COMPLIANCE COMMITTEE **CC/ERT/ARR/2010/18**
9 March 2010

Report of the individual review of the annual submission of Bulgaria submitted in 2009

Note by the secretariat

The report of the individual review of the annual submission of Bulgaria (FCCC/ARR/2009/BGR) submitted in 2009 was published on 9 March 2010. An advance version of the report is contained in the annex to this note. The secretariat would draw your attention, in particular, to paragraphs 11 and 12 and sections II and X of the report.

In accordance with section VII, paragraph 1, of the annex to decision 27/CMP.1 and rule 19, paragraph 1, of the "Rules of procedure of the Compliance Committee of the Kyoto Protocol" (annex to decision 4/CMP.2, as amended by decision 4/CMP.4; hereinafter referred to as the rules of procedure), the report, which lists the question of implementation in paragraph 200 will be forwarded to the bureau for allocation to the appropriate branch. Upon allocation by the bureau, the secretariat will notify members and alternate members of the appropriate branch of the question of implementation and send them all available materials in accordance with rule 19, paragraph 2, of the rules of procedure, and notify the members and alternate members of the other branch of the question of implementation in accordance with rule 19, paragraph 3, of the rules of procedure.

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Report of the individual review of the annual submission of Bulgaria submitted in 2009*

* In the symbol for this document, 2009 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Executive summary

1. This report covers the in-country review of the 2009 annual submission of Bulgaria, coordinated by the UNFCCC secretariat, in accordance with decision 22/CMP.1. The review took place from 28 September to 3 October 2009 in Sofia, Bulgaria, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalist – Mr. Justin Goodwin (United Kingdom of Great Britain and Northern Ireland); energy – Mr. Tinus Pulles (Netherlands); industrial processes – Ms. Maria Jose Lopez (Belgium); agriculture – Ms. Janka Szemesova (Slovakia); land use, land-use change and forestry (LULUCF) – Mr. Nijavalli Ravindranath (India); and waste – Mr. Kai Skoglund (Finland). Mr. Pulles and Mr. Ravindranath were the lead reviewers. The review was coordinated by Mr. Matthew Dudley (UNFCCC secretariat).

2. In accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1), a draft version of this report was communicated to the Government of Bulgaria, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

3. In 2007, the main greenhouse gas (GHG) in Bulgaria was carbon dioxide (CO_2), accounting for 77.7 per cent of total GHG emissions[1] expressed in CO_2 eq, followed by methane (CH_4) (15.3 per cent) and nitrous oxide (N_2O) (6.7 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 0.3 per cent of the overall GHG emissions in the country. The energy sector accounted for 73.8 per cent of the total GHG emissions, followed by waste (10.1 per cent), industrial processes (9.4 per cent), agriculture (6.6 per cent) and solvent and other product use (0.1 per cent). Total GHG emissions amounted to 75,792.79 Gg CO_2 eq and decreased by 43.3 per cent between the base year[2] and 2007, generally following the developments in the economy of Bulgaria.

4. Tables 1 and 2 show GHG emissions by gas and by sector, respectively. Table 1 includes emissions from Annex A sources only and excludes emissions and removals from the LULUCF sector.

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1988 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

Table 1. Total greenhouse gas emissions by gas, 1988–2007[a]

Greenhouse gas	Gg CO_2 eq								Change 1988–2007 (%)
	Base year[b]	1990	1995	2000	2004	2005	2006	2007	
CO_2	98 815.11	86 268.66	66 361.16	50 482.42	53 270.20	54 028.36	55 144.22	58 889.66	–40.4
CH_4	21 986.32	20 237.93	16 037.79	13 421.22	12 878.07	11 924.92	11 693.14	11 603.66	–47.2
N_2O	12 945.50	11 165.79	6 158.25	5 220.68	4 730.29	4 682.16	4 482.59	5 049.46	–61.0
HFCs	2.95	NA, NE, NO	2.95	96.02	217.30	386.84	610.68	246.61	8 248.7
PFCs	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	NA, NE, NO	0.04	NA, NE, NO	NA
SF_6	1.26	NA, NE, NO	1.26	2.23	3.68	4.42	5.30	3.40	169.3

Abbreviations: NA = not applicable, NE = not estimated, NO = not occurring.

[a] "Total greenhouse gas emissions" includes emissions from Annex A sources only (and excludes emissions/removals from the land use, land-use change and forestry sector).

[b] "Base year" refers to the base year under the Kyoto Protocol, which is 1988 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

Table 2. Greenhouse gas emissions by sector, 1988–2007

Sector	Gg CO_2 eq								Change 1988–2007 (%)
	Base year[a]	1990	1995	2000	2004	2005	2006	2007	
Energy	94 666.41	81 465.34	61 974.36	48 177.61	51 469.40	51 228.32	52 286.59	55 944.34	–40.9
Industrial processes	10 573.97	9 892.52	8 963.05	6 080.35	6 020.50	6 529.09	6 793.99	7 106.16	–32.8
Solvent and other product use	75.99	73.30	70.90	67.21	49.85	53.47	55.40	54.10	–28.8
Agriculture	15 390.15	13 618.39	6 206.34	5 648.28	5 075.49	5 074.92	4 972.66	5 030.31	–67.3
LULUCF	NA	–6 074.23	–7 343.67	–8 908.24	–6 908.07	–6 785.43	–6 789.62	–6 801.90	NA
Waste	13 044.63	12 622.82	11 346.76	9 249.12	9 126.22	8 140.90	7 827.32	7 657.89	–41.3
Other	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total (with LULUCF)	NA	111 598.14	81 217.75	60 314.34	64 833.39	64 241.27	65 146.35	68 990.89	NA
Total (without LULUCF)	133 751.15	117 672.37	88 561.42	69 222.57	71 741.46	71 026.70	71 935.97	75 792.79	–43.3

Abbreviations: LULUCF = land use, land-use change and forestry, NA = not applicable.

[a] "Base year" refers to the base year under the Kyoto Protocol, which is 1988 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base year emissions include emissions from Annex A sources only.

5. Emission estimates have not been prepared in line with the *Revised 1996 Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines), IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) and the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF). The ERT identified emission estimates for some key categories in the industrial processes, agriculture and waste sectors that could be improved with the use of higher-tier estimation methodologies (see paras. 99, 100, 101, 104, 106, 107, 121, 127 and 165 below) and/or country-specific and comparable data (see paras. 99, 100, 101, 104, 106, 107, 109, 122, 123, 125, 126, 160, 161, 162 and 166 below), which would improve the accuracy of the estimates and/or resolve the issue of any identified potential underestimations.

6. The 2009 annual submission is in general complete in respect of its coverage of sectors, gases and years of the inventory time series, and is complete in terms of geographical coverage. However, the expert review team (ERT) identified issues with regard to the completeness of the coverage of categories in all sectors (see para. 21 below). Not all common reporting format (CRF) tables have been provided by the Party in this annual submission, such as the CRF tables for explanations of recalculations (table 8(b)) and information on completeness (table 9) (see para. 22 below).

7. The national inventory report (NIR) has not been prepared fully following the structure set out in the "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories" (hereinafter referred to as the UNFCCC reporting guidelines) (e.g. the chapter on the LULUCF sector) (see paras. 23 and 58 below), nor does it provide sufficient information on choice of methodologies, activity data (AD) and emission factors (EFs), calculation procedures, assumptions, or rationale for recalculations and their impact on emission trends (see para. 58 below) and time-series consistency. The time-series of emission estimates for a number of categories in the energy sector are not consistent (see para. 52 below). In addition, the Party was not able to provide information to the ERT on the methodologies, AD and EFs used to estimate emissions for the earlier years (1988–1996) of the time series for these categories, explaining that the estimates had been prepared by organizations in the "previous national system" (the national system changed in early 2007).

8. The supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol was submitted, in part, by the Party on a voluntary basis in accordance with section I of the annex to decision 15/CMP.1 (hereinafter referred to as the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol). Bulgaria did not submit on a voluntary basis information on activities under Article 3, paragraph 3, of the Kyoto Protocol[3] (hereinafter referred to as KP-LULUCF), or information on the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol.

9. The ERT noted with utmost concern that if the Party does not develop a methodology to identify and collect data on areas of land use and land-use change, along with the ability to estimate carbon stock changes on an annual basis, pursuant to paragraphs 5 to 9 of the annex to decision 15/CMP.1 and the annex to decision 16/CMP.1, nor develop technical capacity within the national system to plan, prepare and manage a KP-LULUCF inventory, it will face major problems with regard to the reporting of KP-LULUCF, which is mandatory as from the next annual submission, due on 15 April 2010 (see paras. 171 and 172 below).

10. Bulgaria has reported information on its accounting of Kyoto Protocol units in accordance with section I.E of the annex to decision 15/CMP.1, and used the standard electronic format (SEF) tables as

[3] Bulgaria did not elect to account for land subject to activities under Article 3, paragraph 4, of the Kyoto Protocol.

required by decision 14/CMP.1. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP). Bulgaria has reported in its 2009 annual submission that there have been no changes in its national system or its national registry since the previous annual submission. However, the ERT identified, during the review week that the details of the registry system administrator had changed since the initial review under the Kyoto Protocol, but that this had not been reported by the Party in its annual submissions since the initial review.

11. Bulgaria has reported in its 2009 annual submission that there have been no changes in its national system since the previous annual submission. The ERT found that the Bulgarian national system does not operate fully in performing its required general and specific functions as set out in the "Guidelines for national systems for the estimation of anthropogenic GHG emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol" (annex to decision 19/CMP.1). The ERT identified that the national system did not ensure that the Party's 2009 annual submission was transparent, consistent, comparable, complete and accurate, as required by the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

12. The ERT has included in this report recommendations for Bulgaria to address the above-mentioned issues with regard to the transparency, accuracy, completeness, comparability and consistency of its inventory before the 2010 annual submission. The ERT concluded that, in order to do so, the Party must strengthen its current institutional arrangements and the general capacity of the national system, including the technical competence of the staff therein, as these were found by the ERT to be insufficient to enable the adequate planning, preparation and management of the inventory submission in accordance with the general and specific functions of national systems set out in the annex to decision 19/CMP.1.

13. Bulgaria, in response to questions raised during the in-country review, submitted on 16 November 2009 a work plan containing measures to address institutional arrangements with a view to improving the competence of the staff within the national system, and to initiate projects with a view to improving the quality of its annual submission. Bulgaria, in its response to the draft version of this annual review report, submitted to the ERT on 16 February 2010 information on its activities to strengthen institutional arrangements in the national system, and an update of the scheduling of the projects and training workshops outlined in the aforementioned work plan. A new cooperation agreement between the Ministry of Environment and Water (MoEW) and the National Statistical Institute (NSI) (see para. 31(a) below) was signed on 12 February 2010, and an equivalent cooperation agreement between the MoEW and the Ministry of Agriculture and Food (MAF) is in its final stages of completion (see para 31(b) below). This response of Bulgaria also indicated that all the projects outlined in the work plan had commenced, and that an extra staff member was allocated to the Executive Environment Agency (ExEA) for purposes of supporting its work on inventory development (see para. 31(c) below). In the period 25 February 2010 up until the publication of this report Bulgaria continued to provide the ERT with updated information on the aforementioned cooperation agreements and on the projects and training workshops outlined in the work plan submitted to the ERT on 16 November 2009, and information that contained steps taken by the Party to address potential problems raised by the ERT, including the use of an external consultant, for its 2010 annual submission.

14. However, the ERT is concerned that these developments are not likely to be realized in the Bulgarian 2010 annual submission in regard to improving the quality of the inventory submission. Further, the ERT is concerned that, working under the time schedule provided for the completion of the activities defined in this work plan, the Party will not be able to implement all of the improvements required in time for the first mandatory submission of the supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol, which is due on 15 April 2010.

15. The ERT encourages Bulgaria to explore the possibility of structuring its reporting, in its next annual submission, following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.[4]

II. Overview

A. Annual submission and other sources of information

16. The 2009 annual inventory submission was submitted on 13 April 2009; it contains a generally complete set of CRF tables for the period 1988–2007, and an NIR. Bulgaria also submitted, in part, information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on its accounting of Kyoto Protocol units, and information stating that there has been no change in its national system or national registry since its previous annual submission. The SEF tables were also submitted on 13 April 2009. The annual submission was submitted in accordance with decision 15/CMP.1. The Party indicated that the 2009 submission is also its voluntary submission under the Kyoto Protocol.

17. Bulgaria officially submitted additional information on 16 November 2009, in response to questions raised by the ERT, on the completeness of its 2009 annual inventory submission, and also on the general and specific functions of its national system with regard to the technical competence of the staff involved in the planning, preparation and management of its inventory, and the current institutional arrangements. Bulgaria provided the ERT on 16 February 2010 new information regarding ongoing activities on the cooperation agreements between the MoEW and NSI and MAF; this information was provided by Bulgaria in response to the draft 2009 annual review report (see para. 27 below). Bulgaria in this response also provided the ERT with an update on the projects and training workshops outlined in the work plan submitted to the ERT on 16 November 2009 (see para. 31 below). In the period 25 February 2010 up until the publication of this report Bulgaria continued to provide the ERT with updates on the aforementioned items.

18. In addition, the ERT used the standard independent assessment report (SIAR), Parts I and II, to review information on the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and on the national registry.[5]

19. During the in-country review, Bulgaria provided the ERT with additional information. The documents concerned are not part of the annual submission. The full list of materials used during the review is provided in annex I to this report.

Completeness of the inventory

20. The 2009 inventory submission is in general complete with regard to its coverage of sectors, gases and years of the inventory time series, and complete in terms of geographical coverage. The inventory submission covers most emissions by sources and removals by sinks. However, the ERT noted that the coverage of categories in all sectors is not complete, and considers that this coverage needs to be improved in order to ensure that the next annual submission is prepared and reported in accordance

[4] <http://unfccc.int/files/national_reports/annex_i_ghg_inventories/reporting_requirements/application/pdf/annotated_nir_outline.pdf>.

[5] The SIAR, Parts I and II, is prepared by an independent assessor in line with decision 16/CP.10 (paras. 5(a), 6(c) and 6(k)), under the auspices of the international transaction log (ITL) administrator using procedures agreed in the Registry System Administrators Forum. Part I is a completeness check of the submitted information relating to the accounting of Kyoto Protocol units (including the SEF tables and their comparison report) and to national registries. Part II contains a substantive assessment of the submitted information and identifies any potential problem regarding information on the accounting of Kyoto Protocol units and the national registry. The SIAR is not publicly available.

with the UNFCCC reporting guidelines and the "Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol" (decision 15/CMP.1).

21. The ERT identified the following categories that have been reported as "NE" although the respective activities are known to occur in the country, and methods for estimating the resultant emissions by sources or removals by sinks are available in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and/or the IPCC good practice guidance for LULUCF: solid fuel transformation (1.B.1.b) – CO_2 and CH_4; most sub-categories of oil and natural gas – CO_2 and N_2O; oil exploration – CH_4; manure management (buffalo) – N_2O; unmanaged waste disposal on land – CH_4; and waste incineration – CO_2. In addition, potential emissions of HFCs and actual emissions of SF_6 have been reported by the Party for the period 1995–2007, but potential emissions of PFCs have been reported as "NE" for most PFC species and years, with the exception of 2006. Furthermore, Bulgaria has reported emissions/removals from forest land remaining forest land, cropland remaining cropland and wetlands remaining wetlands for all years of the inventory time series, while land converted to forest land has been reported for the base year and 1990–1991 only. All other categories in the LULUCF sector (including all other land-use conversions) have been reported as "NE" for all GHGs.

22. The CRF tables are generally complete and have been provided for each year of the inventory time series. However, the Party has not provided in CRF table 8(b) explanations of recalculations undertaken for the years 1988–2006, nor has it provided a complete list of explanations in CRF table 9(a) for the reporting of categories as not estimated ("NE"). CRF table 7 (key category analysis) has been reported by the Party for 1988, 1995 and the period 2000–2007. The ERT recommends that Bulgaria ensure that these issues are resolved in its next annual submission.

