



United Nations

FCCC/ARR/2016/BGR



Framework Convention on
Climate Change

Distr.: General
21 June 2017

English only

Report on the individual review of the annual submission of Bulgaria submitted in 2016*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual greenhouse gas (GHG) inventory covering emissions and removals of GHG emissions for all years from the base year (or period) to two years before the inventory due date (decision 24/CP.19). Parties included in Annex I to the Convention that are Parties to the Kyoto Protocol are also required to report supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol, with the inventory submission due under the Convention. This report presents the results of the individual inventory review of the 2016 annual submission of Bulgaria, conducted by an expert review team in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol”. The review took place from 10 to 15 October 2016 in Sofia, Bulgaria.

* In the symbol for this document, 2016 refers to the year in which the inventory was submitted, not to the year of publication.

GE.17-10363(E)



* 1 7 1 0 3 6 3 *

Please recycle 



Contents

	<i>Paragraphs</i>	<i>Page</i>
I. Introduction	1–6	3
II. Summary and general assessment of the 2016 annual submission.....	7	4
III. Status of implementation of issues and/or problems raised in the previous review report	8	7
IV. Issues identified in three successive reviews and not addressed by the Party	9	17
V. Additional findings made during the 2016 technical review	10	18
VI. Application of adjustments.....	11	51
VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol	12	51
VIII. Questions of implementation	13	51
 Annexes		
I. Overview of greenhouse gas emissions and removals for Bulgaria for submission year 2016 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol		52
II. Information to be included in the compilation and accounting database		58
III. Additional information to support findings in table 2		60
IV. Documents and information used during the review		61
V. Acronyms and abbreviations		63

I. Introduction¹

1. This report covers the review of the 2016 annual submission of Bulgaria organized by the UNFCCC secretariat, in accordance with the “Guidelines for review under Article 8 of the Kyoto Protocol” (decision 22/CMP.1, as revised by decision 4/CMP.11) (hereinafter referred to as the Article 8 review guidelines). As indicated in the Article 8 review guidelines, this review process also encompasses the review under the Convention, as described in the “Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention” (hereinafter referred to as the UNFCCC review guidelines) and particularly part III, “UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention”. The review took place from 10 to 15 October 2016 in Sofia, Bulgaria, and was coordinated by Mr. Javier Hanna and Mr. Davor Vesligaj (UNFCCC secretariat). Table 1 provides information on the composition of the expert review team (ERT) that conducted the review of Bulgaria.

Table 1

Composition of the expert review team that conducted the review of Bulgaria

<i>Area of expertise</i>	<i>Name</i>	<i>Party</i>
Generalist	Mr. Dario Gomez	Argentina
Energy	Ms. Gherghita Nicodim	Romania
IPPU	Ms. Kristina Kaar	Estonia
Agriculture	Ms. Rocio Danica Condor	Italy
LULUCF	Ms. Thelma Krug	Brazil
Waste	Mr. Sabin Guendehou	Benin
Lead reviewers	Mr. Dario Gomez Ms. Gherghita Nicodim	

Abbreviations: IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry.

2. This report contains findings based on the ERT’s assessment of the 2016 annual submission against the Article 8 review guidelines. The ERT has made recommendations to resolve those findings related to issues,² including issues related to problems.³ Other findings, and, if applicable, the ERT’s encouragements to resolve them, are also included.

3. A draft version of this report was communicated to the Government of Bulgaria, which provided no comments.

¹ At the time of publication of this report, Bulgaria had not yet submitted its instrument of ratification of the Doha Amendment, and the amendment had not yet entered into force. The implementation of the provisions of the Doha Amendment is therefore considered in this report in the context of decision 1/CMP.8, paragraph 6, pending the entry into force of the amendment.

² Issues are defined in decision 13/CP.20, annex, paragraph 81.

³ Problems are defined in decision 22/CMP.1, annex, paragraphs 68 and 69, as revised by decision 4/CMP.11.

4. Annex I shows annual greenhouse gas (GHG) emissions for Bulgaria, including totals excluding and including the land use, land-use change and forestry (LULUCF) sector, indirect carbon dioxide (CO₂) emissions and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from activities under Article 3, paragraph 3, forest management under Article 3, paragraph 4, and additional activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), if elected, by gas, sector and activity for Bulgaria.

5. Information to be included in the compilation and accounting database can be found in annex II.

6. The ERT notes that Bulgaria’s 2015 annual submission was delayed, consistent with decision 6/CMP.9, paragraph 4. As a result, the review of the 2016 annual submission is being held in conjunction with the review of the 2015 annual submission, in accordance with decision 10/CMP.11, paragraph 1. To the extent that identical information is presented in both annual submissions, the ERT has reviewed this information only once and, as appropriate, has replicated the findings below in both the 2015 and the 2016 annual review reports.

II. Summary and general assessment of the 2016 annual submission

7. Table 2 provides the assessment by the ERT of the annual submission with respect to the tasks undertaken during the review. Further information on the issues identified, as well as additional findings, may be found in tables 3 and 5.

Table 2

Summary of review results and general assessment of the inventory of Bulgaria

<i>Assessment</i>	<i>Issue or problem ID#(s) in table 3 and/or 5^a</i>		
Dates of submission	Original submission: 27 May 2016 (NIR), 27 May 2016, version 4 (CRF tables), 15 April 2016 (SEF tables) Revised submissions: 27 May 2016 (NIR), 23 January 2017, version 9 (CRF tables), 27 May 2016 (SEF tables)		
Review format	The values from the latest submission are used in this report In-country		
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and Wetlands Supplement (if applicable)	Have any issues been identified in the following areas:		
	1. Identification of key categories	No	
	2. Selection and use of methodologies and assumptions	Yes	E.3, L.2 and L.14
	3. Development and selection of emission factors	Yes	E.4, I.4, A.4, W.8, E.10, I.14, I.16 and L.15
	4. Collection and selection of activity data	Yes	E.7, E.9, E.12, E.13, E.16, I.13, A.11, A.13, A.24 and W.13

<i>Assessment</i>			<i>Issue or problem ID#(s) in table 3 and/or 5^a</i>
	5. Reporting of recalculations	Yes	I.29
	6. Reporting of a consistent time series	Yes	I.30
	7. Reporting of uncertainties, including methodologies	Yes	G.3
	8. QA/QC	QA/QC procedures were assessed in the context of the national system (see below)	
	9. Missing categories/completeness ^b	Yes	I.18, I.20, A.23 and L.14
	10. Application of corrections to the inventory	No	
Significance threshold	For categories reported as insignificant, has the Party provided sufficient information showing that the likely level of emissions meets the criteria in paragraph 37(b) of the UNFCCC Annex I inventory reporting guidelines?	The Party did not report “NE” for any insignificant categories	
Description of trends	Did the ERT conclude that the description in the NIR of the trends for the different gases and sectors is reasonable?	Yes	
Supplementary information under the Kyoto Protocol	Have any issues been identified in the following areas:		
	1. National system:		
	(a) The overall organization of the national system, including the effectiveness and reliability of the institutional, procedural and legal arrangements	No	
	(b) Performance of the national system functions	No	
	2. National registry:		
	(a) Overall functioning of the national registry	No	
	(b) Performance of the functions of the national registry and the technical standards for data exchange	No	
	3. ERUs, CERs, AAUs and RMUs and on information on discrepancies reported in accordance with decision 15/CMP.1, annex, chapter I.E, taking into consideration any findings or recommendations contained in the SIAR	No	
	4. Matters related to Article 3, paragraph 14, of the Kyoto Protocol, specifically problems related to the transparency, completeness or timeliness of reporting on the Party’s activities related to the priority actions listed in decision 15/CMP.1, annex, paragraph 24, including any changes since the previous annual submission	No	
	5. LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol:		

Assessment	Issue or problem ID#(s) in table 3 and/or 5 ^a	
(a) Reporting in accordance with the requirements of decision 2/CMP.8, annex II, paragraphs 1–5	No	
(b) The Party has demonstrated methodological consistency between the reference level and reporting on forest management in accordance with decision 2/CMP.7, annex, paragraph 14	No	
(c) The Party has reported information in accordance with decision 6/CMP.9	No	
(d) Country-specific information has been reported to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34	No	
(e) Other issues	No	
CPR	Was the CPR reported in accordance with the annex to decision 18/CP.7, the annex to decision 11/CMP.1 and decision 1/CMP.8, paragraph 18?	Yes
Adjustments	Has the ERT applied an adjustment under Article 5, paragraph 2, of the Kyoto Protocol?	No
	The ERT accepts that the revised estimates submitted by Bulgaria in its 2016 annual submission can replace a previously applied adjustment in the compilation and accounting database	NA
Response from the Party during the review	Has the Party provided the ERT with responses to the questions raised, including the data and information necessary for the assessment of conformity with the UNFCCC Annex I inventory reporting guidelines and any further guidance adopted by the Conference of the Parties?	Yes
Recommendation for an exceptional in-country review	On the basis of the issues identified, does the ERT recommend that the next review be conducted as an in-country review?	No
Questions of implementation	Did the ERT list a question of implementation?	No

Abbreviations: AAU = assigned amount unit, CER = certified emission reduction, CPR = commitment period reserve, CRF = common reporting format, ERT = expert review team, ERU = emission reduction unit, LULUCF = land use, land-use change and forestry, NA = not applicable, NE = not estimated, NIR = national inventory report, QA/QC = quality assurance/quality control, RMU = removal unit, SEF = standard electronic format, SIAR = standard independent assessment report, UNFCCC Annex I inventory reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”, Wetlands Supplement = 2013 Supplement to the 2006 Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories: Wetlands.

^a The ERT identified additional issues in the energy, industrial processes and product use, agriculture and waste sectors that are not specifically listed in table 2 but are included in table 3 and/or 5.

^b Missing categories, for which methods are provided in the Intergovernmental Panel on Climate Change (IPCC) 2006 IPCC Guidelines for National Greenhouse Gas Inventories, may affect completeness and are listed in annex III.

III. Status of implementation of issues and/or problems raised in the previous review report

8. Table 3 compiles all the recommendations made in the previous review report. Owing to the unique circumstances of the 2015 annual submission described in paragraph 6 above, the latest available review report was for the review of the 2014 annual submission, published on 14 April 2015. For each issue and/or problem, the ERT specified whether it believes the issue and/or problem has been resolved by the conclusion of the review of the 2016 annual submission and provided the rationale for its determination, taking into consideration the publication date of the previous review report and national circumstances.

Table 3

Status of implementation of issues and/or problems raised in the previous review report of Bulgaria

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report^c</i>	<i>ERT assessment and rationale</i>
General			
G.1	Inventory planning (13, 2014) Transparency	Fully document the use and QA/QC of the data from branch business associations and the EU ETS in the NIR	Resolved. The NIR indicates, in its section on description of the national inventory arrangements (chapter 1.2.2), that AD reported by different branch business associations have been used for validation purposes, and explains in the energy sector chapter (chapter 3) how data reported under the EU ETS have been used to derive country-specific EFs for CO ₂
G.2	Inventory planning (14, 2014) Transparency	Include general QA/QC and sector-specific QA/QC activities in the QA/QC plan by referencing the appropriate documents	Resolved. The NIR provides, in its section on QA/QC and verification (chapter 1.3.1), a thorough description of the QA/QC system, referencing the appropriate regulation and indicating that sector-specific QA/QC activities are included
G.3	Inventory planning (16, 2014) Transparency	Clearly describe in the NIR the methods and assumptions used for the uncertainty analysis	Resolved. The NIR, in its section on general uncertainty evaluation (chapter 1.6), describes the main considerations associated with the uncertainty analysis undertaken by the Party, which is based on approach 1 from the 2006 IPCC Guidelines. The specific values for AD and EF uncertainties are covered in the corresponding sectoral

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report ^c	ERT assessment and rationale
chapters			
Energy			
E.1	Fuel combustion – reference approach (24, 2014) Transparency	Provide a brief explanation of the cause of the difference between the two approaches in the documentation box of CRF table 1.A(c)	Resolved. At the time of the latest annual submission of Bulgaria, the implementation of this recommendation was not relevant. During the review, in response to a question raised by the ERT, the Party explained that the comments in CRF Reporter were not imported and not generated in the CRF tables. Bulgaria explained in the NIR the differences between the reference approach and the sectoral approach. In addition, during the review Bulgaria provided information related to the empty cells in CRF tables 1.A(b) reference approach, 1.A(c) comparison of CO ₂ emissions from fuel combustion and 1.A(d) feedstocks, reductants and other non-energy use of fuels
E.2	1.A.2.a Iron and steel – liquid and solid fuels – CO ₂ , CH ₄ and N ₂ O (27, 2014) Transparency	Include in the NIR the explanation provided to the ERT during the review on the methods used to produce steel to improve the transparency of the emission estimates for iron and steel production	Resolved. Bulgaria provided in the NIR (chapter 4.4.1) a clarification on the closure of the oxygen blast-furnace plant and the current working plants
E.3	1.A.3.b Road transportation – liquid fuels – CO ₂ (28, 2014) Accuracy*	Conduct a tier 2 estimate of CO ₂ emissions from gasoline based on country-specific EFs (CO ₂ emissions resulting from the COPERT model may serve to cross-check the tier 2 estimates)	Not resolved. The NIR (chapter 3.3.12.3.3) states that the Party contacted the only refinery in the country, which stated that the carbon content of gasoline and diesel is not measured. In addition, the State Agency for Meteorological and Technical Surveillance reported that it does not monitor the carbon content of the fuels. During the review, in response to a question raised by the ERT,

