification of capacity-building needs

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

- (a) Collection of AD on consumption of F-gases, particularly SF₆;
- (b) Collection of AD and EFs to support the development of a tier 2 method for road transport;
- (c) Support in the expansion of the current facility-level carbon accounting programme, taking into account lessons learned from the current voluntary carbon accounting programme by the public electricity utility;
- (d) Development of solid waste and wastewater balances to better understand the flow of solid waste and wastewater from the point of generation to the final end site (e.g. solid waste disposal sites in the case of solid waste, or seas, rivers or lakes in the case of wastewater);
- (e) Data collection to improve upon current expert judgement in the allocation of manure into various manure management systems;
- (f) Developing concrete category-level plans to collect the necessary uncertainty values for AD, EFs and parameters;
- (g) Aggregating the project-level results of mitigation actions to sectoral and national totals;
- (h) Performing an ex ante assessment of non-mitigation benefits of mitigation actions.

74. The TTE noted that, in addition to those identified during the technical analysis, Ghana reported a capacity-building need in its BUR to ensure continuous capacity-building in data collection processes for the GHG inventory, in particular for new techniques and methodologies in the compilation, analysis and dissemination of energy statistics.

75. In paragraph 68 of the summary report on the technical analysis of Ghana's first BUR, the previous TTE, in consultation with Ghana, had identified and prioritized capacity-building needs. In its second BUR, Ghana reflected that some of those capacity-building needs have been addressed. These cover the use of the 2006 IPCC Guidelines, improvement and strengthening of the national GHG inventory system, particularly capacity-building on GHG data management and institutional arrangements, improvement of the GHG inventory report, continuous training of GHG experts, improvements in the institutional arrangements, improvement of completeness checks and methods for the estimation of emissions from product use as a substitute for ozone-depleting substances.

III. Conclusions

76. The TTE conducted a technical analysis of the information reported in the second BUR of Ghana in accordance with the UNFCCC reporting guidelines on BURs. The TTE concludes that the reported information is mostly consistent with the UNFCCC reporting guidelines on BURs and 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 removal by sinks of most 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; and the domestic MRV.

77. Ghana reported information on the institutional arrangements relevant to the regular preparation of its BURs, which includes the legal status, roles and responsibilities of the overall coordinating entity, the involvement and roles of other institutions and stakeholders, and mechanisms for information and data exchange. Ghana reported that it has taken significant steps to create institutional arrangements that allow for the sustainable preparation of its BURs. These include organizational improvements and participation, knowledge-sharing procedures and operational guidelines to facilitate sectoral information transfer.

78. In its second BUR, submitted in 2018, Ghana reported information on its national GHG inventory for 1990–2016. This included GHG emissions and removals of CO₂, CH₄ and N₂O for most relevant sources and sinks, as well as the precursor gases. Estimates of HFC and PFC emissions were provided, but estimates of SF₆ emissions were not provided owing to difficulties in obtaining the necessary data. The inventory was developed on the basis of the 2006 IPCC Guidelines. The total GHG emissions for 2016 were reported as 29,280 Gg CO₂ eq (excluding FOLU) and 42,150 Gg CO₂ eq (including FOLU). Twenty-two key categories were identified, with net CO₂ emissions from land converted to cropland identified as the main gas and key category.

79. Ghana reported information on mitigation actions and their effects, including the baseline and mitigation scenarios for 2015 to 2030, and frames its national mitigation actions in the context of the national strategy of emission reductions and sustainable development outcomes, which was launched in 2015. Ghana reported planned and ongoing mitigation actions within several sectors, including energy, waste and forestry. It also reported that despite economic development challenges it has been able to invest in renewable energy, energy efficiency, power generation, clean cooking, waste management and forest management actions that have led to more GHG emission reductions than originally expected. Among these, actions in the energy sector have the highest expected cumulative emission reductions. Ghana's actions to promote low-carbon electricity generation and reduced flaring alone are projected to achieve emission reductions of 1.2 Mt CO₂ eq/year. Overall Ghana reported that total cumulative emission reductions from 2011 and 2017 were 13.7 Mt CO₂ eq. The Party reported that if the mitigation actions reported in its BUR are fully implemented, with external support, the cumulative GHG emission reductions achieved will be 44 Mt CO₂ eq in 2030.

80. Ghana reported information on key constraints, gaps and related needs. The BUR clearly identifies the needs related to the development of the national GHG inventory and financial support. Information on support received and needed was reported specific to mitigation actions. Ghana also reported the key achievement in the operationalization of the domestic MRV since the first BUR, which includes establishing a standardized and sustainable system for monitoring the financial support received by the Ministry of Finance. Information on technology needs and technology needed and received was also reported in the BUR.

81. The TTE, in consultation with Ghana, identified the eight 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. The Party further identified the capacity-building needs set out in paragraph 73(b), (c), (d) and (f) above as having high priority and those set out in paragraph 73(a), (e), (g) and (h) above as medium priority capacity-building needs.