23. The ERT identified that chapter 7 of the Party's NIR was based on the previous UNFCCC reporting guidelines[6] (i.e. based on a land-use change and forestry structure as set out in the Revised 1996 IPCC Guidelines) and not as required by the current UNFCCC reporting guidelines[7] that uses a structure based on the IPCC good practice guidance for LULUCF. Bulgaria also did not provide any of the information, as outlined in the current UNFCCC reporting guidelines and the IPCC good practice guidance for LULUCF, with regard to methodologies, AD, EFs, land-use change matrix, etc., which should be reported by the Party in its NIR. The ERT also identified that the change in the contact details of the registry system administrator had not been reported by the Party in its 2009 annual submission. The ERT recommends that Bulgaria prepare its NIR in line with the UNFCCC reporting guidelines when reporting on the LULUCF sector. Also, the ERT encourages the Party to explore the possibility of structuring its reporting, including the reporting of the supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol, following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.

24. The ERT recommends that Bulgaria ensure, before its next annual submission, that sufficient resources are made available within the national system, including with regard to the technical competence of the staff therein, and that strengthened institutional arrangements are in place, to ensure that it has the capacity to resolve these issues concerning the completeness of its annual submission.

B. A description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

1. Overview

25. During the in-country visit, Bulgaria explained the national system, with regard to its general and specific functions, and the institutional arrangements in place for the preparation of its annual

[6] FCCC/SBSTA/2004/8.
[7] FCCC/SBSTA/2006/9.

submission. The Party confirmed that there had been no changes in the national system, including institutional arrangements, since its previous annual submission. The ExEA is the single national entity with overall responsibility for the national inventory, and was delegated by the MoEW (Order No. RD-54/25.01.2007) to plan, prepare and manage the inventory submission. The NIR provides information on the existing legal and institutional arrangements; however, at the time of the in-country visit, these arrangements had only been in place for one month. ExEA is the sole organization directly involved with the preparation of the inventory. One ExEA staff member prepares the annual submission with very limited active quality assurance/quality control (QA/QC) support from other team members and/or senior staff. During the course of the in-country review the ERT ascertained that for the 2009 inventory compilation the NSI, State Forestry Agency (SFA), MAF, Road Control Department of the Ministry of Internal Affairs (MIA) each provided statistics and/or data. However, these organizations did not provide support or advice on the choice of EFs and/or methods, nor provided input in the compilation of emission estimates and/or QA/QC of these estimates or AD. The ERT noted an exception in the waste sector (see para. 158 below).

26. The ERT concluded that the Bulgarian national system does not function fully in accordance with the general and specific functions of national systems as set out in the annex to decision 19/CMP.1, with particular reference to paragraph 10(a) of the annex to that decision that refers to the institutional arrangements. The ERT identified that the national system did not ensure that the Party's 2009 annual submission was transparent, consistent, comparable, complete and accurate, as required by the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

27. The current institutional arrangements and the general capacity of the national system, including the technical competence of the staff therein, pursuant to paragraph 10 (b) of the annex to decision 19/CMP.1 that refer to arrangements for technical competence of staff involved in the inventory development process, were found to be insufficient to enable the adequate planning, preparation and management of the Party's 2009 inventory submission.

28. In response to questions raised by the ERT during the review week on Bulgaria's national system and the technical competence of the staff therein, as well as on the planning, preparation and management of its annual submission in accordance with the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol, and in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, the Party submitted on 16 November 2009, in response to questions raised by the ERT during the review week, a work plan comprising information on the following actions to support the improvement of its annual submission:

(a) To address the issue of technical competence of staff involved in the inventory development process, a training programme for Bulgarian inventory experts will be established comprising a series of workshops planned for the period December 2009 to May 2010 covering all of the inventory sectors and engaging external GHG inventory experts from the Federal Environment Agency of Austria. The ERT noted that the workshops for the industrial processes and waste sectors were annotated "if resources are available" and that the workshops for the energy and agriculture sectors were dated "February/March and April/May 2010";

(b) Providing the single national entity with an additional human resource, who began work on 23 November 2009, to support the national inventory focal point in the inventory development process (planning, preparing and management);

(c) Strengthening the institutional arrangements:

(i) By having established Government Order 1850-06.10.2009 with SFA, which designates three experts from SFA to support the inventory development process with regard to the provision and QA/QC of LULUCF data, with a view to ensuring that the Party can plan, prepare and manage its KP-LULUCF inventory in line with decisions 15/CMP.1 and 16/CMP.1 and the IPCC good practice guidance for LULUCF;

(ii) By having established an agreement with a professor at the University of Forestry to support the inventory development process with regard to the provision and QA/QC of KP-LULUCF and LULUCF data;

(iii) By having established an agreement with a professor at the Forest Research Institute under the Bulgarian Academy of Sciences to support the inventory development process with regard to the provision and QA/QC of KP-LULUCF and LULUCF data;

(iv) With the engagement of an expert from the MAF (Statistics Department) to support the inventory development process with regard to the provision and QA/QC of data on agriculture, KP-LULUCF and LULUCF;

(v) By having established Order MZ-11/28.09.2009 with the Road Control Department of the MIA for an expert to support the inventory development process with regard to the provision and QA/QC of transport data;

(vi) With the engagement of an expert from the Geophysical Institute to support the inventory development process with regard to the energy and industrial processes sectors and QA/QC (this contract is related to the project referred to in para. 29 (b) below);

(vii) With the engagement in the inventory development process of two additional experts from the University of Forestry with the specific role of leading the compilation of the inventories for LULUCF and KP-LULUCF (this contract is related to the project referred to in para. 29 (a) below);

(viii) With the engagement of an expert from the NSI (draft annex to RD21-25/30.01.2003) to support the inventory development process with regard to the energy and waste sectors and the QA/QC of emission estimates of these sectors.

29. Bulgaria also provided to the ERT on 16 November 2009 a schedule for four projects, whose defined objectives are to improve the Party's current estimation methodologies, the technical competence of the staff within the national system, and the management and archiving of data. The four projects outlined by the Party are:

(a) Project 1 – "Development of methodology for calculation of emissions and removals for LULUCF sector according to requirements of UNFCCC and Kyoto Protocol". This project has been contracted and will commence on 24 November 2009 and be completed by 24 April 2010.

(b) Project 2 – "Recalculations of previously submitted estimates of emissions under UNFCCC and the European Monitoring and Evaluation Programme/Convention on Long-range Transboundary Air Pollution (EMEP/CLRTAP) according to the new Common Methodology from the base year to all subsequent years, up to the year in

which recalculations are made and cover all inventory data". This project is to commence on 1 December 2009 and will be completed by 1 February 2011.

(c) Project 3 – "Development of software tool and automatic preparation of national inventories under UNFCCC and EMEP/CLRTAP". This project is yet to be contracted, but once it commences the duration will be twelve months.

(d) Project 4 – "National study for determine the quantity of actual fluorinated gases (F-gases) (HFCs, PFCs and SF_6) in Bulgaria and methods for their calculations". This project is yet to be contracted, but once it commences the duration will be eight months.

30. On 16 November 2009, Bulgaria informed the ERT that government approval had been granted for these projects. The Party also indicated that two of the projects were in the process of starting and that the tendering process for Projects 3 and 4 could commence shortly.

31. Bulgaria, in its response to the draft version of this annual review report, submitted on 16 February 2010 information on:

(a) A new cooperation agreement between the MoEW and the NSI that was signed on 12 February 2010. This new arrangement formalizes the role of the MoEW whose functions are to be largely executed by the ExEA that are to coordinate the overall inventory preparation process including its associated activities (see para. 38 below).

(b) An equivalent cooperation agreement between the MoEW and the MAF was in its final stages of completion (see para. 39 below).

(c) An extra staff member that was allocated to ExEA for purposes of supporting its work on inventory development.

(d) The timing of the projects outlined in paragraph 29 above, and indicated to the ERT that all four projects had commenced with results of the KP-LULUCF project (project 1) to be included in the 2010 annual submission. However, Bulgaria also indicated that projects 2 (recalculations and time-series consistency), 3 (data management systems) and 4 (F-gases) will not complete before the due date of the 2010 annual submission, and instead their results will be included in the 2011 annual submission.

32. In the period 25 February 2010 up until the publication of this report Bulgaria continued to provide the ERT with updated information on the aforementioned cooperation agreements, including information that the agreement between MoEW and MAF had been signed (see para. 39 below) and on the projects outlined in the work plan submitted to the ERT on 16 November 2009, and information that contained steps taken by the Party to address potential problems raised by the ERT, including the use of an external consultant, for its 2010 annual submission.

33. The ERT acknowledges Bulgaria's commitment to addressing the key issues identified by the ERT during the in-country review week concerning the national system. The information received from Bulgaria on 16 November 2009 and 16 February 2010, and updates provided to the ERT in the period 25 February up until publication of this report, illustrated its willingness to strengthen its institutional arrangements with a view to improving the competence of the staff within the national system, and to initiate projects with a view to improving the quality of its annual submission.

34. However, the ERT is concerned that, taking into account the provided time schedule for completing these projects, the Party will not be able to deliver the improvements required on the inventory submission in time for the first mandatory submission of the supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol, which is due on 15 April 2010. Further, the

ERT is concerned that the stated deliverables of these projects will not necessarily translate into an improvement or development of the technical competence of the staff within the national system, especially with regard to KP-LULUCF, or contribute to the strengthening of the Party's institutional arrangements to ensure that its annual submission is prepared, for each year of the first commitment period, in accordance with the UNFCCC reporting guidelines, the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT recommends that Bulgaria ensure that it uses the stated deliverables of these projects to improve the capacity of the national system to plan, prepare and manage its annual submission, and to improve the technical competence of the staff therein, and that the Party report on progress in this regard in its 2010 annual submission.

2. Inventory planning

35. The NIR outlines the Party's sources of AD, including MAF, the Ministry of Economy and Energy, MIA, MoEW, the Ministry of Interior, the National Forest Policy and Strategy, and NSI. Bulgaria's QA/QC plan allocates responsibilities within the national system for the inventory development process. However, the ERT found very little evidence of the implementation of this plan by those designated by it, pursuant to paragraph 12 (c) of the annex to decision 19/CMP.1, to perform specific QA/QC tasks, and, in general, little evidence of the implementation of the QA/QC procedures contained in the plan, pursuant to paragraph 12 (d) of the annex to that same decision. The ERT noted that:

(a) The national system had limited engagement with research institutes and/or industry for the collection of country-specific EFs;

(b) Only two out of eight institutes/departments within the national system (MAF and MIA, covering agriculture and transport) had formal agreements in place to provide data and support for QA/QC on an annual basis to ExEA;

(c) There was limited awareness of the QA/QC plan and limited engagement from the other institutions and organizations involved in the inventory planning process (e.g. no external experts used to review the inventory) in ensuring the quality of the annual submission;

(d) The inventory team at ExEA was restricted in the inventory development process by a lack of technical expertise with regard to the collection of data, the selection of methods and EFs, and the processing and archiving of the inventory in terms of the methods, AD and EFs used.

36. The Party explained to the ERT during the in-country review that the organizations responsible for providing statistical data were in the early stages of engagement with the national system and agreements, although drafted, had not yet been finalized. It also explained that, owing to staff shortages, the human resources available for the preparation of the inventory were very limited.

37. Bulgaria, in response to questions raised during the review week, submitted on 16 November 2009 details of additional expertise brought in to support the planning, preparation and management of its inventory (see paras. 28 and 29 above) and provided additional documentation on agreements with other organizations (MIA, NSI, SFA and the University of Forestry) engaged in data collection and QA/QC for the preparation of the inventory.

38. Bulgaria, in its response to the draft version of this annual review report, submitted on 16 February 2010 a new cooperation agreement between the MoEW and the NSI that establishes roles and responsibilities concerning inventory planning and QA/QC:

(a) The MoEW are responsible for the preparation of a QA/QC plan with a focus on data relating to the inventory, but no further information was provided as to whether this plan would replace or expand on the existing plan, nor did it elucidate on the 'data relating to the inventory';

(b) MoEW, through the ExEA, coordinates the overall preparation of the inventory submission;

(c) The NSI are to participate in the development and implementation of the QA/QC plan with a focus on AD, participate in the development of country-specific EFs (without specifying to which sectors these are to be developed for), and to prepare 'a part of the national inventory' (without elucidating what this is referring to).

39. In the period 25 February 2010 up until the publication of this report Bulgaria continued to provide the ERT with updated information on the aforementioned cooperation agreements, including that the agreement between MoEW and MAF had been signed. This agreement sets out roles and responsibilities for MAF, including:

(a) QA/QC activites;

(b) Provide ExEA with information on uncertainty of data;

(c) Participate in the inventory planning activities such as the development and/or selection of country-specific EFs;

(d) Undertake research, if required, to improve inventories based on proposals submitted by ExEA.

40. The ERT recommends that MoEW, supported by ExEA, ensure that the additional capacity referred to in paragraph 28 above is focused on strengthening and maintaining Bulgaria's long-term institutional arrangements, fully implementing its QA/QC plan and documenting it as required, and improving the transparency, accuracy, completeness, consistency and comparability of its 2010 annual submission. The ERT encourages the Party to actively seek to engage additional sector expertise from other ministries/agencies, sources of statistics and/or data, universities and consultancies with the appropriate expertise and technical competence in terms of choosing methods and EFs (appropriate to the available AD), with a view to supporting the inventory planning and preparation process.

41. The ERT found that the inventory improvements implemented by the Party (either identified internally through QA/QC or following recommendations of previous review reports) were not detailed or rigorous enough and that Bulgaria had not yet consolidated a formal inventory improvement plan using the results of its key category and uncertainty analyses. Bulgaria, in response to questions raised by the ERT during the review week, submitted on 16 November 2009 a detailed improvement plan identifying, in each case, the recommended improvement, the source of the recommendation, and the planned dates for and actors involved in the execution of the improvement. This improvement plan includes all of the outstanding recommendations of the previous review report. The present ERT encourages Bulgaria to maintain and use this inventory improvement plan, and to link this plan to the results of its key category and uncertainty analyses as a means of prioritizing improvements to its annual submission. The ERT also encourages Bulgaria to make use of the results of its four planned projects (see para. 29 above) and include the development of higher-tier estimation methods and country-specific EFs for key categories as a key item in its inventory improvement plan.

3. Inventory preparation

42. Bulgaria's GHG inventory was found by the ERT not to have been prepared in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF), as required by paragraph 14(b) of the annex to decision 19/CMP.1 in that appropriate methods were not used by the Party to prepare its emission estimates for a number of categories in the industrial processes, agriculture and waste sectors. The Party informed the ERT during the in-country review that the data required to implement higher-tier estimation methods for the key categories within these sectors did exist; however, the Party had yet to establish appropriate institutional arrangements and resources to develop these higher-tier methods in line with paragraph 14(c) of the annex to the same decision.

43. During the in-country review, Bulgaria was not able to provide information to the ERT in support of its choice of methods and EFs used to estimate emissions by sources and removals by sinks for the energy sector for the period 1988–1996 (see para. 52 below) and for the industrial processes sector for the entire time series. The Party explained to the ERT that the methods and EFs used for these years had been prepared by organizations in the "previous national system" and had not been recalculated by ExEA. In its work plan submitted on 16 November 2009, the Party explained its plans to prepare time-series consistent estimates of emissions by sources and removals by sinks, and to improve the quality of its inventory by implementing higher-tier estimation methods for key categories, but not before increasing the capacity of the national system, holding expert workshops, and obtaining the deliverables of Projects 2 and 4 referred to in paragraphs 29(b) and 29(d) above, as planned.

44. Bulgaria, in its response to the draft version of this annual review report, submitted on 16 February 2010 a new cooperation agreement between the MoEW and the NSI that included information regarding the role of the NSI in the development of country-specific EFs. In the period 25 February 2010 up until the publication of this report Bulgaria continued to provide the ERT with updated information on the cooperation agreement between MoEW and MAF and the role of MAF in the development and/or selection of EFs. The ERT welcomes these developments.