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report ^c	ERT assessment and rationale
E.4	1.B.1.a Coal mining and handling – solid fuels – CO ₂ and CH ₄ (30, 2014) Accuracy*	Develop a country-specific EF for fugitive CH ₄ emissions from underground coal mining and handling to enable it to apply a higher-tier method to this category	<p>Bulgaria indicated to the ERT that implementing a tier 1 approach with default IPCC carbon contents of the fuels was considered but it was finally decided to adopt the COPERT model approach, which uses the CO₂ EFs for gasoline and transport diesel provided in the <i>EMEP/EEA air pollutant emission inventory guidebook</i> (see table 5, E.10)</p> <p>Not resolved. Bulgaria indicated in the NIR (chapter 3.3.8.9) that measurements of mine air ventilation and measurements of the in-situ gas content of coal samples are not available because the financial costs related to the laboratory measurements in order to derive country-specific EFs are significant, and Bulgaria considers that this expense cannot be justified</p>
E.5	1.A.3.a Domestic aviation – liquid fuels – CO ₂ , CH ₄ and N ₂ O (31, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Apply the appropriate definitions for the notation keys when reporting emissions in the CRF tables (inappropriate use of “NO” for emissions from gasoline for 1991, 2000, 2006 and 2007)	Resolved. CO ₂ , CH ₄ and N ₂ O emissions from aviation gasoline consumption have been estimated and reported for 1991, 2000, 2006 and 2007. The AD were taken from the national energy balance instead of that based on the Eurostat format, and thus Bulgaria avoided the rounding of the data to the level of 1 000 t fuel consumed
IPPU			
I.1	2. General (IPPU) (34, 2014) (39, 2013) Transparency*	Revise the chapter in the NIR on industrial processes and include additional background information for the missing categories (e.g. CH ₄ emissions from ethylene, dichloroethylene, styrene and methanol production), aggregating information to protect confidential information as necessary	Not resolved. Bulgaria has not included in its NIR fully transparent descriptions of country-specific parameters used (e.g. cement types). Moreover, Bulgaria has omitted chapters for specific categories (e.g. CH ₄)

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report ^c	ERT assessment and rationale
I.2	2. General (IPPU) (35, 2014) (40, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Strengthen the QC activities to ensure that information included in the NIR is consistent with the data reported in the CRF tables and review, and as appropriate revise, the use of notation keys in the industrial processes sector	emissions from methanol, ethylene, ethylene dichloride and vinyl chloride monomer production) Addressing. Bulgaria has made efforts to improve consistency between the CRF tables and the NIR. However, the ERT noted that some inconsistencies still remain (e.g. aerosols data between the CRF tables and the NIR). In addition, the ERT noted an incorrect use of notation keys (e.g. CO ₂ emissions from aluminium production should be reported as “NA” whereas they are reported as “NO”)
I.3	2.A.2 Lime production – CO ₂ (36, 2014) (41, 2013) Transparency	Provide in the NIR the method and source used for estimating the ratio between quicklime and dolomitic lime production	Resolved. Bulgaria informed in the NIR (chapter 4.2.2.3.1) that it applied a default assumption from the 2006 IPCC Guidelines, namely that 85% of lime production is high-calcium lime and 15% is dolomitic lime
I.4	2.A.4 Other process uses of carbonates – CO ₂ (37, 2014) (43, 2013) Accuracy*	Assess whether the accuracy of the adjusted IEFs based on the newly available data from the EU ETS applied for the period 2009–2012 would be more accurate than the EFs applied prior to 2008, and, if appropriate, conduct the necessary recalculations based on the applied EFs for the period 1988–2007	Not resolved. Bulgaria has continued to apply the 2008 EF for the period 1988–2007 (see table 5, I.16)
I.5	2.B.1 Ammonia production – CO ₂ (38, 2014) Transparency*	Report more information to justify the decrease in emissions from ammonia production and include in the NIR the explanation provided to the ERT during the review	Not resolved. No explanation has been provided in the NIR. During the review, Bulgaria informed the ERT that because of the ongoing activities relating to the optimization of the ammonia production process and market downsizing, there was a decrease in ammonia production and consequently reduction of CO ₂ emissions
I.6	2.B.1 Ammonia production –	Clearly explain in the NIR the source of the equation used for the CO ₂ emission estimate and	Not resolved. Bulgaria has provided an explanation in the

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report^c</i>	<i>ERT assessment and rationale</i>
	CO ₂ (39, 2014) (44, 2013) Transparency*	clearly report how emissions of CO ₂ recovered for use in urea production are accounted for in the inventory	NIR (chapter 4.3.1.3) of the source of the equation used for the CO ₂ emission estimate. Explanation for the accounting of CO ₂ emissions from urea production was not provided in the NIR (see I.18 below)
I.7	2.C.1 Iron and steel production – CO ₂ (40, 2014) Transparency	Continue to report more information under this category (including description of open hearth furnaces and on the methodologies used for calculation of the country-specific EF)	Resolved. Information has been included in the NIR (chapters 4.4.1.1 and 4.4.1.3.2)
I.8	2.C.1 Iron and steel production – CO ₂ (41, 2014) (46, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Use the notation key “IE” for pig iron production and coke production	Resolved. The notation key for pig iron production has been changed to “NO, IE” and “IE” in CRF table 2(I).A–H. Coke production is no longer included in CRF table 2(I).A–H
I.9	2.F.2 Foam blowing agents – HFCs (44, 2014) (51, 2013) Transparency	Improve transparency by providing more information about methodologies, parameters and assumptions used for emission estimates under this category	Resolved. More information about methodologies, parameters and assumptions used for emission estimates has been reported in the NIR (chapters 4.7.2.1 and 4.7.2.2)
I.10	2.B.5 Carbide production – CO ₂ (45, 2014) (52, 2013) Accuracy	Investigate the quantity of anthracite used as a reducing agent and deduct these emissions from the energy sector	Resolved. The quantity of anthracite used as a reducing agent in industrial processes has been investigated and the emissions associated with anthracite use have been deducted from those from the energy sector (see chapter 3.3.3 in the NIR)
I.11	2.B.8 Petrochemical and carbon black production – CH ₄ (46, 2014) (53, 2013) Transparency*	Include information in the NIR for this category on AD sources, EFs and associated parameters, methods and assumptions to ensure that all estimates can be independently verified	Not resolved. Bulgaria reported CH ₄ emissions from methanol, ethylene and ethylene dichloride production without explaining the methods and data sources used
I.12	2.C.2 Ferroalloys production – CO ₂ (47, 2014)	Recalculate emissions for this category by applying default EFs based on ferroalloy type and using available AD	Resolved. Bulgaria has applied default EFs based on ferroalloy type and using available AD

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report^c</i>	<i>ERT assessment and rationale</i>
Accuracy			
Agriculture			
A.1	3. General (agriculture) (49, 2014) (56, 2013) Transparency	Include all relevant information regarding recalculations in the NIR (e.g. CH ₄ emissions from manure management for pigs, N ₂ O emissions from agricultural soils)	Resolved. Bulgaria has provided relevant information on recalculations made in the NIR (chapters 5.3.5 and 10.1.1)
A.2	3. General (agriculture) (52, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Improve QA/QC procedures in the agriculture sector to solve the inconsistencies within the NIR and between the NIR and the CRF tables (e.g. NIR 2014 table 176 has not been updated, NIR tables 165–167 and 176 have incorrect cross-references, the uncertainty estimates in section 6.4.3 and table 172 of the NIR are different)	Not resolved. The ERT identified a number of inconsistencies and gaps in the information provided in the NIR and the CRF tables. For example, in CRF table 3.A (additional information) there is no information on parameters used in the tier 2 approach for sheep, while in chapter 5 of the NIR (agriculture – enteric fermentation) there is a shortage of information on the use of the tier 2 approach for sheep, and no parameters for the estimates are reported
A.3	3.A Enteric fermentation – CH ₄ (53, 2014) (60, 2013) Transparency*	Provide in the NIR detailed information on the AD used and the emission calculation method applied for this category, especially for young cattle	Not resolved. The NIR does not provide information on the parameters used for the tier 2 emission estimates for other mature cattle and growing cattle
A.4	3.B Manure management – CH ₄ and N ₂ O (54, 2014) (61, 2013) Accuracy*	Justify the use of a methane conversion factor of 90% and make efforts to develop a country-specific value	Not resolved. Bulgaria did not justify the use of the selected value for the methane conversion factor and did not report on efforts to develop a country-specific value
A.5	3.B Manure management – CH ₄ and N ₂ O (56, 2014) (63, 2013) Accuracy	Investigate the Nex values further and provide additional transparent documentation that the values are appropriate estimates for conditions in Bulgaria	Resolved. Country-specific information is provided in the NIR (chapter 5.5.2.3)
A.6	3.B Manure management – CH ₄ and N ₂ O (57, 2014)	Present in detail in the NIR the relevant and scientifically justified information regarding the country-specific value of volatile solids for swine	Resolved. Relevant information has been provided in the NIR (chapter 5.5.2.1)

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report^c</i>	<i>ERT assessment and rationale</i>
Transparency			
A.7	3.D.b Indirect N ₂ O emissions from managed soils – N ₂ O (60, 2014) (67, 2013) Accuracy	Use country-specific parameters to estimate N ₂ O emissions from ammonia volatilization and report them under the indirect soil emissions category	Resolved. A country-specific value for Frac _{GASF} is provided in the NIR (chapter 5.7.2.1) and emissions are reported under the category indirect soil emissions
A.8	3.F Field burning of agricultural residues – CH ₄ and N ₂ O (62, 2014) Transparency	Provide a justification for the values used in the CRF tables or use the values from the IPCC good practice guidance, and correct the inconsistency identified	Resolved. Justification for the values used for carbon/nitrogen ratio is provided in the NIR (chapter 5.8.2) and the inconsistencies between the CRF tables and the NIR have been corrected
LULUCF			
L.1	4. General (LULUCF) (66, 2014) Transparency*	Include in the NIR the information on private forests	Not resolved. No information regarding private forests has been provided in the NIR
L.2	4.A.1 Forest land remaining forest land – CO ₂ (67, 2014) (74, 2013) Accuracy*	Apply a higher-tier method to estimate emissions and removals in the dead organic matter and soil carbon pools	Not resolved. However, Bulgaria provided information to the ERT during the review week that it plans to provide estimates for the dead organic matter pool using results from the carbon budget model study conducted for Bulgaria by the Joint Research Centre of the European Commission
L.3	4.A.2 Land converted to forest land – CO ₂ (68, 2014) Transparency*	Include in the NIR a detailed description of the method and data used for calculating living biomass for cropland and grassland	Not resolved. The NIR provided the same information as in the NIR of the 2014 annual submission for cropland/grassland converted to forest land
L.4	4.A.2 Land converted to forest land – CO ₂ (69, 2014) Accuracy	Develop a country-specific value for the reference soil carbon stock in other land, and estimate the carbon stock changes in mineral soil for other land converted to forest land using the new value	Resolved. However, the ERT considers that the estimate provided overestimates the actual carbon stock in other land. The ERT noted that Bulgaria reported in the NIR under planned improvements the development of a country-specific value for the reference carbon stock in the

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report ^c	ERT assessment and rationale
soil organic carbon pool			
Waste			
W.1	5. General (waste) (72, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Enhance QC activities in the waste sector and include more adequate information on the recalculations	Resolved. The QC activities implemented by Bulgaria are included in the NIR (chapters 7.1.4, 7.2.5, 7.3.3, 7.4.8 and 7.5.5) and were also presented to the ERT during the review week
W.2	5.A Solid waste disposal on land – CH ₄ (74, 2014) Transparency*	Make further efforts to increase transparency by reporting on the industrial waste amounts and the types considered	Not resolved. During the review, Bulgaria clarified that it takes time to collect AD on the types and amounts of industrial waste sent to landfills separately, and indicated that the issue will be addressed in the next annual submission
W.3	5.A Solid waste disposal on land – CH ₄ (75, 2014) Transparency	Clarify what half-life values are used in the calculation	Resolved. Bulgaria provided in the NIR (chapter 7.2.3.2) information on the half-life values used in the calculations. However, the ERT noted that the half-life values used by Bulgaria were not in line with the 2006 IPCC Guidelines. During the review week, in response to a question raised by the ERT, Bulgaria used the default methane generation rate (k) from the 2006 IPCC Guidelines and provided revised CH ₄ emission estimates (see table 5, W.16)
W.4	5.D Wastewater treatment and discharge – CH ₄ (78, 2014) Consistency	Improve the accuracy of reporting and QA/QC activities to avoid inconsistencies (e.g. for the MCF ₁ and EFs used)	Resolved. The issue of inconsistencies was addressed in the NIR 2016. QA/QC activities implemented and a source-specific improvement plan are described in the NIR (chapters 7.5.5 and 7.5.7) and were further explained during the review week
W.5	5.D Wastewater treatment and discharge – CH ₄	Provide more information on the recalculations performed to improve transparency	Resolved. The recalculations performed by Bulgaria are reported in the NIR (chapter

<i>ID#</i>	<i>Issue and/or problem classification^{a, b}</i>	<i>Recommendation made in previous review report^c</i>	<i>ERT assessment and rationale</i>
	(79, 2014) Transparency		7.5.6) and were further explained during the review week
W.6	5.D Wastewater treatment and discharge – CH ₄ (80, 2014) Adherence to UNFCCC Annex I inventory reporting guidelines	Correct the notation key used for CH ₄ recovery from sludge from “NO” to “IE” and clearly indicate where the respective emissions are included	Resolved. The amount of CH ₄ recovered from wastewater treatment plants is reported in CRF table 5.D.1
W.7	5.D Wastewater treatment and discharge – CH ₄ (81, 2014) (88, 2013) Transparency	Provide in the NIR background information on domestic sludge treatment practices	Resolved. Bulgaria included in the NIR (chapter 7.5.3.3) information on the treatment of sludge resulting from wastewater treatment plants. N ₂ O emissions from sludge used in agriculture are reported under the agriculture sector
W.8	5.D Wastewater treatment and discharge – CH ₄ (82, 2014) Accuracy	Reconsider the use of the MCF ₁ value and recalculate emissions if necessary	Not relevant. Bulgaria applied a methodology from the 2006 IPCC Guidelines, which removed the separate estimations of CH ₄ emissions from wastewater and from sludge (chapter 7.5.3.5)
W.9	5.D Wastewater treatment and discharge – CH ₄ (83, 2014) Accuracy	Include in the NIR the values used for COD per industrial wastewater type	Resolved. Bulgaria included information on COD values for major industrial wastewater types in the NIR (table 233, p. 474) and indicated that it will continue to improve the provision of information on COD values in the next annual submission
W.10	5.D Wastewater treatment and discharge – CH ₄ (83, 2014) Transparency	Include more detailed information on the consideration of industrial wastewater under domestic and commercial wastewater (approach, amounts, etc.)	Resolved. Bulgaria reported in the NIR (chapter 7.5.3.4) and confirmed during the review week that industrial wastewater is either treated on site or discharged into centralized sewers. Bulgaria clarified that emissions from industrial wastewater discharged into centralized sewers are included in