Annex I

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

Table 1

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

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/partly/no/NA</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, paragraph 41(g)	The first BUR shall cover, at a minimum, the inventory for the calendar year no more than four years prior to the date of the submission, or more recent years if information is available, and subsequent BURs shall cover a calendar year that does not precede the submission date by more than four years.	Yes	Ghana submitted its second BUR in October 2018 and submitted a revised version in February 2019; the GHG inventories reported are for 1990–2016.
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 COP or those determined by any future decision of the COP on this matter.	Yes	Ghana used the 2006 IPCC Guidelines.
Decision 2/CP.17, annex III, paragraph 5	The updates of the section on national inventories of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol should contain updated data on activity levels based on the best information available using the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF; any change to the EF may be made in the subsequent full NC.	Yes	
Decision 2/CP.17, annex III, paragraph 6	Non-Annex I Parties are encouraged to include, as appropriate and to the extent that capacities permit, in the inventory section of the BUR:		
	(a) The tables included in annex 3A.2 to the IPCC good practice guidance for LULUCF;	Partly	Ghana reported information on land areas, but comparable information on the living biomass, dead organic matter and soils pools was not reported.
	(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). The inventory section of the BUR should consist of an NIR as a summary or as an	Yes	This information was reported for 1990–2016.

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/partly/no/NA</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, annex III, paragraph 9	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 table annex 1.1.
	(b) Table 2 (National greenhouse gas inventory of anthropogenic emissions of HFCs, PFCs and SF ₆).	Partly	Information was reported in table annex 1.1, but information on HFCs and PFCs were reported in CO ₂ eq. SF ₆ emissions were reported as “-”.
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 13	Non-Annex I Parties are encouraged to describe procedures and arrangements undertaken to collect and archive data for the preparation of national GHG inventories, as well as efforts to make this a continuous process, including information on the role of the institutions involved.	Yes	Information on a national system for sustainable inventory preparation, including procedures, arrangements and institutions involved was reported.
Decision 17/CP.8, annex, paragraph 14	Each non-Annex I Party shall, as appropriate and to the extent possible, provide in its national inventory, on a gas-by-gas basis and in units of mass, estimates of anthropogenic emissions of:		
	(a) CO ₂ ;	Yes	
	(b) CH ₄ ;	Yes	
	(c) N ₂ O.	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	
	(b) PFCs;	Yes	
	(c) SF ₆ .	No	SF ₆ emissions were not reported.
Decision 17/CP.8, annex, paragraph 16	Non-Annex I Parties are encouraged, as appropriate, to report on anthropogenic emissions by sources of other GHGs, such as:		
	(a) CO;	Yes	
	(b) NO _x ;	Yes	
	(c) NMVOCs.	Yes	
Decision 17/CP.8, annex, paragraph 17	Other gases not controlled by the Montreal Protocol, such as SO _x , 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 particulate matter 2.5 and black carbon.

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/partly/no/NA</i>	<i>Comments on the extent of the information provided</i>
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 Second Assessment Report 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 and removals by sinks of GHGs not controlled by the Montreal Protocol;	Yes	Ghana used the 2006 IPCC Guidelines. A tier 2 methodology was used for aluminium, land and solid waste disposal. Tier 1 methods were used for all other categories.
	(b) Explanation of the sources of EFs;	Yes	
	(c) Explanation of the sources of AD;	Yes	Ghana used national and international data sources.
	(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:	NA	
	(i) Source and/or sink categories;		
	(ii) Methodologies;		
	(iii) EFs;		

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/partly/no/NA</i>	<i>Comments on the extent of the information provided</i>
	(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 and 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.	Partly	Ghana reported on the use of notation keys in background tables of the NIR (e.g. tables 66, 70, 73, 80 and 108 of the NIR) but not the summary tables of the BUR.
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;	Partly	Uncertainty information was reported for the land categories only.
	(b) Underlying assumptions;	Partly	Assumptions were reported for the land categories only.
	(c) Methodologies used, if any, for estimating these uncertainties.	Partly	Methodologies were reported for the land categories only.

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, paragraphs 3–10 and 41(g). Further, as per paragraph 3 of those guidelines, non-Annex I Parties are to submit updates of their national GHG inventories in accordance with 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. 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 2

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

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/partly/no</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, annex III, paragraph 11	Non-Annex I Parties should provide information, in tabular format, on actions to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol.	Yes	
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.	Yes	

<i>Decision</i>	<i>Provision of the reporting guidelines</i>	<i>Yes/partly/no</i>	<i>Comments on the extent of the information provided</i>
	sectors and gases), quantitative goals and progress indicators;		
	(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, paragraphs 11–13.

Table 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 Ghana

<i>Decision</i>	<i>Provision of the reporting requirements</i>	<i>Yes/partly/no</i>	<i>Comments on the extent of the information provided</i>
Decision 2/CP.17, annex III, paragraph 14	Non-Annex I Parties should provide updated information on:		
	(a) Constraints and gaps;	Yes	
	(b) Related financial, technical and capacity-building needs.	Yes	The needs, expressed mainly as financial needs, are provided in table 22 of the BUR. Capacity-building needs are listed in table 21.
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	Information on financial resources received also includes private investment.
	(b) Information on technical support received from the Global Environment Facility, Parties included in Annex II to the Convention and other developed country Parties, the Green Climate Fund and multilateral institutions for activities relating	Yes	

<i>Decision</i>	<i>Provision of the reporting requirements</i>	<i>Yes/partly/no</i>	<i>Comments on the extent of the information provided</i>
	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, paragraphs 14–16.

Annex II

Documents and information used during the technical analysis

Reference documents

First BUR of Ghana. Available at <http://unfccc.int/8722.php>.

First, second and third NC of Ghana. Available at <https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-update-reports-non-annex-i-parties/national-communication-submissions-from-non-annex-i-parties>.

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/gp/lulucf/gp_lulucf.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>.

Summary report on the technical analysis of the first BUR of Ghana. Available at http://unfccc.int/national_reports/non-annex_i_parties/ica/technical_analysis_of_burs/items/10054.php.