45. The ERT recommends that Bulgaria use the stated improved capacity of its national system in conjunction with the projects' deliverables (see para. 29 above) to review its basis for estimating emissions, including the rationale for its choice of AD and EFs, etc., to ensure that the estimates of emissions by sources and removals by sinks are prepared in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF, and that all underlying information and reference material is documented and archived in accordance with the UNFCCC reporting guidelines and the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol. As noted in paragraph 34 above, the ERT is concerned that not all of the necessary improvements will have been undertaken in time for the development of the 2010 annual submission, owing to the long time frame of Project 2.

Key categories

46. Bulgaria has reported a key category tier 1 analysis, both level and trend assessment, as part of its 2009 submission. The key category analysis performed by the Party and that performed by the secretariat[8] produced different results owing to an error in the Party's data used for CO_2 from cropland

[8] The secretariat identified, for each Party, the categories that are key categories in terms of their absolute level of emissions, applying the tier 1 level assessment as described in the IPCC good practice guidance for LULUCF. Key categories according to the tier 1 trend assessment were also identified for Parties that provided a full set of CRF tables for the base year or period. Where the Party performed a key category analysis, the key categories presented in this report follow the Party's analysis. However, they are presented at the level of aggregation corresponding to a tier 1 key category assessment conducted by the secretariat.

remaining cropland and the use of aggregation of emissions from sub-categories of manufacturing industries and construction, enteric fermentation and wastewater handling in the Party's analysis. Bulgaria has included the LULUCF sector in its key category analysis, which (except for the problems identified by the ERT stated above) was performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT used the secretariat's key category analysis to determine the key categories and to structure the remainder of this report.

47. The Party has not reported in its NIR, nor did it provide any information to the ERT during the review week, on how it uses the key category analysis to prioritize improvements to its inventory.

48. The ERT recommends that Bulgaria ensure that in the key category analysis reported in its 2010 annual submission the error with regard to the category cropland remaining cropland is resolved, and that the analysis is applied at the level of aggregation suggested by the IPCC good practice guidance. The ERT also recommends that Bulgaria include in its next annual submission information on how the key category analysis is used to prioritize improvements to its inventory, especially with regard to estimating emissions for key categories using higher-tier methods.

49. The ERT encourages Bulgaria to identify key categories for activities under Article 3, paragraph 3, of the Kyoto Protocol in its next annual submission, following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory as provided in chapter 5.4.4 of the IPCC good practice guidance for LULUCF.

Uncertainties

50. Bulgaria has included in its NIR information and data on its tier 1 uncertainty analysis. The information provided is appropriate and as required by the UNFCCC reporting guidelines and the IPCC good practice guidance. However, the information is incomplete for the energy sector, as no underlying information has been provided, and it has not been prepared strictly in line with the IPCC good practice guidance for the agriculture sector, as the Party has reported only the default uncertainty values that it used in its tier 1 analysis. The ERT recommends that Bulgaria include in its NIR information on the assumptions made and the data used for the uncertainty analyses of both AD and EFs, and that the Party try to generate country-specific uncertainty values and report thereon in its next annual submission. The ERT noted that the uncertainty analysis performed by the Party did not include the LULUCF sector. Furthermore, the uncertainty analysis has not been identified in the NIR as a driving factor for the planning and preparation of the Party's inventory submission, nor as a means to improve the quality of the estimates therein. The ERT recommends that Bulgaria, for its next annual submission, include the LULUCF sector in its uncertainty analysis and integrate the uncertainty analysis into its inventory improvement process.

Recalculations and time-series consistency

51. Recalculations have been reported by the Party in its CRF tables for the energy (CO_2 and CH_4 emissions from energy industries, and CH_4 emissions from oil and natural gas), agriculture (N_2O emissions from manure management and from agricultural soils) and LULUCF (CO_2 emissions from cropland remaining cropland) sectors. The ERT found that these recalculations were performed in line with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The Party explained to the ERT during the in-country review that the recalculations for the years 1997 and 2006 in the energy sector, and for the years 1988–2006 in the other aforementioned sectors, had been undertaken to take into account changes/improvements in EFs and AD including the correction of errors identified in the estimates reported in the previous annual submission. The changes, and the magnitude of the impact, include: a decrease in the estimate of total GHG emissions in 1988 (by 0.01 per cent) and an increase in this estimate for 2006 (by 0.12 per cent). The rationale for these recalculations has not been provided in

the NIR or in CRF table 8(b). The ERT recommends that Bulgaria, in its next annual submission, report the rationale of any recalculations in the NIR and in CRF table 8(b) in accordance with the UNFCCC reporting guidelines.

52. Bulgaria recalculated the estimates in its inventory for the energy sector for 2006 using the same methods applied to calculate its estimates for the inventory for the energy sector for 2007. The estimates for the earlier years of the time series, except for 1997 where AD for railways was corrected (see para. 73 below), were not recalculated, however, and this has resulted in a time-series inconsistency for most categories. The lack of transparency in the Party's annual submission, particularly in the NIR, made it difficult for the ERT to confirm the effects of these inconsistencies. Further, the Party was not able to elucidate on the methods, AD and EFs used to estimate emissions from the energy sector for 1988–1996, explaining that these estimates had been prepared by organizations in the "previous national system". The ERT reiterates a recommendation of the previous review report that the Party ensure that the emissions for these years be estimated using the same data sources and methods as for all other years of the time series, and that it report thereon in its next annual submission. The ERT also recommends that Bulgaria provide descriptions of and the rationale for any recalculations undertaken, as well as their impact on the emission trends, in its annual submissions.

Verification and quality assurance/quality control approaches

53. Bulgaria has elaborated a QA/QC plan in accordance with decision 19/CMP.1 and the IPCC good practice guidance. This plan has been disseminated to the institutions and organizations which provide AD, along with letters requesting that these institutions and organizations nominate experts to be responsible for the QA of the annual submission.

54. The procedures outlined in the QA/QC plan, including the general QC and category-specific procedures, have not yet been implemented fully in accordance with the IPCC good practice guidance and as required by paragraph 14(g) of the annex to decision 19/CMP.1. Although the plan outlines QA/QC procedures, and requests have been sent by ExEA to the main institutions and government agencies within the national system concerning QA/QC, the ERT is concerned that there is insufficient capacity within the national system to undertake the procedures elaborated in the Party's QA/QC plan. The ERT was not provided with any evidence in the NIR or during the in-country review that the implementation of the QA/QC plan involved adequate QA (peer review) or the involvement of statistical agencies and other entities in the formal procedures of reviewing methods, AD and EFs used for the preparation of the inventory. Furthermore, there was no evidence that any corrections or improvements had occurred before the submission of the inventory as a result of any such QA or QC procedures. However, the Party did provide in its NIR a QC checklist used as evidence of implementation of its QA/QC plan in the waste sector (see para. 158 below).

55. During the in-country review, Bulgaria provided details of some sector-specific QA undertaken in the industrial processes sector. The Party explained that data obtained under the European Union emissions trading scheme (EU ETS)) and data reported by industry under other regulations (e.g. European Pollutant Emission Register) are used to verify emissions data for the categories cement production, iron and steel production and nitric acid production. However, Bulgaria has provided little evidence or documentation of QA undertaken for the other sectors. The ERT recommends that Bulgaria provide sufficient information in the NIR on the use of EU ETS data for verification of its emissions data, including which tier approach from the EU ETS guidelines was used for the QA and/or verification of the EU ETS data used.

56. The ERT recommends that Bulgaria ensure that other institutions are engaged in the checking and review of the annual submission as set out in its QA/QC plan. The ERT also recommends that Bulgaria improve the review of the annual submission by MoEW. This could be achieved by ensuring

that technical experts are in place to identify areas for improvement or errors in the annual submission prior to its official submission. The ERT further recommends that Bulgaria, in accordance with paragraph 16(a) of the annex to decision 19/CMP.1, formally document and archive information on all QA/QC activities undertaken by different individuals within the inventory preparation process, and report thereon in its next annual submission. In addition, the ERT recommends that the Party fully implement its QA/QC plan in line with decision 19/CMP.1, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF by ensuring that there is sufficient technical capacity within the national system for the official consideration and approval of the inventory and for basic QA/QC of the annual submission prior to its official submission. The ERT further recommends that Bulgaria implement additional tier 1 general category-specific QC checks, document these in its NIR and keep records of its QA/QC activities in its archive.

57. During the in-country review, and also in its response to questions raised by the ERT submitted on 16 November 2009, Bulgaria indicated its plans to address the above-mentioned problems and to implement the procedures outlined in its QA/QC plan in the future. The ERT commends Bulgaria for these intentions and encourages the Party to pursue these and report thereon in its next annual submission.

Transparency

58. The NIR generally follows the structure set out in the UNFCCC reporting guidelines, with the exception of the chapter on the LULUCF sector. The ERT noted, during the in-country review, improvements made by the Party to the transparency of information on the flow and use of data through the emission estimation procedures for the estimates for 2006–2007 (e.g. in spreadsheet referencing, checking areas and additional internal supporting documentation) since ExEA has been compiling the inventory; however, this additional supporting information has not been included in the NIR. The ERT also noted that the NIR provided limited or no information on the methods, EFs and AD used to estimate emissions for all sectors (see paras. 72, 83, 95, 105, 106, 107, 116, 123, 124, 125, 144, 156 and 161 below), and limited or no information on calculation procedures, assumptions, trends in emissions and removals, or the rationale for recalculations and their impact on the emission estimates and trends. In addition, the ERT noted that Bulgaria was unable to provide sufficient explanation for some of the methods and EFs used in the Energy and Industrial Processes sectors. The ERT recommends that Bulgaria improve the transparency of its annual submission by providing information in the NIR in line with the UNFCCC reporting guidelines, especially for the LULUCF sector.

4. Inventory management

59. Bulgaria has a centralized archiving system, which is managed by ExEA and located at its offices in Sofia. Some of the archived information which is not available electronically, such as scientific papers and industry correspondence, is kept also in hard copy at the offices of ExEA. The backing up of the archiving system was initiated during the in-country review in response to questions raised by the ERT. Bulgaria was able to provide some of the archived documents requested by the ERT during the review, including confidential data. However, Bulgaria was unable to provide some of the detailed material used for the early part of the time series for some sectors (e.g. background information on methods, AD and EFs used for the energy sector) and the ERT noted that there was insufficient internal documentation held within the archive on: methods, assumptions, QA/QC procedures, external and internal reviews, annual key categories and key category identification, and planned inventory improvements, as required by paragraph 16(a) of the annex to decision 19/CMP.1. Only a few individuals have expert knowledge of the operation of the inventory system and this is not fully documented. The ERT recommends that Bulgaria explore new and existing data sources and references for AD and EFs to support its existing estimates and, where these are unavailable, that the Party focus on collecting in the archive supporting material for these methods. The ERT also recommends that Bulgaria

provide additional resources to enable full documentation on methods, data sources (including AD and EFs), assumptions and QA/QC activities that should be written, maintained and archived as part of the national system.

C. Follow-up to previous reviews

60. Bulgaria has made some improvement to its national system and institutional arrangements following the recommendations of the previous two review reports, including the development of a detailed QA/QC plan and procedures, and the initiation of agreements between ExEA and the organizations responsible for supplying data. However, the implementation of the QA/QC plan, including the appropriate involvement of experts and relevant organizations in the national system, has not progressed sufficiently.

61. To date, since the previous review, Bulgaria has not made any significant improvements to its estimation methods, or to the transparency of the reporting on these estimation methods in the NIR, for a number of categories in the energy, industrial processes, agriculture and waste sectors. In addition, Bulgaria has not addressed the recommendations of the previous review report concerning the following categories for which the use and transparency of the methods and EFs used to estimate emissions were not fully in line with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance: civil aviation, navigation, international bunker fuels, iron and steel production, lime production, ammonia production, enteric fermentation, all categories in the LULUCF sector, and solid waste disposal on land.

62. The present ERT noted that the Party had also not addressed the recommendation of the previous review report to prepare its estimates of emissions by sources and removals by sinks fully in line with the IPCC good practice guidance for LULUCF.

63. A large number of pending issues identified in previous review reports remain unresolved by the Party. These include recommendations relating to the completeness of the inventory, transparency (e.g. description of implemented QA/QC activities and methods, AD and EFs for key categories), the inclusion of the LULUCF sector in the uncertainty analysis, and the full implementation of its QA/QC plan and engagement with the experts and organizations that form part of its national system.

D. Areas for further improvement

1. Identified by the Party

64. The 2009 NIR identifies areas for improvement, including:

(a) To continue to improve the QA/QC system;

(b) To improve the completeness of the GHG inventory by estimating and documenting emissions/removals from the LULUCF sector;

(c) To continue to improve the transparency of the reporting in the NIR;

(d) To continue to improve the accuracy of the emission estimates.

65. During the in-country review, Bulgaria indicated that it had received ministerial approval for four important projects (see para. 29 above). These projects provide an opportunity for the Party to improve its current methodologies, institutional and procedural arrangements, and management and archiving of data. The ERT recommends that Bulgaria ensure that these projects start quickly and that it optimize their timing and delivery so that improved methods, addressing the methodological findings of the ERT detailed in the relevant sector chapters of this report, and data are available in time for the preparation of the 2010 annual submission. Bulgaria is also recommended to ensure that these projects are used to build

up the current capacity of its national system, fully implement its QA/QC plan and procedures, and deliver the data and capacity (sustained expertise in the national system) necessary to prepare and report an annual submission for each year of the first commitment period in accordance with the UNFCCC reporting guidelines, the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol, the Revised 1996 IPCCC Guidelines, the IPCC good practice guidance, and the IPCC good practice guidance for LULUCF.

66. During the in-country review, Bulgaria identified a number of areas for the improvement of the estimation methods used in the energy, industrial processes and waste sectors, and the QA/QC procedures in the agriculture sector, as indicated in the relevant sector chapters of this report.

2. Identified by the expert review team

67. The ERT identifies the following cross-cutting issues for improvement:

(a) With regard to the capacity of the national system:

(i) To develop sufficient capacity within the national system to ensure that it operates in accordance with the required general and specific functions of national systems as set out in sections V and VI of the annex to decision 19/CMP.1;

(ii) To ensure sufficient arrangements for the technical competence of the staff involved in the inventory development process (and the maintenance thereof), as required by paragraph 10(b) of the annex to decision 19/CMP.1;

(iii) To develop sufficient capacity to ensure that the 2010 annual submission is prepared in accordance with the UNFCCC reporting guidelines, the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol (decision 15/CMP.1) and in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance, and the IPCC good practice guidance for LULUCF;

(iv) To develop the capacity, including the technical competence of the staff within the national system, to plan, prepare and manage an inventory for LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol (hereinafter referred to as the KP-LULUCF inventory).

(b) With regard to inventory planning:

(i) To fully implement the QA/QC plan in line with paragraphs 12(c), 12(d), 14(g) and 16(a) of the annex to decision 19/CMP.1, including QA of the inventory submission by independent institutions and organizations;

(ii) To implement the recommendations identified in previous review reports (see paras 61, 62 and 63 above).

(c) With regard to inventory preparation:

(i) To explore, to the extent possible, with a focus on key categories, new and existing data sources and references for AD and EFs to support the development of higher-tier estimation methods with a view to improving the accuracy of the inventory and avoiding any potential underestimations of emissions (in the energy, industrial processes and LULUCF and waste sectors);

(ii) To develop a more formal inventory improvement plan, which uses, inter alia, the key category and uncertainty analyses as drivers for prioritizing improvements to the annual submission, and to report thereon in the next annual submission;

(iii) To actively involve relevant institutions and organizations that have specific expertise on methodologies, AD and/or EFs within a given sector in the planning, preparation, management and general improvement of the annual submission;

(iv) To ensure that the stated planned improvements to the inventory (e.g. Bulgaria's work plan submitted to the ERT on 16 November 2009), in addition to any other projects that may be identified by the Party, are used to strengthen the current institutional arrangements and the capacity of the national system, as well as the technical competence of the staff therein, before the next and each subsequent annual submission within the first commitment period;

(v) To include the LULUCF sector in the quantified uncertainty analysis;

(vi) To improve data management systems so that all data relevant to the inventory are available, including documentation of data, data flows and historic record keeping;

(vii) To provide in the NIR more precise and detailed descriptions of methodologies, AD, EFs, recalculations and trends;

(viii) To improve the storage of emission calculations and the internal documentation of the inventory in the archive, ensuring that all data used are supported by reference material;

(d) To explore the possibility of structuring the reporting, following the annotated outline of the NIR, and the guidance contained therein, that can be found on the UNFCCC website.