ID#	Issue and/or problem classification ^{a, b}	Recommendation made in previous review report ^c	ERT assessment and rationale
			emissions from domestic wastewater
W.11	5.D Wastewater treatment and discharge – N ₂ O (84, 2014) (89, 2013) Adherence to UNFCCC Annex I inventory reporting guidelines	Investigate the possible double counting of N ₂ O emissions from sludge spreading on agricultural soils and from wastewater handling, and include all relevant information in the NIR	Resolved. N ₂ O emissions from sludge used in agriculture are reported under the agriculture sector as referred to in the NIR (chapter 5.7.1) and the emissions associated with sludge handling in waste are reported under the waste sector
KP-LULUCF			
KL.1	Afforestation and reforestation – CO ₂ (89, 2014) (93, 2013) Consistency	Apply notation keys consistently in the CRF tables for the deadwood pool (change the notation key “NR” to “NO” in the KP-LULUCF table NIR-1)	Resolved. Bulgaria has changed the notation key used, as recommended
KL.2	Afforestation and reforestation – CO ₂ (90, 2014) Transparency*	Transparently describe in the NIR how the carbon loss on lands subject to afforestation/reforestation is estimated	Not resolved. The NIR provides the same information as the NIR of the 2014 annual submission for cropland/grassland converted to forest land, which is used also to estimate changes in carbon stock for afforestation/reforestation
KL.3	Deforestation – CO ₂ (93, 2014) Transparency*	Enhance the QC activities on the information reported (correct the value of net CO ₂ emissions for forest land converted to settlements in table 257 of the NIR 2014 in accordance with the value reported in table 5(KP-I)A.2)	Not resolved. The value for net CO ₂ emissions from deforestation reported in NIR table 277 on key categories (–87.10 kt CO ₂) is not consistent with the value reported in CRF table 4(KP-I)A.2 (87.11 kt CO ₂)

Abbreviations: AD = activity data, COD = chemical oxygen demand, CRF = common reporting format, EF = emission factor, ERT = expert review team, EU ETS = European Union Emissions Trading System, IE = included elsewhere, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, IPPU = industrial processes and product use, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, MCF₁ = methane correction factor, NA = not applicable, Nex = nitrogen excretion rate, NIR = national inventory report, NO = not occurring, NR = not reported, QA/QC = quality assurance/quality control, UNFCCC Annex I inventory reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”, 2006 IPCC Guidelines = 2006 *IPCC Guidelines for National Greenhouse Gas Inventories*.

^a References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) where the issue was raised. Issues are further classified as defined in decision 13/CP.20, annex, paragraph 81. In the review of the supplementary information

reported in accordance with Article 7, paragraph 1, of the Kyoto Protocol, the ERT has applied the classification in decision 22/CMP.1, annex, paragraph 69, in conjunction with decision 4/CMP.11.

^b An asterisk is included next to each issue type for all issues that are also problems, as defined in decision 22/CMP.1, annex, paragraphs 68 and 69, including those that lead to an adjustment or a question of implementation.

^c The review of the 2016 annual submission is being held in conjunction with the review of the 2015 annual submission, and, as such, the 2015 annual review report was not available at the time of this review. Therefore, the recommendations reflected in table 3 are from the 2014 annual review report. For the same reason, the year 2015 is excluded from the list of years in which the issue has been identified.

IV. Issues identified in three successive reviews and not addressed by the Party

9. In accordance with paragraph 83 of the UNFCCC review guidelines, the ERT noted that the issues included in table 4 have been identified in three successive reviews, including the review of the 2016 annual submission of Bulgaria, and have not been addressed by the Party.

Table 4

Issues identified in three successive reviews and not addressed by Bulgaria

<i>ID#^a</i>	<i>Previous recommendation for the issue identified</i>	<i>Number of successive reviews issue not addressed^b</i>
General	No such general issues were identified	
Energy	No such issues for the energy sector were identified	
IPPU		
I.1	Revise the chapter in the NIR on industrial processes and include additional background information for the missing categories (e.g. CH ₄ emissions from ethylene, dichloroethylene, styrene and methanol production), aggregating information to protect confidential information as necessary	3 (2013, 2014 and 2015/2016)
I.2	Strengthen the quality control activities to ensure that information included in the NIR is consistent with the data reported in the CRF tables, and review, and as appropriate revise, the use of notation keys in the industrial processes sector	3 (2013, 2014 and 2015/2016)
I.4	Assess whether the accuracy of the adjusted implied emission factors based on the newly available data from the European Union Emissions Trading System applied for the period 2009–2012 would be more accurate than the EFs applied prior to 2008 and, if appropriate, conduct the necessary recalculations based on the applied EFs for the period 1988–2007	3 (2013, 2014 and 2015/2016)
I.6	Clearly explain in the NIR the source of the equation used for the CO ₂ emission estimate and clearly report how emissions of CO ₂ recovered for use in urea production are accounted for	3 (2013, 2014 and 2015/2016)

<i>ID#^a</i>	<i>Previous recommendation for the issue identified</i>	<i>Number of successive reviews issue not addressed^b</i>
	in the inventory	
I.11	Include information in the NIR for this category (2.B.8) on AD sources, EFs and associated parameters, methods and assumptions to ensure that all estimates can be independently verified	3 (2013, 2014 and 2015/2016)
Agriculture		
A.3	Provide in the NIR detailed information on the AD used and the emission calculation method applied for this category, especially for young cattle	3 (2013, 2014 and 2015/2016)
A.4*	Justify the use of the selected value for the methane conversion factor and make efforts to develop a country-specific value	3 (2013, 2014 and 2015/2016)
LULUCF		
L.2	Apply a higher-tier method to estimate emissions and removals in the dead organic matter and soil carbon pools	3 (2013, 2014 and 2015/2016)
Waste		
No such issues for the waste sector were identified		
KP-LULUCF		
No such issues for KP-LULUCF activities were identified		

Abbreviations: AD = activity data, EF = emission factor, IPPU = industrial processes and product use, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report.

^a An asterisk is included after any issue ID# where the underlying issue is related to accuracy or completeness of a key category, a missing category or a potential key category, as indicated in decision 13/CP.20, annex, paragraph 83.

^b The review of the 2016 annual submission is being held in conjunction with the review of the 2015 annual submission. As the reviews of the 2015 and 2016 annual submissions are not successive reviews, but are rather being held in conjunction, for the purpose of counting successive years in table 4, 2015/2016 is considered as one year. The ERT noted that this table 4 is the same as that in the 2015 annual review report for Bulgaria, modified to reflect the combined 2015/2016 review.

V. Additional findings made during the 2016 technical review

10. Table 5 contains findings made by the ERT during the technical review of the 2016 annual submission of Bulgaria that are additional to those identified in table 3 above.

Table 5

Additional findings made during the 2016 technical review of the annual submission of Bulgaria

<i>ID#</i>	<i>Finding classification</i>	<i>Description of the finding with recommendation or encouragement</i>	<i>Is finding an issue^a and/or a problem^b? If yes, classify by type</i>
General			
G.4	QA/QC and verification	<p>The ERT noted that for certain categories (e.g. fugitive emissions from fuels, product uses as substitutes for ozone-depleting substances, rice cultivation, agricultural soils, urea application, biological treatment of solid waste and incineration and open burning of waste) the NIR provides circular references regarding specific QA/QC checks. In the corresponding sections of the sectoral chapters, the reader is referred to the section in chapter 1 of the NIR that addresses general quality management; however category-specific QA/QC checks are not discussed in that section. During the review, Bulgaria provided the ERT with the QA/QC plan, which lists the category-specific QC and QA checks applied, and the report by the QA/QC manager to the Executive Director of the Executive Environment Agency (ExEA) summarizing the results of the implementation of the QA/QC plan</p> <p>The ERT recommends that Bulgaria in its next annual submission clearly indicate in chapter 1 of its NIR that category-specific QA/QC checks are applied for all categories of the inventory and discuss in the corresponding sectoral chapters only the additional QA/QC checks that are done for certain categories. Bulgaria may wish to provide the lists of QC and QA checks (annexes 2 and 3 to the QA/QC plan, respectively) as an annex to the NIR or through a weblink</p>	Yes. Transparency*
G.5	NIR	<p>The NIR does not include a list of the references, such as research papers and reports by branch business associations, that were used as background information to estimate and/or verify GHG emissions by the Party</p> <p>The ERT recommends that Bulgaria include all references and sources of information used in the NIR, in line with decision 24/CP.19, annex I, paragraph 50</p>	Yes. Transparency*
G.6	Further improvements (identified by the Party)	<p>Chapter 10 of the NIR includes brief information on anticipated future recalculations and improvements, whereas sector- and/or category-specific information is provided in the sectoral chapters. However, the NIR lacks an integrated treatment indicating how the Party has prioritized future improvements to the GHG inventory</p> <p>The ERT encourages Bulgaria to include in the relevant chapters of its next annual submission of the NIR a discussion of how the Party has used the results of the key category analysis, the uncertainty analysis and other qualitative and quantitative criteria, if any, to decide on a priority order for improvements and to report the resulting prioritized list</p>	Not an issue