68. Recommended improvements relating to specific categories are presented in the relevant sector chapters of this report.

III. Energy

A. Sector overview

69. The energy sector is the main sector in the GHG inventory of Bulgaria. In 2007, emissions from the energy sector amounted to 55,944.34 CO_2 eq, or 73.8 per cent of total GHG emissions. Since the base year, emissions have decreased by 40.9 per cent. The key driver for the fall in emissions is the economic changes since the early 1990s following the transition to a market economy in the country. Within the sector, 59.2 per cent of the emissions were from energy industries, followed by 19.3 per cent from manufacturing industries and construction, 14.8 per cent from transport and 3.5 per cent from fugitive emissions from fuel. Stationary combustion in other sectors (1.A.4) accounted for 3.2 per cent. The remaining 0.1 per cent were from other (stationary (1.A.5)).

1. Completeness

70. The 2009 inventory submission includes estimates for most categories, gases and fuel use from the energy sector, as recommended by the Revised 1996 IPCC Guidelines. Categories and gases not reported by Bulgaria include: CH_4 and CO_2 emissions from solid fuel transformation; CO_2 and N_2O

emissions from most sub-categories of oil and natural gas; and CH_4 emissions from oil exploration, natural gas exploration, combined venting, and flaring. Bulgaria has reported these emissions as "NE". Emissions from the energy sector have been reported for all years of the inventory time series, and for all geographical locations. The ERT recommends that Bulgaria estimate emissions from solid fuel transformation and oil exploration, for which methods to estimate emissions are available in the Revised 1996 IPCC Guidelines and in the IPCC good practice guidance, using AD that are published in the national energy statistics.

2. Transparency

71. In order to improve transparency, Bulgaria established a new set of calculation procedures and used them to estimate emissions from the energy sector for both 2007 and 2006. This has resulted in both a clearer view of the flow of data through the emission estimation procedure and the intended increased transparency.

72. Bulgaria was not able to apply these new procedures to estimate emissions for the other years in the inventory time-series (1988 to 2005). For these years, the lack of transparency noted in the previous review reports remains. The ERT strongly recommends that Bulgaria apply the new, and possibly further automated procedures to estimate emissions from the energy sector for all years in the inventory time-series in its next annual submission.

3. Recalculations and time-series consistency

73. The ERT noted that recalculations were undertaken and have been reported by the Party for the years 1997 and 2006. The recalculation for 1997 corrected an error of a factor of 100 in the AD for railways. In the recalculation for 2006, the same methodology as that used to estimate emissions for 2007 was applied. The changes, and the magnitude of the impact, include: for 2006, increases of 76.97 Gg CO_2 eq (0.3 per cent) in the estimate of emissions from energy industries and of 5.52 Gg CO_2 eq (0.3 per cent) in the estimate of fugitive emissions from fuels; and for 1997, an increase in the estimate of CO_2 emissions from railways of 130.35 Gg.

74. According to Bulgaria, the emissions from the energy sector in the years 1988 to 1996 were estimated by organizations in the "previous national system". The underlying data and methods are not available to the current inventory compilers in the national system, who were unable to explain to the ERT why the time series was not consistent. The inventory for these years is therefore not transparent, with the national system lacking sufficient technical competence and capacity to prepare and report a consistent time series of emissions data. Several implied emission factors (IEFs) in these years show unexplained variations over time. Whether these changes actually occurred or were caused by either inconsistencies in AD or changes in estimation methods could not be established by the ERT.
The present ERT reiterates a recommendation of the previous review report that the Party ensure that the emissions in these years be estimated using the same data sources and methods as for the other years in the time series, and that it report thereon in its next annual submission.

4. Verification and quality assurance/quality control approaches

75. QC activities in the Bulgarian inventory include checking by the ExEA of input and calculation actions. No formal QC procedures are implemented and neither is any external expert involved in the QA. During the review, the ERT, together with the expert from ExEA, made a few checks as to whether data from Bulgaria's national energy statistics, available on the Eurostat website, were included in the AD reported in the 2009 annual submission. This appeared to be the case for all of the data checked, with the exception of the data on the use of coke in iron and steel production (2.C.1), which was identified by the ERT as having been underestimated by the Party. The ERT recommends that Bulgaria

cross-check the reported AD against the national energy statistics and report thereon in its next annual submission.

76. The ERT found that the Party used manual data entry and copy-and-paste actions in its calculation procedures for the energy sector, which carries the risk of transcription and other errors in the emission estimation process. The ERT recommends that Bulgaria explore the possibility of developing and implementing both automated procedures (e.g. electronic links and formulae) to manage data entry and appropriate QC checks for the resulting emission estimates, and that it report thereon in its next annual submission.

B. Reference and sectoral approaches

1. Comparison of the reference approach with the sectoral approach and international statistics

77. CO_2 emissions from fuel combustion were calculated using both the reference approach and the sectoral approach. For 2007, the CO_2 emission estimates calculated using the reference approach were 3.5 per cent higher than those calculated using the sectoral approach. Explanations for this have not been provided in the documentation box of CRF table 1.A(c), but an explanation for the fluctuations in the difference between the two approaches over the inventory time series has been provided in annex 4 to the Party's NIR. The ERT recommends that Bulgaria provide a revised analysis of these differences once the full time series of the sectoral approach has been recalculated. The underestimation of the use of coke in iron and steel production (2.C.1) in the industrial processes sector as compared with the national energy statistics from the Eurostat website might in part explain this difference.

2. International bunker fuels

78. In the previous review report, a number of issues were identified regarding the allocation of fuel consumption between civil aviation and aviation bunkers and between navigation and marine bunkers. Both time series show significantly unstable trends and possibly time-series inconsistencies owing to changes in methodologies. Bulgaria has not yet had the capacity to respond to the recommendations of the previous review report on these issues. The ERT therefore reiterates the recommendations made in the previous review report,[9] namely that Bulgaria revise its assumptions and review available data for the allocation of fuel consumption between civil aviation and aviation bunkers and between navigation and marine bunkers for the complete time-series, and ensure the consistency of, correcting if necessary, the AD used in its emission estimations, in strict accordance with the IPCC good practice guidance.
The ERT also recommends that Bulgaria include clear and detailed documentation on methods, AD and assumptions used to estimate emissions from aviation and marine bunkers in the NIR of its next annual submission.

3. Feedstocks and non-energy use of fuels

79. The comparison of the data from the national energy statistics on the Eurostat website on the amount of coke used in the iron and steel industry with the corresponding AD reported in the CRF tables suggests that not all of the Party's coke use has been reported in its inventory submission. During the in-country review, the Party showed the ERT its procedure for calculating this non-energy use of coke in detail, and, from this, it appears that indeed about one third of the coke used as a reductant in iron and steel production in the industrial processes sector has not been reported in the Party's inventory submission, and is a potential underestimation of emissions. The ERT recommends that Bulgaria include in the NIR of its next annual submission a carbon mass balance to show the consistency of the reported AD with the national energy statistics and to ensure that all carbon is accounted for.

[9] FCCC/ARR/2008/BGR.

C. Key categories

1. Stationary combustion: solid and liquid fuels – CO_2

80. Bulgaria has reported the use of a tier 2 method with country-specific and default EFs for its emission estimations in this category. The CO_2 IEFs for solid fuels (106.60–110.20 t/TJ) under public electricity and heat production are high when compared with those of the other reporting Parties for the complete time series, and also higher than the IPCC default range (94.60–106.70 t/TJ). Bulgaria explained in response to previous stages of the review that this was due to the very low calorific value of the local lignites used in the power plants within the Maritza East power plant. However, since the EFs are derived on a per energy basis, they should be relatively independent of the calorific value of the fuels. The ERT recommends that Bulgaria include more details and background information on the methods used to establish the calorific value of these fuels in its next annual submission.

81. Bulgaria has stated in the NIR that the category other (1.A.2.f) includes emissions from auto-producing plants from combined production of electricity and heat. The ERT reiterates the recommendation made in the previous review report that emissions from such entities be reported under public electricity and heat production in the Party's next annual submission.

82. The 11.3 per cent inter-annual change between 1995 and 1996 in the CO_2 IEFs for liquid fuels under manufacture of solid fuels and other energy industries has not been explained in either the 2009 or previous NIRs. The ERT reiterates the recommendation of the previous review report that Bulgaria includes such an explanation and provide more background information on emission trends and on sources of and changes in EFs, at least for key categories, in its next annual submission.

2. Road transportation: liquid fuels – CO_2

83. Bulgaria has reported the use of a tier 2 method with country-specific EFs for its emission estimations in this category. The ERT noted inter-annual changes in the CO_2 IEFs for diesel oil in 1989–1990 (–3.4 per cent) and 1996–1997 (+3.5 per cent), and random inter-annual changes in the CO_2 IEFs for gasoline in the period 1989–1997 (ranging from –3.8 to +2.1 per cent). For the remaining years of the time series the EFs were kept constant by Bulgaria. During the in-country review, Bulgaria explained that the data for the years 1990 to 1996 were copied from the inventories produced by organizations in the "previous national system". The underlying information and documentation, however, were not available. The emission estimates for these years are therefore not transparent. The ERT strongly recommends that Bulgaria revise its estimates and document the emissions for this category, using the same method and data sets for the full time period, and report thereon in its next annual submission.

3. Civil aviation: liquid fuels – CO_2

84. In the period 1988–2007, CO_2 emissions from this category decreased by 78.2 per cent. The emission trend fluctuates and is unstable, in particular during the period 1988–1994 (with inter-annual changes ranging from –41.6 to +17.1 per cent), without any explanation provided in the NIR. The ERT reiterates the recommendation of the previous ERT that Bulgaria improves its explanation of this emission trend and consider including this information in the NIR of its next annual submission. The ERT also recommends that Bulgaria, for its next annual submission, revise its assumptions and review available data for its estimates under this category, as well as check its estimates for consistency, including the allocation of fuel consumption between civil aviation and aviation bunkers for the complete time-series, correcting if necessary the AD used, in strict accordance with the IPCC good practice guidance.

4. Navigation: liquid fuels – CO_2

85. Diesel-oil use in navigation fell from 4,038.35 TJ in 1988 to having been reported as not occurring ("NO") for 1999. No discussion of this trend has been provided in the NIR. The use of residual fuel oil in this category has been reported to be 9,749.93 TJ in 1988 and 10,958.17 TJ in 1989. A limited use of residual fuel oil has been reported for the years 1993–1996 and for 1998 and 1999. For the other years of the time series the use of this fuel has been reported as "NO". These data were based on the different approaches and methods applied by an organization in the "previous national system" and the Party's current single national entity (ExEA) that compiles emission estimates. The ERT strongly recommends that the Party revise its emission estimates in this category, using the same approach for the full time series, and report thereon in its next annual submission.

5. Other transportation: solid and liquid fuels – CO_2

86. Bulgaria has reported emissions under this category from the use of solid fuels for 1988–1997; for the remaining years of the time series emissions have been reported as "NO", but no information on the use of such fuels has been provided in the NIR. The ERT noted inter-annual changes in the CO_2 IEFs for liquid fuels (mainly diesel oil) in 1989–1990 (–3.2 per cent) and 1996–1997 (+3.3 per cent). For the remaining years of the time series the EFs were kept constant by Bulgaria. These inter-annual changes are due to the methodological changes implemented by ExEA when it became the single national entity in early 2007 and responsible for compiling the inventory submission. Documentation on the methods and EFs used by the previous organization is not available. The ERT strongly recommends that the Party re-estimate emissions in this source category, using the same approach for the full time series, and report thereon in its next annual submission.

6. Oil and natural gas – CH_4

87. Bulgaria used a tier 1 approach and IPCC default EFs for estimating CH_4 emissions from this category. The following subcategories have been reported as "NE": CH_4 emissions from oil exploration, natural gas exploration, combined venting and combined flaring. The ERT recommends that Bulgaria estimate emissions from these and other subcategories under oil and natural gas which have currently been reported as "NE" but for which estimation methods are available in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance, and that the Party report thereon in its next annual submission.

D. Non-key categories

Road transportation: liquid fuels – N_2O

88. The N_2O IEFs for gasoline, diesel oil and liquefied petroleum gas (LPG) show unexplained variations during the time series: the N_2O IEF for diesel oil for 1990–1996 is lower (at a constant 1.85 kg/TJ) than that for the other years of the time series (constant at 1.91 kg/TJ); the N_2O IEFs for gasoline show a decreasing trend from 1988 (1.20 kg/TJ) to 2007 (1.14 kg/TJ); and the N_2O IEFs for LPG show large variations in 2005, 2006 and 2007, but the value was kept constant for the other years in the time series. None of these inter-annual changes have been explained in the NIR; however, again they might be due to the changes in methodology that occurred when the organization compiling these estimates in the "previous national system" was replaced by ExEA. The ERT strongly recommends that the Party revise its emission estimates in this category, using the same approach for the full time series, and report thereon in its next annual submission.

E. Areas for further improvement

1. Identified by the Party

89. During the in-country review, Bulgaria showed the ERT the new approach that it used to estimate the emissions from the energy sector for 2007 and 2006. Due to resource constraints, ExEA has not yet been able to apply the same method to estimate these emissions for the other years in the time series; however, during the in-country review, the Party announced a project that will start in early 2010 to apply the same estimation approach for the full time-series. The ERT recommends that Bulgaria ensure that the preliminary results of this project are reflected as much as possible in the NIR of its next annual submission and fully incorporated in the 2011 submission.

2. Identified by the expert review team

90. The emission estimation methods in the energy sector have been changed owing to the succession of the responsible organisations and institutes that compile emission estimates. In addition, documentation on the previous methods is not available to ExEA and cannot be provided to the ERT. The ERT concluded that the data flow from the national energy statistics through a set of spreadsheets then into the CRF tables was based largely on copy-and-paste actions and manual typing. This leads to a non-transparent, untraceable and apparently inconsistent time series, with regard to both AD and EFs. Against this background, the ERT strongly recommends that the Party:

(a) Carry out the planned project (see para. 29 above) to design an electronic data and calculation system that:

(i) Uses electronic links and formulae as tools for the dataflow and calculations;

(ii) Ensures consistency with the national energy statistics;

(iii) Stores the sources of and references to AD, EFs and other parameters used.

(b) Use this new system for a recalculation of the full time series of emission estimates for the energy sector.

IV. Industrial processes and solvent and other product use

A. Sector overview

91. In 2007, emissions from the industrial processes sector amounted to 7,106.16 Gg CO_2 eq, or 9.4 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 54.10 Gg CO_2 eq, or 0.1 per cent of total GHG emissions. Since the base year, emissions have decreased by 32.8 per cent in the industrial processes sector, and decreased by 28.8 per cent in the solvent and other product use sector. The emissions fluctuate in parallel to the industrial production. Within the industrial processes sector, 48.6 per cent of the emissions were from mineral products, followed by 26.4 per cent from chemical industry, 21.4 per cent from metal production and 3.5 per cent from consumption of halocarbons and SF_6.

92. The ERT noted that tier 1 methods and IPCC default EFs were used to estimate emissions from the industrial processes and solvent and other product sectors. For some categories, the ERT found that the methodologies used to estimate emissions were unknown to the staff at ExEA who compiled the 2009 annual inventory submission. Further, the ERT found that ExEA compiled inventories comprising methods and default EFs used by organizations in the “previous national system”, without knowing or understanding the rationale behind the use of these methods and EFs. The Party explained to the ERT, during the in-country review, that the difficulties it faced in preparing and reporting a complete,

transparent and consistent inventory could be attributed largely to its current resource and time constraints. The ERT concluded that Bulgaria's current institutional arrangements and the technical competence of the inventory compilers at ExEA were not sufficient to adequately plan, prepare and manage the annual inventory for these sectors.

1. Completeness

93. The 2009 inventory submission includes estimates for most gases and categories of emissions from the industrial processes and solvent and other product use sectors, as recommended by the Revised 1996 IPCC Guidelines, for all years of the inventory time series, and for all geographical locations. However, the Party has not reported HFC potential emissions and actual emissions of SF_6 for inventory years 1988–1994, and has only reported PFC potential emissions for inventory year 2006 (see para 21 above and para 110 below).

94. In the 2009 annual submission, Bulgaria has reported actual emissions of F-gases from consumption of halocarbons and SF_6 as "NE"; all F-gases have been reported as "NE" for the period 1988–1994, including emissions of PFCs that have also been reported as "NE" for all remaining years of the inventory time series, except for 2006, for which an emission estimate has been reported. Potential emissions of HFCs have been reported for the period 1995–2007. The ERT recommends that Bulgaria estimate actual and potential emissions from this category for all years of the inventory time series, and report thereon in its next annual submission. The ERT noted from the CRF tables that Bulgaria had reported CO_2 emissions from bricks (country-specific category under other (2.A.7)) and from asphalt roofing as "NE". The ERT encourages the Party to explore the possibility of estimating emissions from these categories using methods available in international scientific literature, and to report thereon in its next annual submission.

2. Transparency

95. The ERT noted that the NIR did not provide information on methods, EFs, assumptions and other parameters used to estimate emissions from this sector, or the underlying rationale behind their selection. Description of categories and referencing of external sources of information on methods and EFs were found by the ERT to be lacking, along with information on data collection, implemented QA/QC procedures and verification of data. The ERT recommends that Bulgaria prepare and report this information in its NIR of its next annual submission that is in accordance with the UNFCCC reporting guidelines.

3. Verification and quality assurance/quality control approaches

96. The ERT noted from the NIR that QA/QC procedures were applied by the Party to verify its CO_2 emission estimates for the key categories in the industrial processes sector. However, the ERT found that no further information had been included in the NIR as to the procedures used and the outcome of their implementation. In response to a question raised by the ERT during the in-country review, Bulgaria explained that the QA/QC procedures applied included: comparison of emission estimates calculated using different approaches; review of EFs; checking and/or expert review of plant-specific AD; and quality checks of data by NSI. The CO_2 emission estimates for the six key categories in the industrial processes sector were compared by the Party using verification reports from EU ETS, the annual (compliance) reports under the Integrated Pollution Prevention and Control (IPPC) permit system under the European Union (EU) IPPC directive (permits take into account air emissions from targeted industrial plants), and also the annual reporting under the European Pollutant Release and Transfer Register (E-PRTR) Regulation (reporting includes CO_2 and N_2O emissions from targeted industrial plants). The Party informed the ERT during the in-country review of the results of this verification, for example, for the category cement production EU ETS reports show higher CO_2 emissions for 2007 when compared

to the corresponding CO_2 emissions calculated and reported by the Party in its 2009 annual submission (see para. 98 below). However, Bulgaria did not change its calculated emission estimate nor did it provide any description of this verification and its results in the NIR. These verification procedures used plant-specific data, which is in line with the IPCC good practice guidance.

97. The ERT identified areas for improvement with regard to QA/QC activities/procedures in the industrial processes sector, including that peer reviews of the inventory submission should be undertaken by external sectoral experts not involved in the compilation of the inventory. The ERT recommends that Bulgaria provide sufficient information in its next annual submission on its use of EU ETS data for verification of its emissions data, including which tier approach from the EU ETS guidelines was used for the QA and/or verification of the EU ETS data used, and a discussion on the results of the verification activity.

B. Key categories

1. Cement production – CO_2

98. CO_2 from cement production is a key category according to both level and trend assessment. In 2007, CO_2 emissions from cement production accounted for 2.5 per cent of total GHG emissions and had decreased by 5.5 per cent since the base year. The ERT identified areas for improvement with regard to the transparency of the information in the NIR on the method, EF and other parameters used to estimate these emissions, and on the use of verified EU ETS data to check the emission estimates. In response to questions raised by the ERT during the in-country review, the Party explained that the CO_2 emissions from cement production were calculated using a tier 1 method by multiplying aggregated data on national clinker production (provided by NSI) by a default EF of 0.5071 t/t (obtained by multiplying the default multiplication factor of 0.785 by the default calcium oxide (CaO) content of clinker of 0.65) and by the default cement kiln dust (CKD) correction factor of 1.02 (thus adding 2 per cent to the emission estimate calculated from the data on clinker production). In addition, the Party provided information to the ERT on its use of verified EU ETS data to check its own calculated estimates of CO_2 emissions from this category: the verified estimate of CO_2 emissions from all five cement plants in Bulgaria for 2007 amounted to 1,953.14 Gg CO_2, which is 56.12 Gg (2.96 per cent) higher than the estimate reported in its inventory submission (1,896.98 Gg CO_2) (see para. 96 above).

99. The ERT recommends that Bulgaria develop a higher-tier method to estimate emissions from this key category, and recalculate its emission estimates for all years of the inventory time series. The ERT also recommends that Bulgaria include in the NIR of its next annual submission information on: methods, EFs and other parameters used to estimate CO_2 emissions; how the recalculations ensured time-series consistency and their impact on the emission trend; the types of cement produced in the country, and the composition of the cement and clinker; and the verification activities undertaken by the Party, and explanations for the differences between the emission estimates reported by the Party and verified EU ETS data.

2. Iron and steel production – CO_2

100. In 2007, CO_2 emissions from iron and steel production accounted for 2.0 per cent of total GHG emissions. There are only three steel-producing plants in Bulgaria, two plants (basic oxygen furnace (BOF) and an electric arc furnace (EAF)) in one large integrated primary iron and steel company producing pig iron, sinter, coke and steel which was closed in 2008, and a third plant in a separate company (a secondary steel plant producing EAF steel from scrap metal). Non-energy emissions from the use of coke as a raw material (carbon integrated in the pig iron) in the integrated plant were calculated and allocated to the sub-sector iron and steel under the energy sector. CO_2 process emissions were estimated by multiplying the steel produced (aggregated AD provided by NSI) by an EF of 0.821 t

CO_2/t steel. This EF was elaborated by the Bulgarian Energy Institute taking into account the plant's steel production technologies and capacities (BOF to EAF steel ratio) and based on an analysis using the CORINAIR (core inventory of air emissions) methodology. This very simple approach of multiplying the iron and steel produced by a production-based EF is mentioned in the Revised 1996 IPCC Guidelines, but it is not considered good practice by the IPCC good practice guidance. The ERT recommends that Bulgaria explore developing a higher-tier estimation method in line with the IPCC good practice guidance. The integrated primary plant neither has IPPC emissions reporting obligations nor participates in EU ETS, so no external verification reports are available for the verification of the Party's estimates as part of its QA/QC procedures. The ERT noted with concern that ExEA was not able to explain the aforementioned methodology used to estimate the EF.

101. AD on iron and steel production are considered confidential; however, the ERT identified that the Bulgarian Association of the Metallurgical Industry (BAMI) publishes data on iron and steel production by type of process every year which can be used by the Party to develop a higher-tier estimation method and prepare its emission estimates in line with the IPCC good practice guidance. The ERT recommends that Bulgaria use AD from BAMI to estimate emissions from this key category in line with the IPCC good practice guidance, recalculate the entire time-series, and report thereon in its next annual submission, including information on the higher-tier method, AD, EF and other parameters applied, a description of the plants, their production processes and capacities, and information on how the recalculation ensured time-series consistency and its impact on the emission trend.

102. The present ERT reiterates an encouragement of previous review reports for the Party to explore the possibility of resolving the issue of there being gaps in the time series of AD for this category owing to the confidentiality of the data.

3. Nitric acid production – N_2O

103. In 2007, N_2O emissions from nitric acid production accounted for 1.7 per cent of total GHG emissions. AD used for estimating these emissions were provided by NSI (from the Statistical Report for Produced Industrial Goods and Services according to the NSI Stock Balances, 2007). Emissions were estimated using a tier 1 method, namely a basic equation from the Revised 1996 IPCC Guidelines in which production data are multiplied by an EF. Bulgaria used an EF from the IPCC good practice guidance for a medium-pressure plant, and the ERT noted that this EF was the lowest default value from the IPCC good practice guidance for this type of plant.

104. The ERT found that there was only one fertilizer production plant in Bulgaria producing nitric acid. Even though the plant is known to ExEA, the ERT noted with concern that ExEA did not know the type of the plant or the technology used by it. The ERT recommends that Bulgaria explore the possibility of developing a country-specific EF, either based on plant-specific data (from the single operator) or using data collected within the framework of E-PRTR and the IPPC permits, and to report thereon in its next annual submission, including information on any resultant recalculations and their impact on time-series consistency and the emission trend, and information on how the country-specific EF was developed in line with the IPCC good practice guidance.

105. The ERT recommends that Bulgaria improve the transparency of the reporting on nitric acid production in the NIR, including the improvement of the documentation on methods, AD, EFs and other parameters used to estimate emissions, and the expansion of the background information on the industrial processes and technology used. The ERT reiterates an encouragement of previous expert review reports for the Party to explore the possibility of resolving the issue of there being gaps in the time series of AD for this category owing to the confidentiality of the data.

4. Lime production – CO_2

106. In 2007, CO_2 emissions from lime production accounted for 1.4 per cent of total GHG emissions. A tier 1 methodology was used to estimate emissions from this key category using AD supplied by NSI and an IPCC default EF for high-calcium quicklime. Bulgaria currently assumes that all lime production plants use high-calcium quicklime and it therefore used the default EF for this kind of quicklime. This means that in the 2009 inventory submission Bulgaria did not take into account dolomitic quicklime (for which the IPCC default EF is higher), and is a potential underestimation of emissions from this category. In addition, the captive lime production is not known or at least the ERT found no evidence that the statistics on production from NSI took into account captive lime production. The majority of the lime in Bulgaria is produced by small plants that are not subject to reporting obligations under the E-PRTR Regulation, EU ETS or the EU IPPC directive. For this category, Bulgaria plans for its future submissions in the short-term to recalculate its emission estimates applying the default ratio for high-calcium to dolomitic lime of 85:15 (while still assuming zero proportion of hydrated lime in production and applying the default EFs for both types of lime), and to gather through the very recently established (in 2009) Association of Lime Producers reliable country-specific data on the content and types of lime produced, including the proportion of hydrated lime, and use a country-specific ratio and EF in the long term. The ERT recommends that Bulgaria implement these improvements in its next annual submission, which are in line with the IPCC good practice guidance, and provide a more detailed explanation of the methodology used to estimate CO_2 emissions from this category in order to increase transparency in the NIR.

5. Ammonia production – CO_2

107. In 2007, CO_2 emissions from ammonia production accounted for 0.7 per cent of total GHG emissions. There is only one fertilizer production plant in Bulgaria producing ammonia, and Bulgaria calculated the emissions from this category using a tier 1b method from the Revised 1996 IPCC Guidelines and a country-specific EF of 1.2382 t CO_2/t ammonia produced. However, the Revised 1996 IPCC Guidelines recommends an EF of 1.5 t CO_2/t ammonia produced. Also, the ERT noted that the amount of natural gas consumed was not used by the Party as the proxy for the emission estimation, as recommended by the Revised 1996 IPCC Guidelines. The ERT identified from the NIR that data on ammonia production were provided by NSI and that the country-specific EF was derived from a model, but no further explanations have been provided. During previous reviews, Bulgaria indicated that the EF had been recalculated on the basis of an analytical method taking in account the expenditure standards of non-energy natural gas for ammonia production. In response to a question raised by the ERT during the in-country review, ExEA was unable to explain how this country-specific EF had been derived or its basis. Natural gas used as feedstock in ammonia production were calculated and allocated to the category chemicals under the energy sector. The ERT recommends that Bulgaria develop a country-specific EF using plant-specific data from the single operator or data from E-PRTR to resolve this potential underestimation, and recalculate its estimates for the whole time series and to report thereon in its next annual submission. Furthermore, the ERT recommends that Bulgaria, in the NIR of its next annual inventory submission, provide more detailed explanations of the methodology used to estimate CO_2 emissions from ammonia production, the country-specific EF and AD used, and more background information, in order to increase transparency.

108. The present ERT reiterates an encouragement of previous review reports for the Party to explore the possibility of resolving the issue of there being gaps in the time series of AD for this category owing to the confidentiality of the data.

6. Other (mineral products) – CO_2

109. The ERT noted from the CRF tables that Bulgaria had reported emissions from glass production, the desulphurization process in power plants, and brick production under this category. CO_2 emissions from brick production were not estimated for years 1998 and 2000–2007 as the Party did not have an EF, however, the Party informed the ERT during the in-country review that it has AD for this category for these years. The ERT encourages the Party to explore sources of EFs, including international scientific literature, or to derive a country-specific EF from verified directly measured data from EU ETS, E-PRTR or the IPPC permits, with a view to improving the completeness of its estimate of total GHG emissions, and to report thereon in its next annual submission including the information listed in paragraph 55 above concerning the use of EU ETS data. With regard to the data on emissions from the desulphurization process in power plants, the ERT recommends that Bulgaria allocate these emissions to the category limestone and dolomite use in accordance with the Revised 1996 IPCC Guidelines in its next annual submission.

C. Non-key categories

Consumption of halocarbons and SF_6 – HFCs

110. Actual emissions of HFCs (HFC-134a) have been reported only for 1995. Following the recommendation of the previous review report, and in line with the IPCC good practice guidance, Bulgaria added its estimate of potential emissions of HFCs to the estimate of total GHG emissions when data on actual emissions were not available. Potential emissions of HFCs have been reported for the years 1995 to 2007, whereas corresponding emissions of PFCs and SF_6 are not reported for all years of the time series. Data on the consumption of HFCs were provided by MoEW from data collected to respond to the Party's reporting obligations related to the Montreal Protocol on Substances that Deplete the Ozone Layer. Bulgaria plans to launch a call for tenders to undertake a study to estimate actual emissions of F-gases, but a commencement date for this project is yet to be established (see para. 29 above). The ERT strongly encourages Bulgaria to undertake this study and recommends that the Party estimate not only the actual emissions of all F-gases but also potential emissions of SF_6 and PFCs for the entire time series, as this category is likely to be a key category in the future, and also encourages the Party to include clear and detailed explanations of the estimation methodology, AD and EFs used, in the NIR of its next annual submission.

D. Areas for further improvement

1. Identified by the Party

111. The NIR identified potential improvements for the category cement production that include: to gather through the Bulgarian Association of Cement Industry (BACI) (a recently established organization) reliable country-specific data on the CaO content of the clinker and the fraction of non-recycled (lost) calcined CKD (and/or the use of non-carbonate sources); to validate CO_2 emissions from cement production data through the Regional Environmental Inspectorates (the competent authorities for compliance with the IPPC permits), including on-site checks; and, depending on the results of the validation, to implement the use of a country-specific CaO content of clinker (i.e. CaO content of clinker and/or use of non-carbonate sources) and/or a CKD correction factor to estimate emissions from cement production.

112. Potential improvements for the category lime production include, in the short term and where there are no disaggregated representative data available on the types of lime produced: the recalculation of the emission estimates applying the default ratio for high-calcium to dolomitic lime of 85:15 (while still assuming zero proportion of hydrated lime in production and applying the default EFs for both types of lime); the gathering through the Association of Lime Producers of reliable country-specific data on the

content and types of lime produced (and/or the proportion of hydrated lime produced); and, depending on the results of the validation of these data, the use of a country-specific ratio and EFs to estimate emissions from lime production.