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
G.7	National system	<p>Although the national system continues to perform its required functions as set out in the annex to decision 19/CMP.1, during the review week the ERT had the opportunity to review more closely the interplay of the different institutions that make up the national system. In this regard, the strict division whereby the Ministry of Environment and Water (MoEW) and the Climate Change Policy Directorate (CCPD) have the political responsibility for compliance with the Kyoto Protocol and ExEA has the technical responsibility for the national GHG inventory has served the purpose of establishing the national system and sustaining its performance. However, this strict division may weaken partnership work. The ERT is of the view that greater involvement of MoEW and CCPD in the management of the national GHG inventory would contribute to improving its quality</p> <p>The ERT encourages Bulgaria to strengthen the coordination of MoEW with other ministries, possibly establishing (a) working group(s) aimed at supporting the activities of ExEA in the generation of new information and modelling capacity, with the aim of improving the accuracy of the national inventory</p> <p>The ERT also encourages the Party (via MoEW) to provide more funds aimed at improving the quality of AD, EFs, methods and other relevant technical elements of the national inventory, as referred to in decision 19/CMP.1, paragraph 13</p>	Not an issue
G.8	Kyoto Protocol units	<p>With regard to publicly available information, the Party did not report in its NIR changes in accordance with decision 13/CMP.1, annex, paragraph 45 (an up-to-date set of information for each account number in the registry), paragraph 46 (project information for each project identifier against which the Party has issued ERUs), paragraph 47 (holding and transaction information relevant to the national registry) and paragraph 48 (list of legal entities authorized by the Party to hold Kyoto Protocol units under its responsibility). During the review week, in response to a question raised by the ERT, the Party informed the ERT that: (1) at the time of the submission of the NIR there had been no changes in the reported information; (2) after the submission, in connection with providing up-to-date information to the users, the links reported in the NIR were changed; and (3) it will provide the updated information in the next NIR</p> <p>The ERT recommends that Bulgaria in the NIR of its next annual submission provide the information on changes in accordance with decision 13/CMP.1, annex, paragraph 45 (up-to-date set of information for each account number in the registry), paragraph 46 (project information, for each project identifier against which the Party has issued ERUs), paragraph 47 (holding and transaction information relevant to the national registry) and paragraph 48 (list of legal entities authorized by the Party to hold Kyoto Protocol units under its</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		responsibility)	
	Energy		
E.6	Feedstocks, reductants and other non-energy use of fuels – all fuels – CO ₂	<p>The NIR indicates (p. 87) the use of fractions of carbon stored related to the non-energy use of fuels in the reference approach. The ERT noted that the amounts of fuels that are used for non-energy purposes are available in the energy balance by activity category and type of fuel, separated from the amounts used for energy purposes. During the review, in response to a question raised by the ERT, Bulgaria explained that it applied a value of 1 for the fraction of carbon stored to take this into account. The ERT noted that in such a case it is not necessary to apply a fraction of carbon stored in the calculations for the reference approach. The ERT also noted that the Party’s approach is in accordance with the 2006 IPCC Guidelines and follows the definitions in the energy balance. However, the AD related to the non-energy use of fuels are reported directly as quantities and not as fractions (in CRF table 1.A(d))</p> <p>The ERT recommends that Bulgaria explain in the NIR of the next annual submission that amounts of fuels used for non-energy purposes are available in the energy balance by activity category and type of fuel and that these amounts were used in the calculations for the reference approach, since in this case there is no need to use fractions of carbon stored for the non-energy use of fuels</p>	Yes. Transparency*
E.7	1.A. Fuel combustion – sectoral approach – solid fuels – CO ₂	<p>Bulgaria used the country-specific CO₂ EF for anthracite (98.48 t/TJ – weighted average for the 2007–2010 period) to calculate the CO₂ emissions from other bituminous coal for the period 1988–2003 because the energy balance provides only aggregated information regarding the consumption of anthracite and other bituminous coal under the category “other bituminous coal” in the above-mentioned period. The ERT noted that the net calorific values of these two types of coal are different, that the country-specific CO₂ EF for anthracite is about 2% higher than the CO₂ EF for other bituminous coal and that the Party’s approach led to a potential overestimation of CO₂ emissions for the base year. The ERT included this issue in the list of potential problems and further questions raised by the ERT. In response to the list of potential problems and further questions, Bulgaria provided revised CO₂ emission estimates for anthracite and other bituminous coal for categories 1.A.1 energy industries, 1.A.2 manufacturing industries and construction and 1.A.4 other sectors for the period 1988–2003</p> <p>In order to separate AD for the categories where the consumption of anthracite and other bituminous coal has been reported aggregated as anthracite in the energy balance in the period 1988–2003, Bulgaria applied the average shares of consumption of these two types of coal in</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		<p>the period 2004–2014 for which separate data are available. To preserve the consistency of the data in the energy balance, the originally reported total energy content was maintained. The corresponding country-specific CO₂ EFs were applied separately for anthracite and for other bituminous coal. The ERT considers that the approach used by Bulgaria in its revised estimates is in accordance with the 2006 IPCC Guidelines</p> <p>The ERT recommends that Bulgaria continue to use the approach of separating AD for the categories where the consumption of anthracite and other bituminous coal has been reported aggregated as anthracite and reporting the corresponding CO₂ estimates applying accordingly the country-specific CO₂ EFs to each type of fuel for the period 1988–2003 and to provide the relevant information on the followed approach in the NIR of its next annual submission</p>	
E.8	1.A.1.b Petroleum refining – liquid fuels – CO ₂ , CH ₄ and N ₂ O	<p>The ERT noted that petroleum coke is reported as refinery fuel in the oil national energy balance for the period 2009–2014. According to the International Energy Agency energy statistics manual definitions, petroleum coke is to be reported in energy balances as fuel even if it is burned to restore the catalyst and not for energy purposes. During the review week, in response to a question raised by the ERT, Bulgaria clarified that the refinery fuel (petroleum coke) is exclusively a by-product of the process that is deposited on the catalyst. This carbonaceous deposit is burned to restore the catalyst activity</p> <p>As this combustion is performed only to restore the catalyst's activity and not for energy purposes, the ERT recommends that Bulgaria reallocate emissions from the use of refinery fuels to restore catalyst under category 1.B.2.a.4 fugitive emissions – oil – refining/storage</p>	Yes. Comparability*
E.9	1.A.1.b Petroleum refining – natural gas – CO ₂	<p>The NIR indicates (p. 106) that, starting with the 2015 annual submission, the emissions from hydrogen production have been estimated and reported under subcategory 1.A.1.b petroleum refining. The ERT noted that, according to the 2006 IPCC Guidelines, CO₂ emissions from hydrogen production are typically vented unless they are recovered or stored, so these emissions should be allocated to the corresponding fugitive emissions category, to the extent that feedstock emissions can be separated from the fuel use quantities</p> <p>The ERT recommends that Bulgaria collect relevant AD related to the energy and non-energy use of natural gas and report accordingly CO₂ emissions from hydrogen production under the subcategory 1.B.2.c.ii venting/gas, ensuring that the feedstock for the hydrogen plant is not also reported as fuel</p>	Yes. Comparability*
E.10	1.A.3.b Road transportation – liquid fuels – CO ₂	<p>The CO₂ emissions from gasoline and diesel oil in category 1.A.3.b road transportation are estimated using the corresponding CO₂ EFs from the <i>EMEP/EEA air pollutant emission inventory guidebook</i> (hereinafter referred to as the EMEP/EEA guidebook) and the COPERT</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
E.11	1.A.3.e.ii Other (other transportation) – liquid fuels – CO ₂ , CH ₄ and N ₂ O	<p>model. The ERT noted that for 1988 the CO₂ IEFs for gasoline (72.05 t/TJ) and diesel oil (74.60 t/TJ) are higher than the default IPCC EFs (69.3 t/TJ and 74.1 t/TJ, respectively). In the NIR (chapter 3.3.12.3.4) and during the review week, in response to a question raised by the ERT, Bulgaria explained that the selected EFs better represent national circumstances and, moreover, these CO₂ EFs would not represent a potential underestimation of CO₂ emissions from road transportation for the entire time series</p> <p>However, the ERT noted that Bulgaria did not explain in the NIR how the selected CO₂ EFs from the EMEP/EEA guidebook represent the national circumstances in the period 1988–2003, when leaded gasoline was used. The ERT noted that this choice of EFs led to a potential overestimation of CO₂ emissions from road transportation from the use of gasoline and diesel oil in the base year (1988) and included this issue in the list of potential problems and further questions raised by the ERT. In response to the list of potential problems and further questions, the Party provided revised CO₂ emission estimates for liquid fuel consumption under category 1.A.3.b road transportation. The Party used the default CO₂ EFs provided in the 2006 IPCC Guidelines for gasoline (69.3 t/TJ), diesel oil (74.1 t/TJ) and liquefied petroleum gas (63.1 t/TJ) and the corresponding consumptions of these fuels in the period 1988–2003. Bulgaria considered that, after 2003, the used fuels complied with European fuel quality standards and therefore maintained the originally used CO₂ EFs from the EMEP/EEA guidebook and used the COPERT model for the GHG estimates for 2004 onwards. The ERT considers that the approach used by Bulgaria in its revised estimates is in accordance with the 2006 IPCC Guidelines</p> <p>Taking into account that 1.A.3.b road transportation is a key category for CO₂ emissions, the ERT recommends that Bulgaria, in its next annual submission, provide CO₂ emission estimates in accordance with the 2006 IPCC Guidelines by using country-specific EFs for the used liquid fuels</p> <p>The ERT noted that the NIR does not provide information relating to fuel consumption for off-road activities at airports and harbours. During the review, in response to a question raised by the ERT, Bulgaria clarified that off-road sources of emissions and corresponding fuel quantities have been considered only under activities of construction and agriculture/forestry, and the fuel quantities used at airports and harbours are reported under road transportation</p> <p>The ERT recommends that Bulgaria provide the explanation for the allocation of emissions from off-road transportation activities at airports and harbours in the NIR of its next inventory submission</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
E.12	1.B.1.a.1.i Coal mining and handling – mining activities – CH ₄	<p>The ERT noted that the amount of coal produced as reported in CRF table 1.B.1 is the same as that reported in CRF table 1.A(b) for the reference approach (lignite production) for the whole time series. However, the NIR (p. 200) indicates that the AD used for the calculation of emissions for the category coal mining for underground or surface mining are the raw material of mined coal. During the review, in response to a question raised by the ERT, Bulgaria indicated that, for the earlier years of the time series, coal upgrading activities were performed in Bulgaria; however, further information is not available. Since the upgraded coal is obtained by removal of some of the mineral matter from the raw material, the ERT noted that this could be a source of underestimation of fugitive emissions from mining activities if the selected AD were the amount of saleable coal instead of the amount of raw coal</p> <p>The ERT recommends that Bulgaria, in its next annual submission, clarify which type of coal were used as AD for the estimates across the time series and, if the Party used the amount of saleable coal as AD, estimate the fugitive emissions from mining activities by using the entire quantity of raw coal material, in accordance with the 2006 IPCC Guidelines</p>	Yes. Accuracy*
E.13	1.B.1.a.1.iii Coal mining and handling – abandoned underground mines – solid fuels – CH ₄	<p>The NIR indicates (chapter 3.4.1, p. 194) that coal production at underground mines decreased from about 12% of the total production in the base year to about 2% in 2014 because some of the underground mines were closed. However, emission estimates from abandoned underground mines are reported as “NO” for the whole time series, while no explanatory information is provided in the NIR (for example that the mines are not gassy, were completely flooded or that the emitted CH₄ has been recovered and used for energy purposes). During the review, Bulgaria did not provide information to the ERT on the technology used for closing these mines (e.g. completely flooded), on their characteristics (e.g. not considered as being gassy at the time of closure), or on the recovery of CH₄ for use as fuel, flaring or venting. The ERT therefore noted a potential underestimation of CH₄ emissions for this category and included this issue in the list of potential problems and further questions raised by the ERT</p> <p>In its response to the list of potential problems and further questions, Bulgaria explained that, not having obtained country-specific AD, the Party assumed that its mining activities were similar to those in Hungary and used the data on emissions for abandoned underground mines from this country as proxy data for its estimates. Bulgaria’s rationale in applying this alternative method was that both countries have similar levels of emissions from underground mining operations as well as similar levels of total coal production and consumption. The ERT considered that the approach used by Bulgaria was an acceptable solution within the time frame allotted to respond to the list of potential problems and further questions raised by the ERT</p> <p>The ERT recommends that Bulgaria, for its next annual submission, collect the relevant AD</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		and estimate relevant GHG emissions depending on recovery practices from abandoned underground mines in accordance with the 2006 IPCC Guidelines. If the closed mines were not emitting CH ₄ , the ERT recommends that Bulgaria provide adequate evidence in the NIR	
E.14	1.B.2.a Oil – liquid fuels – CO ₂ and CH ₄	<p>The NIR (table 108, p. 197) reports AD for exploration and production of oil as confidential. However, CRF table 1.B.2 reports AD for these activities, including for oil transport as well as for oil venting and flaring. During the review, in response to a question raised by the ERT, Bulgaria explained to the ERT that the reason for this inconsistency and why the NIR reports the data for exploration and production of oil as confidential is due to the formal requirements of the National Statistical Institute</p> <p>The ERT recommends that, in its next annual submission, Bulgaria ensure consistency between the AD on exploration and production of oil reported in the NIR and the CRF tables</p>	Yes. Transparency*
E.15	1.B.2.b.4 Natural gas – gaseous fuels – CO ₂ and CH ₄	<p>In CRF table 1.B.2 the exploration of natural gas (well drilling, drill stem testing and well completions) is reported as “IE”. The ERT noted that Bulgaria did not explain in the NIR where the GHG emissions from exploration were included. During the review week, in response to a question raised by the ERT, the Party explained that GHG emission estimates for exploration of natural gas are included in the estimates for oil exploration because the exploring activities refer to both oil and natural gas</p> <p>The ERT recommends that Bulgaria include the explanation for the allocation of the CO₂ and CH₄ emissions from exploration of natural gas in the NIR of its next annual submission</p>	Yes. Transparency*