2. Identified by the expert review team

113. The ERT identified the following areas for improvement in the industrial processes sector:

(a) To improve the completeness of the inventory by estimating actual and potential emissions of F-gases for the missing categories.

(b) To explore the possibility of developing higher-tier methods to estimate emissions for all categories by using verified directly measured data from industrial entities (i.e. plant-level data), obtaining these data either by establishing a process of consultation with relevant industry or from reporting under EU ETS, E-PRTR or the IPPC permit system, and to simultaneously undertake recalculations for all years of the inventory time-series using these data. The use of these verified directly measured data is on the proviso that the Party is able to report, in its next annual submission, information on:

(i) How these data have been prepared and incorporated into the inventory submission in line with the principles of the IPCC good practice guidance;

(ii) Whether these data have been subjected to any QA and/or verification and, if so, which approach has been used and how this relates to corresponding QA and/or verification procedures set out in the IPCC good practice guidance;

(iii) How time-series consistency has been ensured when using these data, and the impact of the use of these data on the emission trend.

(c) To document and explain in the NIR input and output data, key assumptions, the types of methods used and the parameters used therein and where and why the IPCC good practice guidance has not been followed.

V. Agriculture

A. Sector overview

114. In 2007, emissions from the agriculture sector amounted to 5,030.31 Gg CO_2 eq, or 6.6 per cent of total GHG emissions. Since the base year, emissions have decreased by 67.3 per cent. The key drivers for the fall in emissions are the reductions in the cattle and swine populations and a strongly reduced use of synthetic and animal fertilizers from 1989 to 1995 and between 1999 and 2001 owing to the country's economic circumstances. Within the sector, 54.7 per cent of the emissions were from agricultural soils, followed by 27.3 per cent from enteric fermentation and 16.5 per cent from manure management. Rice cultivation and field burning of agricultural residues contributed 1.1 and 0.4 per cent, respectively.

1. Completeness

115. The CRF tables for 2007 include estimates for most gases and categories from the agriculture sector, as recommended by the Revised 1996 IPCC Guidelines and the IPCC good practice guidance. N_2O emissions from management of buffalo manure have not been estimated by Bulgaria in this annual submission with notation key included elsewhere ("IE") used for liquid system and solid storage and dry lot animal waste management systems. No explanation has been provided in the NIR or CRF tables as to where these emissions have been included and the ERT found that these emissions were in fact not

estimated by the Party. Bulgaria has used the notation key "NE" to report several EFs and parameters in its CRF tables for 2007, and the ERT noted that a number of these were incorrect. The ERT recommends that Bulgaria review its reporting of notation keys and report thereon in its next annual submission. The ERT also recommends that Bulgaria report emissions for all types of animal which are known to exist in the country and for which methods to estimate emissions are available in the Revised 1996 IPCC Guidelines and/or the IPCC good practice guidance.

2. Transparency

116. The ERT found that the NIR did not provide sufficient information on methodologies, AD and EFs used in the agriculture sector, including the rationale for their selection and information to justify the use of country-specific parameters and methods. The ERT recommends that Bulgaria provide clear and detailed description of and documentation on its methods, including equations used, and information on the choice and descriptions of EFs and other key input parameters used for its emissions estimations, in the NIR of its next annual submission.

3. Recalculations and time-series consistency

117. Bulgaria performed recalculations for the time-series 1988–2006 for its estimates of N_2O emissions from application of synthetic fertilizers, animal manure applied to soils, nitrogen (N)-fixing crops, and crop residue, which resulted in a 0.02 per cent increase in the estimate of total GHG emissions for 2006 and a 0.01 per cent increase in the estimate of total GHG emissions for 1988. Recalculations were undertaken by the Party in response to recommendations of the previous review report with regard to a revision of default methodologies and EFs used to estimate N_2O emissions from agricultural soils. The ERT found that the aforementioned recalculations did improve time-series consistency, but not always the quality of the inventory. The ERT recommends that Bulgaria increase the quality of its inventory by using available country-specific parameters in its estimations, and that the Party document these in its next annual submission, including any recalculations undertaken and their impact on time-series consistency and the emission trend.

118. The ERT encourages Bulgaria to improve the documentation in its NIR and CRF table 8(b) on the rationale for each recalculation, and to report thereon in its next annual submission.

4. Uncertainties

119. Bulgaria used a tier 1 methodology and default values for the uncertainties of AD and EFs by categories to calculate total sectoral uncertainty. The ERT recommends that Bulgaria explore the possibility of identifying country-specific values for AD and EFs on the basis of national circumstances of the agriculture sector. The ERT also recommends that the Party improve the documentation in the NIR on the uncertainty analysis, including the information on the methodologies and parameters used.

5. Verification and quality assurance/quality control approaches

120. The ERT found that Bulgaria performed basic verification of the AD used for the agriculture sector, which was undertaken by the Ministry of Agriculture and Food (Division of Agricultural Statistics) using standard statistical tools, and that there was no verification of emissions data thereafter. ExEA receive AD from the aforementioned Ministry by official letter on an annual basis.[10]
The preliminary inventory is based on data available on the official webpage in May (half-year statistics) and then this is verified by the data obtained from the Statistical Yearbook in November each year. The ERT encourages Bulgaria to implement the verification and QC procedures presented in its QA/QC plan between ExEA and the data providers.

[10] These data can be found at <http://www.mzh.government.bg/Article.aspx?lmid=820&id=820&lang=2>.

B. Key categories

1. Enteric fermentation – CH_4

121. The ERT found that estimates of emissions from enteric fermentation were not prepared or reported in line with the IPCC good practice guidance. Since this category was identified as key by both the Party and the secretariat, the ERT reiterates a recommendation made in the previous review report that the Party explore the possibility of using a higher-tier method to estimate these emissions, especially for those animal types (e.g. cattle and sheep) contributing the most emissions in the latest inventory year. Further, the ERT recommends that Bulgaria use available detailed statistical information to improve the EFs over the time series for dairy and non-dairy cattle on the basis of data on milk production, revise its emission estimates and report thereon in its next annual submission, including information on recalculations undertaken and their impact on the time-series.

122. The ERT noted inconsistencies in the trend in AD for the years leading up to 2001, which the Party explained to be as a result of a change in data provider. The ERT recommends that Bulgaria improve the consistency of the time series of AD by using national statistics in the first instance, and if this is not possible then to use international statistical data from the Food and Agriculture Organization of the United Nations (FAO) for before 2001, which are well harmonized with recent national statistics. The ERT also recommends that Bulgaria improve the transparency of information on emission trends by explaining any fluctuations in the trends in its next annual submission.

123. Bulgaria estimated CH_4 emissions from enteric fermentation in poultry, but the ERT found no description of the methodology used in the NIR. According to the IPCC good practice guidance, no CH_4 emissions occur from enteric fermentation in poultry, owing to their different digestive characteristics compared with other animals. The ERT recommends that Bulgaria provide in its next annual submission an explanation of its basis for estimating CH_4 emissions from enteric fermentation in poultry, and a description of the method and EF used.

2. Manure management – CH_4

124. The ERT noted that Bulgaria used a tier 1 methodology for all animal categories and default EFs to estimate CH_4 emissions from manure management, the exceptions being dairy and non-dairy cattle and swine, for which the country-specific allocation to AWMS was available. The ERT recommends that Bulgaria improve documentation on methods used, including EFs and the reasoning behind the allocation of the animal types to the different AWMS. The ERT also recommends that Bulgaria calculate and appropriately report the allocation to AWMS by livestock category and the methane conversion factors (MCFs) used. The ERT encourages Bulgaria to use the appropriate notation keys in the CRF tables.

125. Bulgaria has reported a constant CH_4 IEF for non-dairy cattle of 12.207 kg/head/year for all years of the inventory time series. No explanation is provided in the NIR on this constant IEF. This value is lower than the IPCC default value for temperate climate regions in Eastern Europe (13 kg/head/year). The ERT recommends that Bulgaria document and justify the use of this country-specific EF in its next annual submission, as it could have led to an underestimation of emissions.

126. Bulgaria has reported a constant CH_4 IEF for swine (9.946 kg/head/year) for all years of the inventory time series. This value is higher than the IPCC default value for temperate climate regions in Eastern Europe (7 kg/head/year). During in-country review, Bulgaria explained that domestic breeding of swine is the most common practice in the country and that this results in a higher IEF value. The ERT recommends that Bulgaria include this justification for the use of this EF in its next annual submission.

3. Direct soil emissions – N_2O

127. The IPCC default tier 1a methodology and default EFs were used to estimate direct N_2O emissions from agricultural soils. Bulgaria has compiled estimates of emissions from synthetic fertilizers, animal manure applied to soils, N-fixing crops, crop residues and cultivation of histosols. The emissions from cultivation of histosols were estimated using a default EF and constant land area of 205 ha across the whole time series. The ERT recommends that Bulgaria, as this is a key category, develop country-specific EFs on the basis of the country-specific data available from national statistics.

4. Pasture, range and paddock manure – N_2O

128. Bulgaria used a constant country-specific value for the fraction of livestock N excretion and deposition onto soil during grazing ($Frac_{GRAZ}$) of 45.6 per cent for all animal categories. N excreted on pasture, range and paddocks as a percentage of total N excretion, as calculated from the data in CRF table 4.B(b), equals 43.7 per cent, which is not in accordance with the reported value for $Frac_{GRAZ}$. Bulgaria provided corrected values for $Frac_{GRAZ}$ before the in-country review and the ERT recommends that Bulgaria use these values for the next annual submission. This methodological approach will ensure consistency between the reported categories, in line with the IPCC good practice guidance.

5. Indirect soil emissions – N_2O

129. Bulgaria estimated N_2O emissions from atmospheric deposition and from N leaching and run-off using a tier 1a default methodology and default EFs for indirect soil emissions, which is not in line with the IPCC good practice guidance. The ERT recommends that Bulgaria collect and harmonize the necessary input data and parameters in order to increase the transparency and accuracy of the inventory, and report thereon in its next annual submission.

C. Non-key categories

1. Manure management – N_2O

130. Bulgaria estimated N_2O emissions from manure management using a tier 1 methodology for all animal categories and AWMS, and default EFs. Bulgaria applied the default N excretion rates for each livestock category and country-specific fractions of waste allocated to each AWMS for cattle. The ERT considered the information provided by the Party, in the NIR, to be insufficient and recommends that Bulgaria improve the transparency of its reporting by providing the necessary background information and data for the entire time series in its next annual submission.

131. Bulgaria has reported N_2O emissions from buffalo under the solid storage and dry lot and liquid system AWMS as "IE", but it has not been explained in the respective CRF table or the NIR where these emissions from buffalo have been included in the inventory. In response to a question raised by the ERT during the in-country review, Bulgaria indicated that these emissions had been allocated to the category other non-specified; however, for this category the notation key "NO" has been used. The ERT recommends that Bulgaria use the IPCC good practice guidance and estimate and report the emissions from buffalo in the appropriate way, since these emissions have potentially currently been underestimated.

132. Bulgaria has allocated emissions from poultry to the pasture, range and paddock AWMS, but, in CRF table 4.B(a), the allocation and MCF parameters for this AWMS have been reported as "NO". The ERT encourages Bulgaria to reallocate emissions from poultry to the appropriate AWMS and use the correct N-excretion parameters, since these emissions have potentially currently been underestimated.

133. The ERT noted that the sum of the N excretion for all AWMS per animal category and the sum of the animal population size multiplied by the N excretion per head are not equal for all animal categories. The ERT encourages Bulgaria to rectify this in its next annual submission.

2. Rice cultivation – CH_4

134. Bulgaria used the default methodology and a country-specific EF of 40.27 g/m^2 derived from an expert study for its estimation of emissions from continuously flooded rice cultivation. Bulgaria was not able to provide the ERT with the scientific report that provides the basis for the EF, nor did it provide this information in the NIR. In the previous review report, a recommendation that Bulgaria increase the transparency of the reporting on and documentation for this EF was reiterated. The ERT recommends that Bulgaria justify its use of this country-specific EF by including in its next annual submission information from the aforementioned scientific report. The ERT noted during the in-country review that available statistical information could improve the Party's emission estimates for this category.

3. Field burning of agricultural residues – CH_4 and N_2O

135. Bulgaria estimated emissions of CH_4 and N_2O for this category assuming that 10 per cent of the cereal residues were burned on site. The ERT recommends that the Party improve the transparency of the AD on crop areas across sub-sectors and reconsider the aforementioned assumption. The ERT noted that in similar countries the share of residues burned on site is higher than 10 per cent. Bulgaria was requested by the ERT during the in-country review to provide documentation that substantiates the reported share, but was unable to do so. The ERT recommends that Bulgaria provide the relevant justification on this parameter in its next annual submission.

D. Areas for further improvement

1. Identified by the Party

136. The ERT welcomed initiatives taken by Bulgaria to establish a plan for the further improvement of this sector by reducing potential underestimations of emissions and inconsistencies in AD. The ERT also welcomes the steps taken by the Party to involve MAF (Division of Agricultural Statistics) in its inventory planning and preparation.

2. Identified by the expert review team

137. The ERT strongly recommends that Bulgaria include national sectoral experts to improve the quality of the inventory for the agriculture sector. The ERT recommends that Bulgaria, in its next annual submission, provide additional documentation on AD, include information on country-specific methodologies and parameters used, and rectify discrepancies in the time series of AD for the years leading up to 2001.

138. The ERT also recommends that Bulgaria improve its use of notation keys in the CRF tables, with a view to improving the transparency of its reporting. The ERT further recommends that Bulgaria explore the possibility of using higher-tier estimation methods, especially for key categories, and report thereon in its next annual submission.

VI. Land use, land-use change and forestry

A. Sector overview

139. Net CO_2 removals of 6,801.90 Gg have been reported for the LULUCF sector for 2007. Net CO_2 removals have been reported for all years from the base year (1988) to 2007 and during that period CO_2 removals increased by 34.6 per cent. CO_2 removals from the sector ranged from a low of 5,049.51 Gg in

1988 to a high of 9,381.16 Gg in 2001. The key drivers for the reported changes in the magnitude of CO_2 removals are the changes in the level of wood harvested. Within the sector, 6,992.98 Gg CO_2 of the net removals were from forest land remaining forest land. CO_2 removals of 411.63 Gg have been reported for cropland remaining cropland. Only wetlands were a source of emissions, of 602.71 Gg CO_2. The estimates of emissions and removals for the years 1988 to 2006 were recalculated for the 2009 inventory submission. Although these recalculations did not change the sectoral emission trend, the ERT found that they did have an impact on the magnitude of the net removals.

140. The ERT concluded that Bulgaria's inventory for the LULUCF sector had not been prepared in accordance with the IPCC good practice guidance for LULUCF and not reported in line with the UNFCCC reporting guidelines. The ERT found the LULUCF inventory not to be complete (see para. 134 below) or transparent (see para. 137 below).

1. Completeness

141. The CRF tables include CO_2 emission estimates from carbon stock change for only forest land remaining forestland, cropland remaining cropland and wetlands remaining wetlands, as well as for land converted to forest land, which has been reported for the base year and 1990–1991 only. CO_2 emissions from agricultural lime application are reported for the period 1988–1993, and as "NE" for the remaining years of the inventory time series. All other land-use conversions, grassland, settlements, other land, N_2O emissions from fertilizers, N_2O emissions from disturbance associated with land use conversion to cropland and emissions from biomass burning have been reported as "NE". The ERT identified during the in-country review that these activities were occurring in the country and that AD were available for grassland, settlements and other land. Further, the areas of land converted could potentially be calculated from the data on area under the different land uses for different years. The data required for estimating non-CO_2 emissions are not available for this sector, and the ERT recommends that Bulgaria explore how such data can be obtained in support of estimating non-CO_2 emissions from this sector. The ERT found that the NIR did not provide a land-use change matrix, which is essential for the estimation of the land areas converted from one category to another (e.g. land converted to forest land). The ERT recommends that Bulgaria explore the possibility of preparing estimates of emissions by sources and removals by sinks for all mandatory land categories, for all carbon pools (in particular the missing dead organic matter and soil carbon) and for all GHGs, and report thereon in its next annual submission.

142. In response to questions raised by the ERT during the in-country review, the Party indicated that Project 1 referred to in paragraph 29 above had been established and this will provide the capacity to plan, prepare and manage a LULUCF inventory in accordance with the IPCC good practice guidance for LULUCF.

143. The ERT reiterates the recommendations of the previous review report with regard to the completeness of the Party's coverage of LULUCF activities and carbon pools. The ERT recommends that the Party effectively address the issues relating to identifying areas of land and areas of land-use change, and report thereon in its next annual submission. The ERT also recommends that the Party report estimates of non-CO_2 emissions from the LULUCF sector in accordance with the IPCC good practice guidance for LULUCF, and provide estimates of CO_2 emissions and removals for all required carbon pools, and to report thereon in its next annual submission. For those carbon pools not accounted for (i.e. those reported as "NE"), the ERT requests that Bulgaria provide verifiable information that demonstrates that these unaccounted carbon pools were not a net source of GHG emissions, in accordance with paragraph 6(e) of the annex to decision 15/CMP.1.

2. Transparency

144. The transparency of the Party's LULUCF inventory was found to be lacking owing to the fact that the relevant chapter of the NIR is not structured in accordance with, nor does it include the information required by, the UNFCCC reporting guidelines. The ERT strongly recommends that the Party report its LULUCF inventory in line with the UNFCCC reporting guidelines, and include the information required by the IPCC good practice guidance for LULUCF, which includes descriptions of AD and EFs used, sources of data, methods adopted, calculation procedures, QA/QC procedures adopted, and the land-use change matrix. This information should cover all mandatory categories, land conversions, carbon pools and GHGs. Also, the ERT found that the Party did not provide information in support of the recalculations performed for cropland remaining cropland. The information reported by the Party in its NIR was judged by the ERT to be inadequate to enable the assessment of the LULUCF inventory. The ERT recommends that Bulgaria report on recalculations in its NIR in accordance with the UNFCCC reporting guidelines and the IPCC good practice guidance for LULUCF.

3. Recalculations and time-series consistency

145. Recalculations have been performed and reported for 1988–2006 for the category cropland remaining cropland, in particular for the land category arable land. In the 2008 inventory submission, biomass increment was assumed for arable land, which led to a high estimate of CO_2 removals for the cropland remaining cropland category. However, the recalculation of this estimate in the 2009 inventory submission was based on the assumption of no biomass carbon increment for arable land, which resulted in a reduced estimate of CO_2 removals. The rationale for this recalculation and the method adopted has not been described in the NIR. The ERT recommends that the Party provide a detailed explanation for any recalculation.

4. Uncertainties

146. Bulgaria did not include the LULUCF sector in its uncertainty analysis. The ERT recommends that the Party include the LULUCF sector in its uncertainty analysis for its next annual submission.

5. Verification and quality assurance/quality control approaches

147. QA/QC procedures were not implemented by the Party for this sector, nor have any QA/QC procedures been described in the NIR of the 2009 annual submission. In response to a question raised by the ERT during the in-country review, the Ministry of Agriculture and Forestry indicated that some "ground-truthing" of the National Forest Inventory is undertaken periodically. The ERT urges the Party to follow up on its stated intention to develop and implement QA/QC procedures for this sector.

B. Key categories

Forest land remaining forest land – CO_2

148. Forest land remaining forest land is a key category. AD come from the State Forestry Agency, while the EFs used are from the National Forest Inventory, which is conducted periodically once every five years. Biomass expansion factors and other parameters used are IPCC default values. Only the living biomass carbon pool has been reported, while dead organic matter and soil carbon stock changes have been reported as "NE". The ERT recommends that Bulgaria endeavour to improve the completeness of its reporting, including all land conversions and carbon pools, and report thereon in its next annual submission.

149. The ERT was able to ascertain, during the review, that land conversion to forest land was occurring within the country. Data from the SFA indicated annual afforestation rates ranging from about 3,000 to 5,000 ha. The ERT reiterates the recommendation of the previous review report that the Party

report a land-use change matrix that incorporates all land area that has been converted to forest land in its next annual submission.

C. Non-key categories

1. Cropland remaining cropland – CO_2

150. CO_2 removals have been reported for fallow land and permanent cultures. CO_2 removals have been reported for the living biomass carbon pool only. Carbon stock changes in dead organic matter and soils have been reported as "NE". Gains and losses in carbon pools have been reported as "NO" for the arable land category. Land converted to cropland has been reported as "NE". The ERT recommends that the Party report carbon stock changes in dead organic matter and soils for cropland remaining cropland, as well as estimates of CO_2 emissions and removals from land converted to cropland in future submissions.

2. Wetlands remaining wetlands – CO_2

151. An area of 159 kha has been reported for wetlands in 2007. Only carbon losses in living biomass have been reported; other carbon pools have been reported as "NE" and "NO". There is no explanation in the NIR of the AD or EFs used for the category wetlands. The ERT recommends that the Party provide detailed explanations of the AD and EFs used for this land category, in its NIR of its next annual submission. Land converted to wetlands has been reported as "NE" and "NO". The ERT also recommends that the Party clarify, in its NIR, whether land has been converted to wetlands in the country in its next annual submission.

D. Areas for further improvement

1. Identified by the Party

152. The NIR did not identify any improvements for this sector. The ERT recommends that Bulgaria include in its next annual submission information provided to the ERT during the in-country review on the four projects mentioned in paragraph 29, and how this will improve the quality of its inventory. Associated timelines and expected completion dates of each project should also be provided.

2. Identified by the expert review team

153. The ERT identifies the following cross-cutting areas for improvement in the LULUCF sector:

(a) To ensure sufficient technical competence and resources within the national system to compile, prepare and report a LULUCF inventory in accordance with the IPCC good practice guidance;

(b) To strengthen the institutional arrangements between ExEA and SFA and other institutions (e.g. Forest Research Institute and University of Forestry) with a view to improving the technical competence of the inventory compilers under the national system, and to ensuring that the annual submission under the Kyoto Protocol meets the requirements as set out in paragraphs 5 to 9 of the annex to decision 15/CMP.1;

(c) To improve the completeness of the LULUCF inventory by including emission estimates for all mandatory land categories, all land conversions, all carbon pools and all GHGs;

(d) To improve the transparency of the LULUCF inventory by preparing and reporting information (e.g. methods, AD, EFs and other parameters) in line with the structure of the NIR set out in the UNFCCC reporting guidelines, and by including the information

required by the IPCC good practice guidance for LULUCF (e.g. a land-use change matrix);

(e) To develop QA/QC procedures for the LULUCF inventory;

(f) To include the LULUCF sector in the uncertainty analysis.

VII. Waste

A. Sector overview

154. In 2007, emissions from the waste sector amounted to 7,657.89 Gg CO_2 eq, or 10.1 per cent of total GHG emissions. Within the sector, solid waste disposal on land accounted for 87.2 per cent of emissions and wastewater handling for 12.8 per cent. Emissions from the sector decreased by 41.3 per cent over the period 1988–2007, with the main contributor to this observed declining trend being the 37.0 per cent decrease in the CH_4 emissions from solid waste disposal on land, which was in turn the result of a decline in the amount of municipal solid waste disposed to landfills (59.5 per cent decrease between 1988 and 2007). CH_4 and N_2O emissions from wastewater handling decreased by 60.9 and 53.0 per cent, respectively, between 1988–2007.

1. Completeness

155. The CRF tables for the waste sector are complete and many of the background data tables have been updated in the 2009 annual submission. However, the ERT found that the NIR did not include information on relevant waste management practices in Bulgaria, as recommended in the IPCC good practice guidance and the UNFCCC reporting guidelines. The Party has reported estimates of emissions from managed waste disposal on land, industrial wastewater treatment, domestic and commercial wastewater treatment and N_2O emissions from human sewage. However, emissions from unmanaged waste disposal on land and waste incineration have been reported as "NE" despite the fact that the Party confirmed during the in-country review that these activities have occurred in Bulgaria. The ERT recommends that the Party estimate emissions from these categories and report thereon in its next annual submission.

2. Transparency

156. The ERT found that the 2009 annual submission included general descriptions of the methods used to estimate emissions from the waste sector, but that the transparency of the inventory could be improved by providing in the NIR additional information on the AD on unmanaged waste disposal on land and waste incineration and their corresponding emission estimates. In addition, the inclusion of a time series of the AD on the amount of waste disposed to landfills and the methane correction factor would improve the transparency of the first-order decay (FOD) model used for the estimates, and general descriptions of solid waste and wastewater management practices would improve the transparency of the inventory.

3. Uncertainties

157. IPCC default values for AD and EFs were used for the uncertainty analysis in the waste sector and the Party has reported no change in its uncertainty estimates since the previous annual submission.

4. Verification and quality assurance/quality control approaches

158. The ERT noted that the Party had started to implement its QA/QC plan for the waste sector and had included in its 2009 annual submission a checklist as evidence. The ERT encourages the Party to

continue to implement this QA/QC plan by establishing an automated means of inputting data into the calculation models and checking the calculations thereafter in its next annual submission.

B. Key categories

1. Solid waste disposal on land – CH_4

159. A first order decay model (IPCC tier 2 method) combined with IPCC default EFs was used to estimate CH_4 emissions from solid waste disposal on land. In 2007, CH_4 emissions from solid waste disposal on land accounted for 57.5 per cent of the Party's total CH_4 emissions. The ERT concluded that the emission estimates for this category were prepared generally in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

160. The Party used a starting year of 1960 for the FOD model, which is not in line with the IPCC good practice guidance, which recommends a starting year of 1950 or earlier. The IPCC good practice guidance also recommends that the Party provide a justification for the use of a starting year later than 1950 stating that no underestimation of emissions has occurred as a result; however, Bulgaria has provided no such justification in its NIR. The ERT recommends that the Party explore the possibility of using a starting year for the FOD model that is in line with the IPCC good practice guidance, and, if not, that it outline in its NIR a justification stating that the use of a later starting year will not result in an underestimation of emissions.

161. The ERT identified that the country-specific value for the waste generation rate (0.86 t/capita/year) used for the years 1988–1993 is very high when compared with the IPCC default value for Eastern European countries (0.38 t/capita/year). The ERT recommends that Bulgaria provide in its next annual submission a justification for the use of this country-specific value for the waste generation rate, and to report on the appraisal of the reliability of this value and other AD used to estimate emissions for this category, and, where required, recalculate its emission estimates on the basis of the outcome of this appraisal.

162. Bulgaria has reported a constant degradable organic carbon (DOC) value for all years of the inventory time series. The ERT concluded that the use of a constant DOC value may not reflect the changing composition of solid waste over the time series. The ERT recommends that the Party investigate the sensitivity of the FOD model to calculating a DOC value that considers the different carbon content in waste over the years, and report thereon in its next annual submission.

163. CH_4 emissions from unmanaged waste disposal sites have been reported as "NE" despite the fact that the Party confirmed during the in-country review that this activity did occur in Bulgaria over the inventory time series. The Party explained, during the in-country review, that emissions could not be estimated for this category as there were no available data. The ERT recommends that Bulgaria explore sources of AD in order to estimate emissions from this category in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, and to report thereon in its next annual submission. If sources of AD cannot be found, then the ERT recommends that Bulgaria report in its next annual submission, in the completeness section of its NIR, an explanation as to why emission estimates for this category cannot be prepared and reported for those years of the inventory time-series that this activity is known to have occurred.

2. Wastewater handling – CH_4 and N_2O

164. In 2007, emissions from wastewater handling accounted for 7.2 per cent of the Party's total CH_4 emissions and 2.9 per cent of its total N_2O emissions. Emissions from wastewater handling decreased by 67.5 per cent over the period 1988–2007, owing to a steady decline in the volume of wastewater treated.

165. Emissions from industrial wastewater and domestic and commercial wastewater were estimated using the default method and EFs from the IPCC good practice guidance, and AD from the national wastewater statistics. The Party explained to the ERT, during the review, that it had included all likely industrial sources of emissions in the estimation of emissions from industrial wastewater activities. The ERT recommends that the Party to explore the possibility of developing a higher-tier method to estimate emissions from this category in its next annual submission.

C. Non-key categories

1. N_2O from human sewage – N_2O

166. N_2O emissions from human sewage were estimated using a tier 1 default method from the Revised 1996 IPCC Guidelines. The Party used country-specific values for annual per capita protein consumption, which the ERT noted had decreased by 45.4 per cent since 1988. The ERT found that corresponding data on nutrition from FAO did not support this trend or the value for 1988, which is very high when compared with the values of other Eastern European countries. The ERT recommends that Bulgaria consider the reliability of the AD used and also compare these data with data from other possible sources or data contained in international literature, and report thereon in its next annual submission, including on any recalculations that may have been undertaken based on the outcome of this appraisal.

2. Waste incineration – CO_2

167. Emissions from waste incineration have been reported as "NE" despite the fact that the Party confirmed during the in-country review that this activity did occur in Bulgaria over the time series. The Party explained to the ERT, during the in-country review, that waste incineration in Bulgaria was not regulated before 1994, hence AD were not available for the years 1988–1993. The ERT reiterates a recommendation of the previous review report that Bulgaria try to identify possible sources of these AD to estimate emissions from this category in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance, and to report thereon in its next annual submission. If the AD are found not to be available for the whole time series, then the ERT recommends that the Party consider applying an extrapolation method in line with the IPCC good practice guidance, and that it report thereon in its next annual submission, including the rationale for the recalculation and its impact on the emission trend, and a description of the extrapolation method used. If sources of AD cannot be found or an extrapolation method cannot be used, then the ERT recommends that Bulgaria explain, in the completeness section of its NIR, why emission estimates for this category cannot be prepared and reported for those years of the inventory time-series that this activity is known to have occurred.

D. Areas for further improvement

1. Identified by the Party

168. The ERT noted from the NIR that Bulgaria identified category-specific improvements in relation to the accuracy of its emission estimates for all categories in the waste sector. The ERT recommends that Bulgaria use its key category analysis and its uncertainty analysis to prioritize improvements to its inventory for the waste sector.

2. Identified by the expert review team

169. The ERT recommends that Bulgaria improve the transparency of its inventory for the waste sector by elucidating the methods, AD and EFs used to prepare its emission estimates; for example, further information could be reported in the NIR on reasons for changes in waste generation rate between years 1988–2007.

170. The ERT also recommends that Bulgaria improve the completeness of its inventory for the waste sector by exploring the availability of AD for those categories currently reported as "NE". Where such data cannot be obtained, the ERT further recommends that Bulgaria explain, in the completeness section of its NIR, why emission estimates for a given category cannot be prepared and reported in accordance with the Revised 1996 IPCC Guidelines and the IPCC good practice guidance.

VIII. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

A. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

171. Bulgaria did not submit on a voluntary basis information on activities under Article 3, paragraph 3, of the Kyoto Protocol. During the review, the ERT identified a number of issues relating to the Party's national system being able to ensure that land areas subject to LULUCF activities under Article 3, paragraph 3, are identifiable. The ERT recommends that the Party effectively address the issues relating to its national system being able to identify areas of land and land-use change subject to activities under Article 3, paragraph 3, and report thereon in its next annual submission.

172. The ERT noted that Bulgaria was unable to report estimates of emissions and removals for all land-use categories and land conversions in its LULUCF inventory. In response to a question raised by the ERT during the in-country review, Bulgaria indicated that it had established a project entitled "Methodology for calculation of emissions and removals for LULUCF sector according to requirements of UNFCCC and Kyoto Protocol" in order to provide the information and data required to meet its reporting requirements under the Kyoto Protocol. When questioned by the ERT during the in-country review, the relevant institutions within the national system were not able to provide the ERT with an understanding or knowledge of the modalities relating to LULUCF activities under the Kyoto Protocol (set out in the annex to decision 16/CMP.1), the reporting provisions (set out in paragraphs 5 to 9 of the annex to decision 15/CMP.1) or the CRF tables (referred to in decision 6/CMP.3), which are each instrumental in meeting the obligations of reporting information on activities under Article 3, paragraph 3, of the Kyoto Protocol.