E.16	1.B.2.b.4 Natural gas – gaseous fuels – CO ₂ and CH ₄	<p>The ERT noted that the AD presented in the NIR (table 108, p. 197) for transmission of natural gas are the same as the AD reported in CRF table 1.B.2 for category 1.B.2.b.4 transmission and storage of natural gas. During the review, the ERT asked the Party whether or not natural gas is stored in the country and whether the fugitive emissions from storage of natural gas were estimated. Bulgaria explained that there are available some data related to the storage of natural gas for some years of the time series (2012–2014) and the involved institutions could provide such information. Based on this information, the ERT concluded that the lack of estimates of emissions from natural gas storage could lead to an underestimation of CH₄ and CO₂ emissions under the category transmission and storage and included this issue in the list of potential problems and further questions raised by the ERT</p> <p>In response to the list of potential problems and further questions, Bulgaria collected the available AD on the quantities of extracted natural gas for the period 2008–2014. Emissions for the period 1988–2007 were estimated using the AD for 2008 as an approximated value for that period. Bulgaria applied the lowest values of EFs in the range provided in table 4.2.5 of the 2006 IPCC Guidelines (volume 2, chapter 4), namely the CH₄ EF equal to 2.5×10^{-5} Gg/10⁶ m³</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		<p>marketable gas and the CO₂ EF equal to 1.1×10^{-7} Gg/10⁶ m³ marketable gas), but without providing the rationale for this choice. The ERT noted that, in the 2006 IPCC Guidelines, the range of values for fugitive emissions is attributed primarily to differences in the amount of process infrastructure per unit of gas throughput; therefore, the ERT considers that the selected values of the EFs for CH₄ and CO₂ are in accordance with the 2006 IPCC Guidelines</p> <p>The ERT recommends that, for its next annual submission, Bulgaria collect appropriate AD and estimate CH₄ and CO₂ emissions in accordance with the 2006 IPCC Guidelines for the period 1988–2007 and provide the rationale for the EFs selected</p>	
IPPU			
I.13	2.A.1 Cement production – CO ₂	<p>Bulgaria reported in its NIR (chapter 4.2.1.7) that a source-specific planned improvement is to contact the relevant cement plants about the calcium oxide (CaO) and magnesium oxide (MgO) content in the clinker in the period 2010–2015, because an average percentage CaO and MgO content in the period 2000–2009 was used for the emission calculations for the period 2010–2014. However, the NIR also stated that CO₂ emissions for 2014 were taken from the EU ETS operators' annual emission reports. During the review, in response to a question raised by the ERT, Bulgaria explained that an average percentage content for the period 2000–2009 was used for the emission calculations for the period 2010–2014</p> <p>The ERT recommends that, for its next annual submission, Bulgaria collect data on CaO and MgO content in clinker from each cement plant for the period from 2010 to the latest reporting year and report CO₂ emissions from cement production taking into account the year-specific parameters. The ERT also recommends that Bulgaria provide in the NIR of its next annual submission information that is consistent with the data used for the emission estimates</p>	Yes. Accuracy*
I.14	2.A.1 Cement production – CO ₂	<p>Bulgaria reported in its NIR (chapter 4.2.1.3.1) that a value of 1.00 is used as the cement kiln dust (CKD) correction factor, based on the modern status of the cement plants and their total (100%) recycling of CKD. During the review, the ERT asked Bulgaria to provide justification for using 1.00 as the emission correction factor for CKD and assuming that there is no calcined CKD lost to the system during the entire time series, especially at the beginning of the time series. In response, Bulgaria explained that discussions had been held with four plants (three of them working and one closed) and all four plants confirmed that the technology has not changed since the plants were built and the captured dust is returned in the process of kilning (in the furnace). Bulgaria further explained that for another two plants it is not possible to be certain that the captured dust is returned to the furnace for the whole reported period. The ERT noted that, in the absence of AD, the default CKD correction factor</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		of 1.02 should be used, according to the 2006 IPCC Guidelines	
		The ERT recommends that, for its next annual submission, Bulgaria further investigate the technology used in the closed and existing plants regarding CKD, apply an appropriate CKD correction factor for each plant (keeping in mind time-series consistency) and provide a justification for the used values in the NIR	
I.15	2.A.3 Glass production – CO ₂	<p>Bulgaria reported in its NIR that for the period 2007–2008 the plant-specific CO₂ EFs for five plants were calculated on the basis of data from annual reports pursuant to the European Union directive on integrated pollution prevention and control and the EU ETS. These EFs were used to calculate an average of the CO₂ EFs for the period 2007–2008, which was further used to calculate CO₂ emissions for the period 1988–2006. The ERT noted that there is no rationale provided in the NIR for choosing the average CO₂ EF for 2007–2008 to establish CO₂ emission estimates for the period 1988–2006. During the review, in response to a question raised by the ERT, Bulgaria explained that it considered the 2007–2008 average to be representative for the period 1988–2006 owing to the fact that the data from the EU ETS were used for the first time in the 2010 annual submission and that there are no new CO₂ EFs determined for these five plants based on the new data from the EU ETS as there are only small variations</p> <p>The ERT recommends that Bulgaria improve the transparency of the reporting by including in the NIR of its next annual submission the rationale for using the average CO₂ EF for 2007–2008 years for establishing of the CO₂ EF for the period 1988–2006</p>	Yes. Transparency*
I.16	2.A.4 Other process uses of carbonates – CO ₂	<p>Bulgaria used data from the EU ETS annual emission reports on production and emission levels for 2008 to obtain a country-specific EF of 0.105 t CO₂/t ceramics produced. This EF was further used for the period 1988–2008. The EFs for the period 2009–2014 were determined in the same way (i.e. based on the EF of 0.057 t CO₂/t ceramics produced in 2014)</p> <p>During the review, in response to a question raised by the ERT, Bulgaria informed the ERT about its plans to recalculate the emissions using an EF of 0.09642 t CO₂/t ceramics produced (as published in Commission regulation 601/2012 of 21 June 2012) for the whole time series in the next inventory. Bulgaria explained that in the EU ETS annual emission reports the companies used two methods for the calculation of CO₂ emissions. The first approach is related to clay consumed in the production process and the second one is related to the manufactured products. For the years 2008–2014 some of the companies under the EU ETS changed their method of estimation from the first approach to the second. The ERT noted that the calculated IEFs used in the inventory are based on the aggregated emissions from the EU ETS reports (for each year) divided by the aggregated AD. After a comprehensive review of</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
I.17	2.B.1 Ammonia production – CO ₂	<p>the AD, Bulgaria found that the AD used to calculate the IEF are not internally consistent (i.e. the AD for the inputs (raw materials) are not consistent with the AD for the outputs (manufactured products) such as bricks and tiles) and the IEFs obtained are applied only to the AD for bricks and tiles provided by the National Statistics Institute of Bulgaria (NSI) and thus the calculated emissions are not accurate. Based on this information, the ERT concluded that this issue could lead to an overestimation of CO₂ emissions for the base year and underestimation of emissions for 2013 and 2014, and included this issue in the list of potential problems and further questions raised by the ERT</p> <p>In response to the list of potential problems and further questions, Bulgaria resubmitted a complete set of CRF tables for 1988–2014 with revised CO₂ estimates for ceramics production. The revised CO₂ estimates for this category were based on the EF of 0.09642 t CO₂/t ceramics produced provided in Commission regulation 601/2012. The ERT agreed that the revised estimates resolved the problem identified in the list of potential problems</p> <p>The ERT recommends that Bulgaria in the NIR of its next annual submission revise the EFs used for estimating CO₂ emissions from ceramics production for the entire time series following the tier 1 method provided in the 2006 IPCC Guidelines. In case Bulgaria wishes to use the EF of 0.09642 t CO₂/t ceramics produced provided in Commission regulation 601/2012, the ERT recommends that it provide a rationale for choosing this EF (e.g. results of comparison made with other European Union member States, and applicability to national circumstances)</p> <p>Bulgaria reported in the NIR (table 121, p. 236) that CO₂ emissions from ammonia production were 2 557.48 kt in 1988 and 2 534.99 kt in 1989. However, Bulgaria reported in the CRF tables that CO₂ emissions from ammonia production were 802.19 kt in 1988 and 872.51 kt in 1989. During the review, in response to a question raised by the ERT, Bulgaria presented to the ERT the related worksheets and explained that there was an error in the CRF tables for 1988 and 1989</p> <p>The ERT recommends that Bulgaria in its next annual submission correct the CO₂ emissions from ammonia production reported in the CRF tables for the years 1988 and 1989 using the information provided in the NIR</p>	Yes. Accuracy*
I.18	2.B.1 Ammonia production – CO ₂	<p>The ERT noted that in CRF tables 2(I)A–H Bulgaria reported CO₂ recovery for urea production for the years 1988–2002. The ERT noted that relatively small quantities of CO₂ were reported under the agriculture sector from urea application (CRF table 3.H), for example 17.12 kt CO₂ for 1988, while CO₂ recovered from urea production in the IPPU sector was 578.35 kt CO₂. During the review, in response to a question raised by the ERT, Bulgaria explained that urea has been used as a component of other production, such as for carbamide</p>	Yes. Completeness*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
I.19	2.B.8 Petrochemical and carbon black production – CO ₂	<p>(urea) formaldehyde resin. Bulgaria further explained that it does not have data on urea exports. The ERT considers that subtracting CO₂ recovered for urea production from the ammonia production emissions without reporting emissions from uses of urea might lead to an underestimation of emissions for the period concerned</p> <p>The ERT recommends that Bulgaria further investigate the use of produced urea in order to ensure that emissions from all sources of urea use are estimated and reported under the respective sectors of the inventory and to provide this information in the NIR of its next annual submission</p> <p>The ERT noted that in CRF tables 2(I)A–H for the period 1988–2014 Bulgaria reported that for methanol production AD were confidential (“C”) or “NO”, and CO₂ emissions were “NA”, with the exception of 2012, for which CO₂ emissions and AD were reported as “NO”. During the review, in response to a question raised by the ERT, Bulgaria explained that CO₂ emissions from methanol production have not been calculated because this production is periodical, in relatively small amounts, and no information is available on the exact technology of production that would allow the use of the relevant EFs. Considering that there are methods available in the 2006 IPCC Guidelines for the calculation of CO₂ emissions from methanol, ethylene, ethylene dichloride and vinyl chloride monomer production, the ERT concluded that reporting CO₂ emissions from methanol production as “NA” could lead to an underestimation of emissions for 2013 and 2014 and included this issue in the list of potential problems and further questions raised by the ERT</p> <p>In response to the list of potential problems and further questions, Bulgaria resubmitted a complete set of CRF tables for 1988–2014 using the notation key “NO” for methanol production AD and CO₂ and CH₄ emissions for the entire time series. Bulgaria provided additional information that there is no domestic production of methanol and that NSI reports some amounts with a wrong allocation in the energy balance (based on imports). The ERT agreed with the revised estimates</p> <p>The ERT recommends that, in its next annual submission, Bulgaria report in the CRF tables the correct notation key (i.e. “NO” for AD for methanol production) and CO₂ and CH₄ emissions for the entire time series and provide the corresponding explanation in the NIR</p>	Yes. Transparency*
I.20	2.B.8 Petrochemical and carbon black production – CO ₂	<p>The ERT noted that in CRF tables 2(I)A–H for ethylene production AD were reported as “C” (for 1988–2009) or “NO” (for 2010–2014) and CO₂ emissions as “NA” (for 1988–2009 and 2012) or “NO” (for 2010–2011 and 2013–2014); and for ethylene dichloride and vinyl chloride monomer production, AD were reported as “C” (for 1988–2005) or “NO” (for 2006–2014) and CO₂ emissions were reported as “NA”. During the review, in response to a question raised by the ERT, Bulgaria explained that, similar to for methane production, CO₂</p>	Yes. Completeness*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		<p>emissions from production of ethylene, ethylene dichloride and vinyl chloride monomer have not been calculated because this production is periodical, in relatively small amounts, and no information is available on the exact technology of production that would allow the use of the relevant EFs</p> <p>The ERT recommends that Bulgaria further investigate and report in its next annual submission whether domestic production of ethylene, ethylene dichloride and vinyl chloride monomer occurred in the period from 1988 to the latest reporting year, collect necessary data and calculate CO₂ emissions according to the 2006 IPCC Guidelines and provide information on the methodology, AD and EFs used; otherwise, the ERT recommends that Bulgaria use appropriate notation keys in line with paragraph 37 of annex I to decision 24/CP.19 in the CRF tables across the time series</p>	
I.21	2.C.1 Iron and steel production – CO ₂ and CH ₄	<p>The ERT noted that Bulgaria reported in CRF tables 2(I)A–H AD as “C” and CO₂ and CH₄ emissions as “IE” for sinter production for the period 1988–2008 and used notation key “NO” for 2009–2014. No information was provided in the NIR or in CRF table 9 on where these emissions are included. During the review, in response to a question raised by the ERT, Bulgaria explained that emissions from sinter production are included under category 2.C.1.a steel (basic oxygen steelmaking)</p> <p>The ERT recommends that, in its next annual submission, Bulgaria include an explanation for the allocation of CO₂ and CH₄ emissions from sinter production for the period 1988–2008 to improve the transparency of the reporting</p>	Yes. Transparency*
I.22	2.C.1 Iron and steel production – CO ₂ and CH ₄	<p>Bulgaria reported in CRF tables 2(I)A–H AD and CO₂ and CH₄ emissions as “IE” for pellet production for the period 1988–2008. No information was provided in the NIR or in CRF table 9 on where these emissions are included. During the review, in response to a question raised by the ERT, Bulgaria explained that there has been no pellet production during the time series and emissions from this category do not occur</p> <p>The ERT recommends that in its next annual submission Bulgaria change the notation key for pellet production AD and CO₂ and CH₄ emissions from “IE” to “NO” for the entire time series and include an explanation in the NIR</p>	Yes. Transparency*
I.23	2.C.3 Aluminium production – CO ₂	<p>Bulgaria reported in CRF tables 2(I)A–H AD as “C” and CO₂ emissions as “NO” for aluminium production for the period 1988–2014. During the review, in response to a question raised by the ERT, Bulgaria explained that there is only secondary aluminium production in Bulgaria and process-related emissions do not occur. The ERT noted that, if an activity under a given source category does occur but does not result in emissions, the correct notation key to be used according to paragraph 37 of annex I to decision 24/CP.19 is “NA”</p>	Yes. Transparency*

<i>ID#</i>	<i>Finding classification</i>	<i>Description of the finding with recommendation or encouragement</i>	<i>Is finding an issue^a and/or a problem^b? If yes, classify by type</i>
		The ERT recommends that, in its next annual submission, Bulgaria change the notation key for aluminium production CO ₂ emissions from “NO” to “NA” and include an explanation of the aluminium production process	
I.24	2.C.5 Lead production – CO ₂	<p>Bulgaria reported in CRF tables 2(I)A–H AD as “C” and CO₂ emissions as “IE” for lead production for the period 1988–2014. No information was provided in the NIR or in CRF table 9 on where these emissions are included. During the review, in response to a question raised by the ERT, Bulgaria clarified that CO₂ emissions from process materials are included in the energy sector under category 1.A.2.b manufacturing industries and construction – non-ferrous metals</p> <p>The ERT recommends that Bulgaria report process emissions from lead production in the IPPU sector and ensure that there is no double counting of emissions with the energy sector. If the consumption cannot be separated into energy and non-energy use of fuels, the ERT recommends that the Party report the associated CO₂ emissions in the IPPU sector only and provide supporting information on process, methodology, AD and EFs used in the NIR of its next annual submission, corresponding to both the energy sector and the IPPU sector</p>	Yes. Comparability*
I.25	2.C.6 Zinc production – CO ₂	<p>Bulgaria reported in CRF tables 2(I)A–H AD as “C” and CO₂ emissions as “IE” for zinc production for the period 1988–2014. No information was provided in the NIR or in CRF table 9 on where these emissions are included. During the review, in response to a question raised by the ERT, Bulgaria clarified that CO₂ emissions from process materials are included in the energy sector under category 1.A.2.b manufacturing industries and construction – non-ferrous metals</p> <p>The ERT recommends that Bulgaria report process emissions from zinc production in the IPPU sector and ensure that there is no double counting of emissions with the energy sector. If the consumption cannot be separated into energy and non-energy use of fuels, the ERT recommends that Bulgaria report the associated CO₂ emissions in the IPPU sector only and provide information on process, methodology, AD and EFs used in the NIR of its next annual submission, corresponding to both the energy sector and the IPPU sector</p>	Yes. Comparability*
I.26	2.D.1 Lubricant use – CO ₂	Bulgaria reported in the NIR (chapter 4.5.1.4) that the AD used for the estimates for category 2.D.1 lubricant use in the IPPU sector are the same as the input data for the COPERT model used for the estimates of emissions for road transportation. The ERT noted that no information was provided in the NIR on lubricants used in industrial applications. During the review, in response to a question raised by the ERT, Bulgaria explained that CO ₂ emissions for this category were calculated only for lubricants used in road transportation, and provided preliminary estimates of CO ₂ emissions from lubricants used in industrial applications for the whole time series. The ERT concluded that not reporting emissions from lubricants used in	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
I.27	2.D.3 Other (non-energy products from fuels and solvent use) – CO ₂	<p>industrial applications could lead to an underestimation of CO₂ emissions for 2013 and 2014 and included this issue in the list of potential problems and further questions raised by the ERT. In response to the list of potential problems and further questions, Bulgaria resubmitted a complete set of CRF tables for 1988–2014 including CO₂ estimates for lubricants used in industrial applications. The calculations to estimate these CO₂ emissions were based on the method and default EFs provided in the 2006 IPCC Guidelines. The ERT agreed with the revised estimates</p> <p>The ERT recommends that, in its next annual submission, Bulgaria continue to report CO₂ emissions from lubricants used in industrial applications for the entire time series</p> <p>Bulgaria reported in the CRF tables and in the NIR that CO₂ emissions from solvent use decreased from 842.50 kt in 1988 to 9.81 kt in 2014. The ERT noted that a major decrease in CO₂ emissions took place between 1993 and 1994, where emissions decreased from 784.91 kt CO₂ to 42.49 kt CO₂. Bulgaria explained in its NIR (chapter 4.5.4.2) that the drop in the period 1993–1995 was mainly due to an economic crisis in the country. The production of many plants in Bulgaria decreased significantly in this period and consequently the activities, including metal degreasing, decreased as well. The ERT further noted that Bulgaria’s per capita emissions from solvent use were much higher in 1990 (96.6 kg CO₂/capita) and much lower in 2014 (1.2 kg CO₂/capita) compared with data reported by other European countries. During the review, the ERT requested further explanation of the decrease in CO₂ emissions for categories where major changes had taken place between 1988 and 2014; namely, manufacture of automobiles, car repairing, construction and buildings, metal degreasing, and polystyrene foam processing. The ERT further requested the Party to provide evidence supporting such significant changes and relevance for using data for the first year available (1992) for the base year. In response, Bulgaria provided the ERT with statistical data for industrial output by branches of the economy showing trends for activities where solvents were used. The ERT noted that there were no major changes in production in the data provided for between 1993 and 1994. The ERT concluded that the large decrease in emissions between 1993 and 1994 cannot be justified solely by the statistical reports provided by Bulgaria. Taking into account this information, the ERT considered that this issue could have led to an overestimation of CO₂ emissions for the base year and an underestimation of emissions for 2013 and 2014, and included this issue in the list of potential problems and further question raised by the ERT</p> <p>In response to the list of potential problems and further questions, Bulgaria resubmitted a complete set of CRF tables for 1988–2014 with revised CO₂ emissions for category 2.D.3 other – solvent use for the entire time series. The revised CO₂ emissions for this category were calculated using an average CO₂ emission rate from a cluster of countries with similar</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		national circumstances (Austria, Croatia, Czechia, Hungary, Italy, Poland, Romania and Slovakia) based on population. The ERT agreed with the revised estimates	
		The ERT recommends that, for its next annual submission, Bulgaria further improve the methodology in order to increase the accuracy of the CO ₂ emission estimates for category 2.D.3 other – solvent use (e.g. by obtaining accurate AD on solvent used or if not possible by correlating AD on solvent use in a specific industrial activity with the level of output (production) of the activity) and include a description of the methodology used in the NIR of its next annual submission	
I.28	2.F.1 Refrigeration and air conditioning – HFCs	<p>Bulgaria reported in its NIR that a product life factor of 10% was used for commercial and industrial refrigeration. The ERT noted that the product life factors reported in the CRF tables are lower than 10% (e.g. 8.89% for HFC-23, 9.94% for HFC-32 and 8.99% for HFC-125 for 2014). The ERT also noted that industrial refrigeration is reported under commercial refrigeration. During the review, in response to a question raised by the ERT, Bulgaria explained that the product life factor is 10% and the difference comes from the fact that emissions from equipment operation are not calculated for the year of the equipment installation. The ERT considers that not applying a product life factor for the first year of the equipment operation is not in line with the 2006 IPCC Guidelines and could lead to an underestimation of HFC emissions for 2013 and 2014. Therefore, the ERT included this issue in the list of potential problems and further questions raised by the ERT</p> <p>In response to the list of potential problems and further questions, Bulgaria resubmitted a complete set of CRF tables for 1988–2014 with a revised product life factor of 10% for commercial refrigeration, including industrial refrigeration. The ERT agreed with the revised estimates</p> <p>The ERT recommends that Bulgaria, in its next annual submission, continue to report HFC emissions for category 2.F.1 refrigeration and air conditioning – commercial refrigeration including industrial refrigeration by applying to every year the same product life factor (i.e. 10% for all equipment (amount in operating systems)) without making a difference for the installation year, in accordance with the 2006 IPCC Guidelines</p>	Yes. Accuracy*
I.29	2.F.1 Refrigeration and air conditioning – HFCs	<p>Bulgaria reported in its NIR that a product life factor of 0.3% was used for domestic refrigeration. The ERT noted that different product life factors were presented for different years in the time series in the CRF tables (e.g. 0.09% for 1992 to 0.37% for 2014). During the review, in response to a question raised by the ERT, Bulgaria explained that the EF used is 0.3% and the difference comes from the fact that emissions from equipment in operation are not calculated for the year of the import of the equipment. The ERT concluded that not</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		<p>applying a product life factor for the first year is not in line with the 2006 IPCC Guidelines</p> <p>The ERT recommends that Bulgaria revise its estimates of HFC emissions for category 2.F.1 refrigeration and air conditioning – domestic refrigeration for the entire time series by applying to every year the same product life factor (i.e. 0.3% for all equipment (amount in operating systems)) without making a difference for the year of import, in accordance with the 2006 IPCC Guidelines</p>	
I.30	2.G.3 N ₂ O from product uses – N ₂ O	<p>The ERT noted that N₂O emissions for category 2.G.3.a medical applications showed a sharp decrease between 2012 (0.06 kt N₂O) and 2013 (0.004 kt N₂O). During the review, in response to a question raised by the ERT, Bulgaria explained that since 2012 no amounts of N₂O for anaesthesia have been reported by the only domestic producer owing to the closure of the production. For 2013 and 2014 the data have been provided only by the Customs Service of Bulgaria. The ERT considers that it is unlikely that N₂O emissions from usage in medical applications would have such a large decrease between two years (approximately 94%) and that this may lead to an underestimation of CO₂ emissions for 2013 and 2014, and included this issue in the list of potential problems and further questions raised by the ERT</p> <p>In response to the list of potential problems and further questions, Bulgaria resubmitted a complete set of CRF tables for 1988–2014 with revised N₂O emissions from medical applications for 2013 and 2014 calculated using a correlation coefficient based on the available AD for the years 2010–2012 and the population of the country. The ERT agreed with the revised estimates</p> <p>The ERT recommends that, for its next annual submission, Bulgaria collect actual AD for 2013, 2014 and the latest reporting year and revise the estimates of N₂O emissions from medical applications as appropriate, and provide relevant information in the NIR on the methodology used</p>	Yes. Consistency*
	Agriculture		
A.9	3. General (agriculture)	<p>The ERT noted that the data from agricultural statistics used for the preparation of the national GHG inventory are not transparently presented in the NIR. During the review, in response to a question raised by the ERT, Bulgaria provided an explanation to the ERT on the sources of information and additional documentation regarding agricultural statistics. The Party clarified that, for livestock population and crop production, values for 1988–1999 were provided by NSI and for 2000–2014 data were provided by the Agriculture Statistics Department of the Ministry of Agriculture and Food (MAF). During the review, MAF provided information on data collection, agricultural surveys, consistency of data and the agricultural census for Bulgaria. MAF also clarified that milk production includes milk</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
A.10	3. General (agriculture)	<p>collected by dairies and milk production on farms</p> <p>The ERT recommends that Bulgaria provide information in the NIR of its next annual submission on how AD such as livestock population, milk production, crop production and synthetic fertilizer consumption, for 1988 to the latest year available, are collected and regulated in Bulgaria's agricultural statistics</p> <p>Bulgaria provided information in the NIR (table 216, p. 371) on the source of the information on synthetic fertilizer use, which is the National Service for Plant Protection. However, during the review, in response to a question raised by the ERT, the Party clarified that the Bulgarian Food Safety Agency (BFSA) is the only source of information on synthetic fertilizer use since 1988 to the present and provided official documentation transmitted by BFSA that was used for the estimates. In addition, the ERT noted that data reported by Bulgaria in the NIR differ from those available in the FAO database</p>	Yes. Transparency*
A.11	3. General (agriculture)	<p>The ERT recommends that Bulgaria report in the next NIR AD for synthetic fertilizer use for the entire time series, indicating clearly the source of this information and clarifying the differences between national and international sources regarding synthetic fertilizer use</p> <p>The ERT noted that the values of uncertainties used for each subcategory of the agriculture sector, both for AD and EFs, were not adequately explained in the NIR, particularly in cases where they deviate from the default values from the 2006 IPCC Guidelines (e.g. AD for manure management and enteric fermentation). In response to a question raised by the ERT, Bulgaria clarified that for AD the main source of the uncertainty values is MAF and that some errors were identified for the EF values. During the review, a comprehensive discussion was held on uncertainty assessment with the representative from MAF, who stated that some values of the AD uncertainties need to be revised</p> <p>The ERT recommends that Bulgaria in its next annual submission justify and document country-specific uncertainty values for AD and revise the uncertainty values for the EFs in accordance with the 2006 IPCC Guidelines</p>	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
A.12	3.A.1 Cattle – CH ₄	<p>Bulgaria implemented a tier 2 method for estimating CH₄ emissions from enteric fermentation for cattle. Feed digestibility (DE%) is a key parameter for estimating the CH₄ EF for enteric fermentation for cattle. Bulgaria used the same DE% value (70%) for mature dairy cattle, other mature cattle and growing cattle for the entire time series. In addition, no documentation for the choice of this parameter is available in the NIR. The ERT noted that the 2006 IPCC Guidelines (volume 4, part 2, table 10.2) provide a range of values for DE% for feedlot animals fed with > 90% concentrate diet (75–85%) and pasture-fed animals (55–</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		<p>75%)</p> <p>During the review, in response to a question raised by the ERT, Bulgaria presented documentation that provides a country-specific DE% value of 71% for mature dairy cattle. The ERT is of the view that the value obtained from this peer-reviewed scientific article would be more appropriate to the animal production conditions of Bulgaria, specifically for mature dairy cattle. However, Bulgaria was not able to justify the use of the 70% value for other mature cattle and growing cattle. By reproducing the Party's estimates for CH₄ emissions from enteric fermentation, using a value of 71% for DE%, the ERT noted that the use of 70% value might lead to: (1) an overestimation of emissions for the base year for mature dairy cattle; and (2) an underestimation of emissions for the latest year for both mature cattle and growing cattle. This issue was included in the list of potential problems and further questions raised by the ERT. In response to the list of potential problems and further questions, Bulgaria submitted revised CH₄ emission estimates using country-specific DE% for mature dairy cattle and default values from the 2006 IPCC Guidelines for other mature cattle and growing cattle. The ERT agreed with the Party's response</p> <p>The ERT recommends that Bulgaria, in its next annual submission, use country-specific DE% for mature dairy cattle and default values from the 2006 IPCC Guidelines for other mature cattle and growing cattle and report the corresponding CH₄ emission estimates. The ERT encourages Bulgaria to keep making efforts to improve the accuracy of the tier estimates of CH₄ emissions from enteric fermentation</p>	
A.13	3.A.1 Cattle – CH ₄	<p>The ERT noted that the NIR provides information on milk production only for 2000–2014 (table 193, p. 347) and that information on the fat content is not reported in the NIR. Both parameters are used to estimate CH₄ emissions using a tier 2 method for cattle. In its answer to preliminary questions raised by the ERT, Bulgaria provided a complete time series for milk production and fat content and the source of this information. The ERT noted that a constant value for milk production and fat was used for 1988–1999. During the review, in response to the potential problem raised in relation to category 3.A.1 cattle (see A.12 above), Bulgaria also revised the data for milk production and fat content for the period 1988–1999</p> <p>The ERT recommends that Bulgaria revise the CH₄ emission estimates for enteric fermentation for mature dairy cattle on the basis of a revised and consistent time series of milk production and fat content from 1988 to the latest reporting year</p>	Yes. Accuracy*
A.14	3.A.2 Sheep – CH ₄	<p>Bulgaria implemented a tier 2 method for estimating CH₄ emissions from enteric fermentation for sheep. No information on the parameters used for these estimations is available in the NIR and CRF tables. In its answer to preliminary questions, Bulgaria provided relevant</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
A.15	3.A.4 Other livestock – CH ₄	<p>information on the tier 2 parameters used for the estimates. The ERT noted that the CH₄ EF value used (7.11 kg CH₄/head/year) is lower than the IPCC default value (8 kg CH₄/head/year)</p> <p>The ERT recommends that Bulgaria in the NIR of its next annual submission provide detailed information on all parameters used for estimating CH₄ emissions from enteric fermentation for sheep and justify the CH₄ EF used, which is lower than the IPCC default value</p> <p>Bulgaria used a tier 1 method for estimating CH₄ emissions from enteric fermentation for buffalo for the whole time series. The ERT noted that the default EF from the 2006 IPCC Guidelines is 55 kg CH₄/head/year corresponding to a live weight of 300 kg. However, Bulgaria reported in the NIR (table 194, p. 348) an average live weight of buffalo equal to 380 kg. Table 10.10 of the 2006 IPCC Guidelines (volume 4, p. 10.28) indicates an approach for scaling the EF using the ratio between the live weight of the animal of interest and the live weight of a reference animal (in this case, 380/300) raised to the power of 0.75. On the basis of this scaling, the ERT noted that Bulgaria is using a relatively low EF for the estimation of CH₄ emissions from enteric fermentation for buffalo, which leads to an underestimation of emissions for the latest inventory years (2013 and 2014). This issue was included in the list of potential problems and further questions raised by the ERT, in which the ERT recommended that Bulgaria scale the EF used for estimating CH₄ emissions from enteric fermentation for buffalo following the recommendations in the 2006 IPCC Guidelines by multiplying the default EF factor of reference by (380/300)^{0.75}. The ERT also recommended that Bulgaria provide revised CH₄ emission estimates for the category enteric fermentation of buffalo for the whole time series. In response to the list of potential problems and further questions, the Party submitted emission estimates revised according to the recommendations made by the ERT. The ERT agreed with the Party's response</p> <p>The ERT recommends that Bulgaria, in its next annual submission, document and justify the recommended approach from the 2006 IPCC Guidelines (i.e. multiplying the default EF factor of reference by (380/300)^{0.75}) and report the corresponding CH₄ emission estimates for enteric fermentation for buffalo</p>	Yes. Transparency*
A.16	3.B Manure management – CH ₄	<p>The ERT noted that the NIR indicates that a tier 2 method was used for estimating CH₄ emissions from manure management for cattle and swine but does not provide comparable information for sheep and poultry. During the review week, in response to a question raised by the ERT, Bulgaria clarified and provided evidence that a tier 2 method was also applied for sheep and poultry. The corresponding IEFs reported in CRF table 3.B(a)s for 1988 are equal to 0.20 kg CH₄/head/year for sheep and 0.03 kg CH₄/head/year for poultry. However, the ERT noted that the default EF from the 2006 IPCC Guidelines for sheep is 0.19 kg</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
A.17	3.B Manure management – CH ₄	<p>CH₄/head/year and for poultry ranges from 0.02 kg to 1.2 kg CH₄/head/year</p> <p>The ERT recommends that Bulgaria provide information on the tier 2 method used for estimating emissions from sheep and poultry in its next annual submission. The ERT also recommends that Bulgaria provide information on all parameters used for estimating CH₄ emissions (manure management) from sheep and poultry in its next NIR and justify why the EF values deviate from the default values in the 2006 IPCC Guidelines</p> <p>The ERT noted that Bulgaria applied a tier 2 method for estimating CH₄ emissions from manure management for swine, and the corresponding IEF reported in CRF table 3.B(a)s1 is 17.90 kg CH₄/head/year for the base year (1988). However, default values from the 2006 IPCC Guidelines range from 3 to 5 kg CH₄/head/year for market and breeding swine, respectively, for 12 °C average temperature. During the review week, in response to a question raised by the ERT, the Party informed the ERT that there is a mistake in the estimation of the EF for swine owing to the use of an MCF value for anaerobic lagoons, a system that is not used in Bulgaria. In addition, Bulgaria applied a tier 1 method for estimating CH₄ emissions from manure management for buffalo. The corresponding IEF reported in CRF table 3.B(a)s1 is 6.0 kg CH₄/head/year for the base year (1988), whereas the default value from the 2006 IPCC Guidelines is 5.0 kg/head/year (12 °C average temperature)</p> <p>Although the approaches are different (tier 2 method for swine and tier 1 method for buffalo), the ERT noted that, in both cases, the use of higher IEFs for the estimation of CH₄ emissions from manure management is leading to a potential overestimation of emissions for the base year (1998). Therefore, this issue was included in the list of potential problems and further questions raised by the ERT. In response to the list of potential problems and further questions, the Party revised the parameters used for estimating CH₄ emissions from manure management for swine, revised the EF used for estimating CH₄ emissions from manure management for buffalo by using table 10.A6 from the 2006 IPCC Guidelines, and provided revised CH₄ emission estimates for both subcategories (manure management of swine and buffalo) for the whole time series. The ERT agreed with the Party's revised estimates, which are in accordance with the 2006 IPCC Guidelines</p> <p>The ERT recommends that Bulgaria in the NIR of its next annual submission document and justify the selection of EFs used to estimate CH₄ emissions from manure management for swine and buffalo</p>	Yes. Transparency*
A.18	3.B.1 Cattle – CH ₄	<p>Bulgaria applied a tier 2 method for estimating CH₄ emissions from manure management for cattle. For 2014, the IEFs reported in CRF table 3.B(a) for mature dairy cattle, other mature cattle and growing cattle are 3.24 kg CH₄/head/year, 1.29 kg CH₄/head/year and 0.84 kg CH₄/head/year, respectively. The ERT noted that the 2006 IPCC Guidelines provide default</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
A.19	3.B Manure management – N ₂ O	<p>EFs in the range of 7 kg CH₄/head/year (other cattle) to 13 kg CH₄/head/year (dairy cows) for an average temperature of 12 °C</p> <p>During the review, in response to a question raised by the ERT, Bulgaria explained and provided evidence that the parameters used to derive the CH₄ EFs are based on country-specific data provided by the Agricultural University of Plovdiv. The ERT and the inventory compiler analysed the selection of all parameters used to estimate the CH₄ EFs and identified that the MCF parameter for the liquid/slurry system was assumed to be zero for Bulgaria. The ERT was of the view that the selection of a zero value for MCF resulted in the low CH₄ EFs used by Bulgaria for the estimation of CH₄ emissions from manure management for cattle, and that this selection leads to a potential underestimation of emissions for the latest inventory years (2013 and 2014). This issue was included in the list of potential problems and further questions raised by the ERT</p> <p>In response to the list of potential problems and further questions, the Party held a new consultation with the researchers at the Agricultural University of Plovdiv and the Party was able to confirm that the parameters used to estimate CH₄ emissions from manure management for cattle represented the country's conditions. Bulgaria further indicated that, according to the Bulgarian legislation for large farms of pasture animals, storage of manure should be carried out on sites with cement floors (consisting of paved open confinement areas where manure is stored for periods of 4–6 months during which no water is added to the manure), and noted that the 2006 IPCC Guidelines' definition corresponds to dry lot management systems and that liquid systems are used only for swine. The ERT considered that the explanation given by Bulgaria was adequate and that issue was resolved</p> <p>The ERT recommends that Bulgaria in the NIR of its next annual submission document the explanation provided by the Agricultural University of Plovdiv to justify its choice of dry lot management system</p> <p>The NIR indicates that only a tier 1 method was used for estimating N₂O emissions from manure management. During the review week, in response to a question raised by the ERT, Bulgaria clarified and provided evidence (Excel spreadsheets) that a tier 2 method was applied for cattle and swine and a country-specific method was applied for poultry</p> <p>The ERT recommends that Bulgaria provide consistent information on the method used in its next NIR and CRF tables for cattle, swine and poultry. The ERT also recommends that Bulgaria provide all parameters used for estimating N₂O emissions from manure management</p>	Yes. Transparency*
A.20	3.C Rice cultivation – CH ₄	The ERT noted that the NIR reports the assumptions used for estimating CH ₄ emissions but does not include the references used to estimate the main parameters. During the review	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		<p>week, in response to a question raised by the ERT, Bulgaria provided documentation for the different assumptions (e.g. cultivation period, agronomic practices), and MAF explained the trends in harvested area for rice from 1988 to 2014</p> <p>The ERT recommends that Bulgaria describe and document in its next NIR the parameters and assumptions (e.g. cultivation period, agronomic practices) used for estimating CH₄ emissions from rice cultivation</p>	
A.21	3.D.a.2.b Sewage sludge applied to soils – N ₂ O	<p>Bulgaria has reported N₂O emissions from sewage sludge applied to soils only since 2007 (in CRF table 3.D). During the review, in response to a question raised by the ERT, Bulgaria provided the ERT with the source of information for sewage sludge and explained that the agronomic practice of using sewage sludge started in 2007 and is in accordance with the Party's legislation</p> <p>The ERT recommends that, in the NIR of its next annual submission, Bulgaria document and clearly report that the activity did not occur before 2007 and provide details of the corresponding legislation</p>	Yes. Transparency*
A.22	3.D.a.5 Mineralization/immobilization associated with loss/gain of soil organic matter – N ₂ O	<p>The ERT noted that N₂O emissions from mineralization/immobilization associated with loss/gain of soil organic matter (in CRF table 3.D.a.5) were reported as "NE". During the review week, in response to a question raised by the ERT, Bulgaria showed the ERT preliminary estimates of N₂O emissions for this category, based on the IPCC tier 1 approach. The ERT noted that this led to potential underestimation of emissions for the latest inventory years (2013 and 2014) and included this issue in the list of potential problems and further questions raised by the ERT, which recommended that Bulgaria estimate and report the N₂O emission estimates using the tier 1 approach from the 2006 IPCC Guidelines. In response to the list of potential problems and further questions, the Party submitted revised N₂O emission estimates for the entire period 1988–2014. The ERT agreed with the Party's revised estimates, which are in accordance with the 2006 IPCC Guidelines</p> <p>The ERT recommends that Bulgaria, in the NIR of its next annual submission, include information on the method used to estimate N₂O emissions from mineralization/immobilization associated with loss/gain of soil organic matter</p>	Yes. Transparency*
A.23	3.D.a.6 Cultivation of organic soils (i.e. histosols) – CH ₄	<p>Bulgaria reported cultivation of organic soils as "NO" in the CRF tables and no information is provided in the NIR regarding this source. During the review week, the ERT highlighted to the Party that data on histosols are available in the FAO database. In response to a question raised by the ERT, Bulgaria informed the ERT that a verification of the area of histosols in the country was performed. Therefore, Bulgaria clarified that nowadays the histosols are in a protected area</p>	Yes. Completeness*