173. The ERT noted with utmost concern that if the Party does not develop a methodology to identify and collect data on areas of land use and land-use change, along with the ability to estimate carbon stock changes on an annual basis, pursuant to paragraphs 5–9 of the annex to decision 15/CMP.1 and the annex to decision 16/CMP.1, it will face major problems with the reporting of LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol, which is mandatory as from the annual submission due on 15 April 2010.

B. Information on Kyoto Protocol units

1. Standard electronic format and reports from the national registry

174. Bulgaria has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the SIAR on the SEF tables and their comparison report.[11] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10.

175. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with section I.E of the annex to decision 15/CMP.1, and reported in accordance with

[11] The SEF tables comparison report is prepared by the administrator of the international transaction log (ITL) and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry, and meets the requirements set out in paragraph 88 (a) to (j) of the annex to decision 22/CMP.1. The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

176. However, the Party has not provided information in its 2009 annual submission to clarify whether any discrepancies were identified by the ITL and whether any actions were undertaken by the Party to correct any problem that caused such a discrepancy to occur, regardless of whether any discrepancy had occurred in the previous calendar year. The ERT reiterates the recommendation of the SIAR that Bulgaria provides the relevant information and improves its reporting on discrepancies and actions taken to correct any problem that caused a discrepancy, in accordance with paragraphs 12 and 17 of the annex to decision 15/CMP.1 in its next annual submission, regardless of the situation.

2. National registry

177. The ERT took note of the SIAR and its finding that the reported information on the national registry is complete and was submitted in accordance with the annex to decision 15/CMP.1. The ERT also took note of the SIAR that the national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with decisions 16/CP.10 and 12/CMP.1. The national registry has adequate security, data safeguard and disaster recovery measures in place and its operational performance is adequate.

3. Calculation of the commitment period reserve

178. Bulgaria has reported its commitment period reserve in its 2009 annual submission. The Party reported its commitment period reserve to be 378,963,955 t CO_2 eq based on the total GHG emissions in its most recently reviewed inventory (75,792,791 t CO_2 eq). The ERT agrees with this figure.

C. Changes to the national system

179. Bulgaria has reported no change in its national system since the previous annual submission. The ERT concluded that the Party's national system required further strengthening in terms of institutional arrangements and its capacity to plan, prepare and manage the national inventory and that it does not fully perform its required general and specific functions in accordance with the requirements of national systems outlined in decision 19/CMP.1 (see section II.B above). After the in-country review, Bulgaria provided the ERT with a work plan that outlines projects and measures for improved resourcing and activities that it intends to implement with a view to addressing the key issues identified by the ERT with regard to the national system. The ERT recommends that information on any changes in the national system resulting from the implementation of the above-mentioned work plan be included in the Party's next annual submission.

D. Changes to the national registry

180. Bulgaria has reported no change in its national registry since the previous annual submission. The ERT concluded that the Party's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the CMP.

181. However, the ERT noted that the details of the registry system administrator had changed since the review of the initial report under the Kyoto Protocol and that this change had not been reported in the Party's annual submission in accordance with paragraph 22 of the annex to decision 15/CMP.1. The ERT recommends that Bulgaria include this information in its next annual submission. The ERT reiterates the findings of the SIAR in relation to the Party's reporting on: changes to cooperation arrangements and the names of the other Parties with which it cooperates to potentially maintain a consolidated system, in accordance with paragraph 32 (b) of the annex to decision 15/CMP.1; and changes to the national registry's conformance with the technical standards for data exchange between registry systems, in accordance with paragraph 32 (d) of the annex to that same decision. The ERT recommends that the Party address these problems and report the results in its next annual submission.

IX. Conclusions and recommendations

182. Bulgaria made its annual submission on 13 April 2009. The Party indicated that it is a voluntary submission under the Kyoto Protocol. The annual submission contains the GHG inventory (comprising CRF tables and an NIR) and supplementary information under Article 7, paragraph 1, of the Kyoto Protocol (information on Kyoto Protocol units and information stating no changes in the national system or the national registry). This is in line with decision 15/CMP.1.

183. The ERT concludes that the inventory submission of Bulgaria has been generally prepared and reported in accordance with the UNFCCC reporting guidelines. The 2009 inventory submission is in general complete in respect of its coverage of sectors, gases and years of the inventory time series, and is complete in terms of geographical coverage. However, the ERT identified issues with regard to the completeness of the coverage of categories in all sectors. Not all CRF tables have been provided by the Party in this annual submission, such as CRF tables 8(b) and 9.

184. Emission estimates have in general been prepared in line with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. However, the ERT identified emission estimates for some key categories in the industrial processes, agriculture and waste sectors that are not consistent with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF or could be improved with the use of higher-tier estimation methodologies and/or country-specific and comparable data, which would improve the accuracy of the estimates and/or resolve the issue of any identified potential underestimations.

185. The NIR has not been prepared fully following the structure set out in the UNFCCC reporting guidelines (e.g. the chapter on the LULUCF sector), nor does it provide sufficient information on choice of methodologies, AD and EFs, calculation procedures, assumptions, or rationale for recalculations and their impact on emission trends and time-series consistency. The emission estimates for a number of categories in the energy sector are not consistent across the time-series. In addition, the Party was not able to provide information to the ERT on methodologies, AD and EFs used to estimate emissions for the earlier years of the time series for these categories, explaining that the estimates had been prepared by organizations in the "previous national system".

186. The supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol was submitted by the Party on a voluntary basis and has been prepared and reported in accordance with section I of the annex to decision 15/CMP.1. Bulgaria did not submit on a voluntary basis information on KP-LULUCF, or information on the minimization of adverse impacts under Article 3, paragraph 14, of the Kyoto Protocol.

187. The ERT noted with utmost concern that if the Party does not develop a methodology to identify and collect data on areas of land use and land-use change, along with the ability to estimate carbon stock

changes on an annual basis, pursuant to paragraphs 5 to 9 of the annex to decision 15/CMP.1 and the annex to decision 16/CMP.1, it will face major problems with regard to the reporting of LULUCF activities under Article 3, paragraph 3, of the Kyoto Protocol, which is mandatory as from the annual submission due on 15 April 2010.

188. The information on the Party's accounting of Kyoto Protocol units has been reported in accordance with section I.E of the annex to decision 15/CMP.1, using the SEF tables as required by decision 14/CMP.1.

189. The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1, and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions. Bulgaria has reported in its 2009 annual submission that there have been no changes in its national registry since the previous annual submission. However, the ERT identified, during the in-country review that the details of the registry system administrator had changed since the review of its initial report under the Kyoto Protocol, but that this had not been reported by the Party in its subsequent annual submissions.

190. The ERT found that the Bulgarian national system did not fully perform its required general and specific functions as set out in the "Guidelines for national systems for the estimation of anthropogenic GHG emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol" (annex to decision 19/CMP.1). The ERT identified that the general and specific functions of Bulgaria's national system did not ensure that the Party's 2009 annual submission was transparent, consistent, comparable, complete and accurate, as required by the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF.

191. The ERT has included in this report recommendations for Bulgaria to address the above-mentioned issues with regard to the transparency, accuracy, completeness, comparability and consistency of its inventory before the 2010 annual submission. The ERT concluded that, in order to do so, the Party must strengthen its current institutional arrangements and the general capacity of the national system, including the technical competence of the staff therein, as these were found by the ERT to be insufficient to enable the adequate planning, preparation and management of the inventory in accordance with the general and specific functions of national systems set out in the annex to decision 19/CMP.1.

192. Bulgaria, in response to questions raised during the in-country review, submitted on 16 November 2009 a work plan containing information on projects and measures it intends to implement to address issues identified by the ERT concerning its national system. In its response to the draft version of the annual review report, Bulgaria provided the ERT on 16 February 2010 a signed new cooperation agreement between MoEW and NSI and information that a cooperation agreement between MoEW and MAF was in its final stages of completion, and also information indicating to the ERT that all projects had commenced and that an additional staff had been allocated to ExEA to support inventory development. In the period 25 February 2010 up until the publication of this report Bulgaria continued to provide the ERT with updated information on the aforementioned cooperation agreements, the projects and training workshops outlined in the work plan, and information that contained steps taken by the Party to address potential problems raised by the ERT, including the use of an external consultant, for its 2010 annual submission. However, the ERT is concerned that, working to the time schedule provided for the completion of the activities defined in this work plan, the Party will not be able to implement the improvements required in time for the first mandatory submission of the supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol, which is due on 15 April 2010.

193. In the course of the review, the ERT formulated a number of recommendations relating to the completeness of the annual submission, and the transparency, accuracy, consistency and comparability of the Party's 2009 annual submission. The key recommendations are that Bulgaria:

(a) Improve the capacity of its national system, including institutional arrangements and the technical competence of staff therein, to ensure that it fully performs the general and specific functions set out in the annex to decision 19/CMP.1 (see para. 67 above);

(b) Improve inventory planning and preparation to ensure that its next and subsequent annual submissions are prepared in accordance with the UNFCCC reporting guidelines, the reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol, the Revised 1996 IPCC Guidelines, the IPCC good practice guidance, and the IPCC good practice guidance for LULUCF (see para. 67 above);

(c) Report any changes in the national system arising from the implementation of the work plan submitted by Bulgaria to the ERT on 16 November 2009 in its next annual submission, including an update on the progress of the four projects;

(d) Report any change in the national registry, including the details of the registry system administrator, in the NIR in accordance with paragraph 22 of the annex to decision 15/CMP.1.

X. Questions of implementation

194. At the end of the review week the ERT found that the Bulgarian national system did not operate fully in accordance with the general and specific functions required of national systems as set out in the "Guidelines for national systems for the estimation of emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol" (decision 19/CMP.1). The ERT found that the specific and general functions of the national system did not ensure that Bulgaria's 2009 annual submission was sufficiently transparent, consistent, comparable, complete and accurate, as required by these guidelines, the UNFCCC reporting guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF. The ERT also found that Bulgaria's institutional arrangements and arrangements for technical competence of staff within the national system involved in the inventory development process, were insufficient, to enable the adequate planning, preparation and management of the Party's annual submission in accordance with the aforementioned guidelines.

195. In line with paragraph 106 of the annex to decision 22/CMP.1, the ERT requested Bulgaria to provide, within six weeks after the end of the review week, a work plan that outlined how the Party will address issues and improvements identified by the ERT in relation to its national system, before its next annual submission (see para. 67 above), with a focus on:

(a) Strengthening of the current institutional arrangements between the government agencies and other entities responsible for the performance of the national system, as defined in the aforementioned guidelines for national systems.

(b) Ensuring that its national system will perform the general and functions defined in these guidelines for national systems, including ensuring that its inventory submission is transparent, consistent, comparable, complete and accurate, and that QA/QC activities are implemented in accordance with the Party's QA/QC plan.

(c) Ensuring arrangements for technical competence of staff involved in preparing the inventory submission.

196. Bulgaria, in response to the above request of the ERT, submitted to the ERT on 16 November 2009, a work plan that outlined the actions and activities the Party will undertake to address ERT identified issues mentioned in paragraph 195 above, including:

(a) Strengthening of the current institutional arrangements, and initiation of arrangements with entities that so far have not been involved in the inventory preparation process, to provide technical capacity within the national system to plan and prepare an inventory submission with a view to improving the technical competence of staff involved in the preparation of the inventory submission, and to improving the overall quality of the inventory submission (i.e. transparency, consistency, comparability, completeness and accuracy).

(b) Strengthening of the institutional arrangements with regard to formalizing QA/QC roles and responsibilities and implementation of the QA/QC plan.

(c) Launching four projects aimed at improving the overall quality of the inventory submission, and improving the technical competence of staff involved in the preparation of the inventory submission (see para 29 above).

197. The ERT considered the response of the Party and identified that to a large extent the activities outlined in the work plan to address the aforementioned ERT identified issues would not be completed before submission of the 2010 annual submission. This conclusion was reflected by the ERT in the draft version of the annual review report.

198. In response to the draft version of this annual review report, Bulgaria provided the ERT on 16 February 2010 new information regarding its institutional arrangements and an update on the status of the four projects mentioned in paragraphs 29 and 196 above. It also provided a copy of the new signed cooperation agreement between MoEW and NSI, and information that a corresponding cooperation agreement between MoEW and MAF was in its final stages of preparation. It further provided a confirmation that all four projects had commenced. In the period from 25 February 2010 up until the publication of this report Bulgaria continued to provide the ERT with updated information on the steps taken to address potential problems raised by the ERT, including: a copy of the cooperation agreement between MoEW and MAF; further details on the projects and training activities outlined in the work plan (see para. 196 above); and plans to involve an external consultant to review the 2010 annual submission.

199. While the Party has indicated good intentions to resolve issues outlined in paragraph 194 above with regard to the functions of its national system and the quality of its inventory submission, the ERT found that three of the four aforementioned projects will not be completed in time to be incorporated by Bulgaria in the planning and preparation of its next annual submission, due on 15 April 2010. This submission is also the first mandatory submission within the first commitment period of supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on KP-LULUCF. The ERT also found that the new cooperation agreement between the MoEW and NSI and between MoEW and MAF may not result in the required level of improvement in the quality of the inventory submission, as required by decision 15/CMP.1, before its next annual submission due on 15 April 2010.

200. The ERT concluded, based on its initial findings and its findings on additional information provided by the Party on 16 February 2010 up until publication of this annual review report (see para. 199 above), that the problems identified in paragraph 194 above with regard to the functions of its national system and the quality of its inventory submission, namely that Bulgaria's institutional arrangements and arrangements for technical competence of staff within the national system involved in the inventory development process were insufficient to enable the adequate planning, preparation and management of the Party's annual submission in accordance with the "Guidelines for national systems for the estimation of emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol" (decision 19/CMP.1), remains an unresolved problem and lists it as a question of implementation.

Annex I

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for Bulgaria 2009. Available at <http://unfccc.int/resource/docs/2008/asr/bgr.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2009. Available at <http://unfccc.int/resource/webdocs/sai/2009.pdf>.

FCCC/ARR/2008/BGR. Report of the individual review of the greenhouse gas inventories of Bulgaria submitted in 2007 and 2008. Available at <http://unfccc.int/resource/docs/2009/arr/bgr.pdf>.

UNFCCC. Standard independent assessment report, Parts I and II. Unpublished document.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Detelina Petrova (Executive Environment Agency), including additional material on the methodology and assumptions used. The following documents were also provided by Bulgaria:

National Statistical Institute. 2007. *Statistical Report for Produced Industrial Goods and Services according to the NSI Stock Balances*.

Bulgarian Association of the Metallurgical Industry. 2008. *Metallurgy in Bulgaria in 2007*. Sofia.

The MoEW provided the ERT with English translations of 2 new cooperation agreements between MoEW and NSI and between MoEW and MAF.

Annex II

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management system
CaO	calcium oxide
CH_4	methane
CKD	cement kiln dust
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
DOC	degradable organic carbon
EF	emission factor
ERT	expert review team
EU	European Union
EU ETS	European Union emissions trading scheme
F-gas	fluorinated gas
FAO	Food and Agriculture Organization of the United Nations
FOD	first-order decay
Gg	gigagram
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6, without GHG emissions and removals from LULUCF
ha	hectare
HFCs	hydrofluorocarbons
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
kg	kilogram (1 kg = 1 thousand grams)
kha	kilo hectares
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
m^3	cubic metre
MCF	methane conversion factor
N	nitrogen
NA	not applicable
NE	not estimated
NIR	national inventory report
NO	not occurring
N_2O	nitrous oxide
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SO_2	sulphur dioxide
TJ	terajoule (1 TJ = 1012 joules)
UNFCCC	United Nations Framework Convention on Climate Change

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