<i>ID#</i>	<i>Finding classification</i>	<i>Description of the finding with recommendation or encouragement</i>	<i>Is finding an issue^a and/or a problem^b? If yes, classify by type</i>
		The ERT recommends that Bulgaria gather information and determine whether cultivation of organic soils occurred in the past in Bulgaria and, if the activity has occurred, recommends that Bulgaria make efforts to estimate and report the corresponding emissions in its next annual submission	
A.24	3.H Urea application – CO ₂	<p>The ERT noted that Bulgaria provided the same value of CO₂ emission estimates for the period 1988–2006. In response to a question raised by the ERT, Bulgaria clarified that the same AD were used for this period because data are available for only since 2007</p> <p>The ERT recommends that Bulgaria, for its next annual submission, identify a proxy variable, which will enable it to obtain an accurate and consistent time series of CO₂ emissions from urea application for 1988–2006</p>	Yes. Accuracy*
LULUCF			
L.5	Land representation – all gases	<p>Bulgaria used the IPCC approach 1 for land representation and estimated changes in carbon stock by using extrapolation and interpolation of data from official sources. Data for cropland and grassland originate from the analysis of orthophotos acquired annually by Bulgaria for the last three years. The ERT noted that, owing to complexities associated with the allocation of land to the cropland or grassland categories, and in order to ensure that the total geographical land is covered, Bulgaria artificially inflated the category other land by including lands that would otherwise be classified as grassland or cropland</p> <p>The ERT recommends that Bulgaria revise the land representation time series and, if appropriate, create grassland/cropland subcategories that could better reflect the actual land cover/use in the country, to ensure adequate and consistent data over time. In addition, the ERT encourages Bulgaria to establish a closer coordination among inventory teams and data providers (e.g. through the creation of a working group) to ensure consistent application of the land category definitions adopted in the country, thus improving the accuracy of the land representation</p>	Yes. Accuracy*
L.6	4. General (LULUCF) – all gases	The ERT noted several inconsistencies between the data provided in the NIR and in the CRF tables and recommends that Bulgaria strengthen its QC activities to ensure that, in the next annual submission, information included in the NIR is consistent with the data reported in the CRF tables	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
L.7	4. General (LULUCF) – all gases	The ERT noted the Bulgaria continued to apply incorrect notation keys in some cases (e.g. in the case of the use of a tier 1 method where it is assumed no changes in carbon stock, the notation key to be used is “NE” and not “NO”)	Yes. Adherence to UNFCCC Annex I inventory reporting

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		The ERT recommends that Bulgaria review and, as appropriate, revise the use of notation keys under the LULUCF sector for categories estimated using a tier 1 method in line with paragraph 37 of annex I to decision 24/CP.19	guidelines
L.8	4.A.1 Forest land remaining forest land – CO ₂	<p>Bulgaria applied the stock change method to estimate changes in carbon stock in biomass. However, the ERT noted that the 2006 IPCC Guidelines indicate that this method will provide more reliable estimates for relatively large increases or decreases in biomass or where very accurate forest inventories are carried out, which is not the case for Bulgaria. In response to a question raised by the ERT during the review, Bulgaria explained that it is still implementing its national forest inventory and that changes caused by disturbances (e.g. wildfires) had not been assessed at the time of the preparation of the inventory</p> <p>The ERT noted that, according to section 2.4.5 of the Kyoto Protocol Supplement, it is good practice to verify the estimates made with results calculated using another tier methodology (approach 2 in box 2.4.3 of the Kyoto Protocol Supplement) and recommends that Bulgaria provide estimates of changes in carbon stock in biomass by applying the gain–loss method in future annual submissions for verification purposes</p>	Yes. Accuracy*
L.9	4.A.2 Land converted to forest land – CO ₂	<p>The ERT noted that the value reported for carbon stock in litter in forest land (5.38 t carbon (C)/ha) is low compared with the default value provided in the 2006 IPCC Guidelines (chapter 2, table 2.2). The ERT also noted that the value presented could lead to an underestimation of CO₂ removals for land converted to forest land, which is a key category</p> <p>Therefore, the ERT recommends that the Party for its next annual submission develop country-specific values for both deadwood and litter</p>	Yes. Accuracy*
L.10	4.B Cropland – CO ₂	<p>The ERT noted that, in the valuation of the changes in carbon stock in cropland, Bulgaria did not include in the NIR any information on the dead organic matter pool (deadwood and litter) and reported it in CRF table 4.B using the notation key “NO”</p> <p>The ERT recommends that Bulgaria include in the NIR of its next annual submission information on how changes in carbon stock in this pool are estimated and, in the case of the use of a tier 1 method, that it report “NE” in the corresponding CRF tables</p>	Yes. Transparency*
L.11	4.B.1 Cropland remaining cropland – CO ₂	The ERT noted that, for cropland remaining cropland, Bulgaria used the default above-ground biomass value from the 2006 IPCC Guidelines. However, when estimating the loss of carbon from conversion of perennial cropland to annual cropland, Bulgaria applied a root-to-shoot ratio to annual crops, thus including below-ground biomass. The ERT considers that this may imply an inconsistency if Bulgaria does not explain that it is applying the default assumption from the 2006 IPCC Guidelines that there is no change in below-ground biomass	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		<p>of perennial trees in agricultural systems</p> <p>The ERT recommends that Bulgaria include in the NIR of its next annual submission explanation of the default assumptions from the 2006 IPCC Guidelines that were used for below-ground biomass of perennial trees in agricultural systems</p>	
L.12	4.B.1 Cropland remaining cropland – CO ₂	<p>As noted for L.11 above, the ERT noted that Bulgaria applied default methods for estimating net carbon stock changes for the cropland remaining cropland pools. The ERT noted that this is a key category and corresponds to the largest land use in the country</p> <p>The ERT recommends that the Party develop country-specific estimates for all pools, in particular those that are significant. In doing so, the ERT encourages Bulgaria to identify the main types of cropland with woody perennial cover with varying biomass stocks and increments, such as fruit orchards, agricultural plantations and agroforestry farms, which will enable Bulgaria to report more accurately and transparently</p>	Yes. Accuracy*
L.13	4.C.1 Grassland remaining grassland – CO ₂	<p>For grassland remaining grassland, Bulgaria used a tier 1 method for estimating changes in carbon stock in biomass and soil, which it has assumed to be at steady state and hence equal to zero. However, the ERT noted that Bulgaria does not mention in the NIR how the dead organic matter pool is treated</p> <p>The ERT recommends that Bulgaria include in the NIR of its next annual submission information on changes in carbon stock in the dead organic matter pool</p>	Yes. Transparency*
L.14	4.C.2 Land converted to grassland – CO ₂	<p>For land converted to grassland, Bulgaria in its NIR (chapter 6.5.3.2.2) indicated that the conversion is mainly from cropland and provided estimates for changes in carbon stock for the biomass and soil carbon pools. The ERT noted that, to be consistent with the 2006 IPCC Guidelines, the dead organic matter pool (deadwood and litter) also needs to be considered</p> <p>The ERT recommends that Bulgaria include consideration of the dead organic matter pool in the NIR of its next annual submission to ensure the completeness of the reporting, and encourages the Party to use local data from agricultural research institutes to provide best estimates of deadwood and litter in perennial cropland systems prior to conversion to grassland, consistent with the IPCC 2006 Guidelines (volume 4, part 1, section 6.3.2.1, p. 6.31)</p>	Yes. Completeness*
L.15	4(V) Biomass burning – CH ₄ and N ₂ O	<p>In response to an observation made by the ERT during the review regarding inconsistencies between the areas affected by forest fires reported in the NIR (table 232, p. 394) and in CRF table 4(V), Bulgaria provided the ERT with revised data and estimates for CH₄ and N₂O emissions</p> <p>The ERT commends the Party for the identification of the issue that led to the inconsistencies</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		and recommends that Bulgaria provide the recalculated figures in the next annual submission	
L.16	4.F Other land – CO ₂	<p>As requested by the previous ERT, Bulgaria estimated the reference soil organic carbon stock for mineral soils for the category other land. The Party used the default values from the 2006 IPCC Guidelines (volume 4, part 1, section 2.3.3.1, table 2.3, p. 2.31) for high-activity clay soil, adjusting the result to 0–40 cm depth and considering that 80% of the territory in Bulgaria is covered by this type of soil. The ERT considers that the carbon stock for other land calculated using the IPCC default value (69 t C/ha) results in an overestimation of the actual carbon stock in an area composed of rocks, bare land and areas that do not fall under any of the other broad land-use categories. The ERT noted that Bulgaria plans to develop a country-specific value for the category other land, to be used in the next annual submission</p> <p>The ERT commends the Party for the initiative and encourages Bulgaria to apply a country-specific value for the category other land in its next annual submission</p>	Not an issue
Waste			
W.12	5.A Solid waste disposal on land – CH ₄	<p>According to the 2006 IPCC Guidelines, the application of the first-order decay model requires the availability of historical data on waste amounts and composition. The ERT noted that Bulgaria has collected AD on generated waste for 1999 onwards (chapter 7.2.3.2 in the NIR), however it was not clear whether sludge resulting from wastewater treatment plants is included in the AD or not. In response to a question raised by the ERT during the review, Bulgaria clarified that the amount of sludge resulting from wastewater treatment plants and sent to landfills was also included in the data on waste disposed at landfills. During the review week, Bulgaria provided the ERT with separate data on the amount of sludge sent to landfills for the time series 2004–2014</p> <p>The ERT recommends that Bulgaria provide separate data on the amount of sludge disposed to landfills in the NIR of its next annual submission</p>	Yes. Transparency*
W.13	5.A.2 Unmanaged waste disposal sites – CH ₄	<p>For the period 1950–2001, Bulgaria used the default waste composition applicable to Eastern European countries from the 2006 IPCC Guidelines, but applied the default DOC value (15%) from the <i>Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories</i> (chapter 7.2.3.2 in the NIR). In response to a question raised by the ERT during the review, Bulgaria provided a revised estimate of DOC using the default waste composition in accordance with the 2006 IPCC Guidelines. The revised DOC value (18%) was 20.0% higher than the default originally used by Bulgaria</p> <p>The ERT recommends that, in the next annual submission, Bulgaria report appropriate DOC values for the time series 1950–2001 in accordance with the default waste composition from</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		the 2006 IPCC Guidelines	
W.14	5.A Solid waste disposal on land – CH ₄	<p>For the period 2000–2014, Bulgaria used country-specific data on waste composition and applied a default DOC value for paper/paperboard (i.e. 40% for both paper/paperboard and textile component of waste, whereas textiles has a lower DOC value of 24%). In addition, the ERT noted that rubber and leather (for the period 2000–2014) and sludge (for the period 2004–2014) were not included in the calculation, leading to a lower final DOC value and a potential underestimation of CH₄ emissions for the period 2000–2014. Therefore the ERT included this issue in the list of potential problems and further questions raised by the ERT, in which the ERT recommended that the Party: separate and include in calculations all components of waste which are disposed on landfills in Bulgaria; use country-specific DOC values for each waste component, or if these values are not available use default values from the 2006 IPCC Guidelines; and provide revised estimates of CH₄ emissions for the period 2000–2014. In response, the Party submitted revised CH₄ emission estimates for the entire time series using default DOC values from the 2006 IPCC Guidelines for each waste component. The ERT agreed with the Party’s response</p> <p>The ERT recommends that, in the next annual submission, Bulgaria document the revised waste composition and DOC values used for the revised CH₄ emission estimates</p>	Yes. Transparency*
W.15	5.A Solid waste disposal on land – CH ₄	<p>Bulgaria applied the oxidation factor of 0.1 to both managed and unmanaged deep landfills. The ERT noted that applying the oxidation factor of 0.1 to unmanaged landfills is not in accordance with the 2006 IPCC Guidelines and results in an underestimation of CH₄ emissions from unmanaged landfills. Therefore the ERT included this issue in the list of potential problems and further questions raised by the ERT, in which the ERT recommended that the Party use an oxidation factor for unmanaged landfills of 0 and submit revised CH₄ emission estimates for 2013 and 2014. In response to the list of potential problems and further questions, the Party submitted revised CH₄ emission estimates for the entire time series to ensure its consistency. The ERT agreed with the Party’s response</p> <p>The ERT recommends that, in the next annual submission, Bulgaria document the application of the oxidation factor of 0 for unmanaged solid waste disposal sites when reporting the corresponding CH₄ emission estimates</p>	Yes. Transparency*
W.16	5.A Solid waste disposal on land – CH ₄	<p>To estimate CH₄ emissions from solid waste disposal sites, Bulgaria applied a bulk waste methane generation rate (k) value (k = 0.05) calculated as a weighted average of default k values of waste components in Bulgaria. The ERT identified that deriving k values (i.e. half-life values (t_{1/2})) by weighted average is not in line with the 2006 IPCC Guidelines because k is not an additive parameter and each waste component has its own decay rate. The values</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		<p>used by Bulgaria were, on average, 44.4% lower than the default k value (0.09) from the 2006 IPCC Guidelines and resulted in an underestimation of CH₄ emissions from solid waste disposal sites for the latest inventory years (2013 and 2014). Therefore, the ERT included this issue in the list of potential problems and further questions raised by the ERT, in which the ERT recommended that Bulgaria use the default k value for bulk waste from the 2006 IPCC Guidelines or use other k values if it considers that the default k value is not appropriate taking into account its national circumstances, and provide appropriate documentation to justify the use of other k values. In response to the list of potential problems and further questions, Bulgaria recalculated the CH₄ emissions using the default k value from the 2006 IPCC Guidelines and submit revised estimates. The ERT agreed with the Party's response</p> <p>The ERT recommends that Bulgaria in the NIR of the next annual submission document the application of the k value in line with the 2006 IPCC Guidelines when reporting the corresponding CH₄ emission estimates</p>	
W.17	5.D.1 Domestic wastewater – CH ₄	<p>The wastewater treatment systems or pathways reported by Bulgaria include: aerobic treatment plants; septic systems; and discharges into water bodies (sea, river and lakes). Bulgaria estimated and reported emissions from the above systems and pathways in accordance with the 2006 IPCC Guidelines. In response to a question raised by the ERT during the review week, Bulgaria confirmed that latrines are also used in the country, but was not able to confirm that respective CH₄ emissions were accounted for in the total emissions for this category. The ERT concluded that not including CH₄ emissions from latrines could result in an underestimation of emissions for the latest inventory years and included this issue in the list of potential problems and further questions raised by the ERT, in which the ERT recommended that the Party submit revised estimates of CH₄ emissions based on data on the size of the population using latrines and country-specific parameters such as BOD and MCF, if available, or, if not, using default values from the 2006 IPCC Guidelines. In response, Bulgaria provided estimates of CH₄ emissions from latrines using national statistical data on the population that has toilets outside the dwellings and associated default parameters from the 2006 IPCC Guidelines. The ERT accepts the Party's response</p> <p>The ERT recommends that Bulgaria in the NIR of its next annual submission document the AD and the method used to estimate CH₄ emissions from latrines</p>	Yes. Transparency*
W.18	5.D Wastewater treatment and discharge – CO ₂ , CH ₄ and N ₂ O	<p>Bulgaria reported in the NIR, and confirmed during the review week, that CH₄ recovered from wastewater treatment plants was used for heat and electricity generation. However, the ERT noted that it is not clear in which sector these emissions were reported (i.e. energy or waste). During the review week, Bulgaria clarified that CH₄ and N₂O emissions were included in emissions under the energy sector (category 1.A fuel combustion, subcategory</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		<p>1.A.4 other sectors for gaseous fuels and biomass), while CO₂ emissions were reported as an information item also under the energy sector</p> <p>The ERT recommends that Bulgaria in the NIR of its next annual submission include transparent information on the allocation of the emissions from CH₄ recovery and carefully classify the CH₄ recovered from wastewater treatment plants to the correct type of fuel</p>	
KP-LULUCF			
KL.4	Afforestation and reforestation – CO ₂	<p>The ERT noted that the previous ERT made a recommendation on the consistent application of notation keys in the CRF tables for the deadwood pool (change the notation key “NR” to “NO” in KP-LULUCF table NIR-1). Bulgaria changed the notation key, as recommended by the previous ERT (see table 3, KL.1), but the ERT noted again problems in the use of the notation keys, such as the use of “NO” in cases where a tier 1 method is used and the changes in carbon stock are assumed to be zero, where “NE” should be applied. Also, in cases where “IE” is used, the Party should include an explanation in the documentation box of the corresponding CRF table</p> <p>The ERT recommends that Bulgaria consistently apply the notation keys in its next annual submission, and in cases where a tier 1 method is used and the changes in carbon stock are assumed to be zero the notation key “NE” should be applied instead of “NO”. The ERT also recommends that Bulgaria include an explanation in the documentation box of the corresponding CRF table in cases where the notation key “IE” is used</p>	Yes. Adherence to UNFCCC Annex I inventory reporting guidelines
KL.5	Afforestation and reforestation – CO ₂	<p>The ERT noted that Bulgaria made a mistake when filling the data in CRF table NIR 2 and that this affected the AD for afforestation/reforestation. The error related to the inclusion, in the row “total area at the end of the previous inventory year” for 1990, of a value different from zero. The result of this error was that the total afforestation/reforestation area for 1990–2014 was reported as 6.99 kha larger than the true value. This error, however, did not have implications for the estimates of net emissions from afforestation/reforestation</p> <p>The ERT recommends that Bulgaria strengthen its QC procedures to avoid errors in the table entries as well as inconsistencies in the reporting of data in the NIR and the CRF tables and provide the correct area under afforestation/reforestation for 1990 in its next annual submission</p>	Yes. Accuracy*
KL.6	Deforestation – CO ₂	<p>The ERT noted that Bulgaria made a mistake when filling the data in CRF table NIR 2 and that this affected the area of forest land converted to other land uses (deforestation). The error related to the inclusion, in the row “total area at the end of the previous inventory year” for 1990, of a value different from zero. The result of this error was that the total deforestation area for 1990–2014 was reported as 0.5 kha larger than the true value. This error, however,</p>	Yes. Accuracy*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		did not have implications for the estimates of net emissions from deforestation	
		The ERT recommends that Bulgaria strengthen its QC procedures to avoid errors in the table entries as well as inconsistencies in the reporting of data in the NIR and the CRF tables and provide the correct area under deforestation for 1990 in its next annual submission	
KL.7	Forest management – CO ₂	<p>The ERT noted that Bulgaria made a mistake when filling the data in CRF table NIR 2 and that this affected the area of forest management reported. The error was triggered by the inclusion of a wrong entry in the row “total area at the end of the previous inventory year” for 1990. This implied that the total forest management area for 1990–2014 was 0.5 kha larger than the true value. This error, however, did not have implications for the estimates of net emissions from forest management</p> <p>The ERT recommends that Bulgaria strengthen its QC procedures to avoid errors in the table entries as well as inconsistencies in the reporting of data in the NIR and the CRF tables and provide the correct area under forest management for 1990 in its next annual submission</p>	Yes. Accuracy*
KL.8	Afforestation and reforestation – CH ₄ and N ₂ O	<p>In response to an observation made by the ERT during the review regarding inconsistencies between the areas affected by forest fires reported in the NIR (table 232, p. 394) and in CRF table 4(V), Bulgaria carried out a revision of the data and provided revised estimates for CH₄ and N₂O emissions for the period 1988–2014. This revision affects the calculation of the background level and margin for natural disturbances occurring in afforestation/reforestation areas as well as in forest management areas</p> <p>In addition, the ERT noted that Bulgaria did not report the correct values for the background level and margin in the NIR and CRF table 4(KP-I)A.1.1, although it has correctly applied the default method from the Kyoto Protocol Supplement</p> <p>The ERT recommends that Bulgaria provide in its next annual submission revised values for the background level and margin for afforestation/reforestation and forest management, as well as provide transparent information in the NIR on how the emissions associated with other natural disturbance events considered (e.g. windstorms, ice, wet snowfall) have been estimated. The ERT also recommends that Bulgaria strengthen its QC procedures to ensure that the estimated figures are accurately reported</p>	Yes. Accuracy*
KL.9	General (KP-LULUCF) – all gases	<p>Bulgaria stated in the NIR (chapters 11.4.4 and 11.5.2) its intention to use the natural disturbance provision to exclude emissions from natural disturbances in afforestation/reforestation areas. The ERT noted that in the NIR Bulgaria presented background level and margin for natural disturbance events occurring in afforestation/reforestation areas (table 273, p. 519) as well as in areas under forest management (table 275, p. 522). The ERT also noted that Bulgaria’s intention to use the</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
		<p>natural disturbance provision to exclude emissions from natural disturbances in forest management is not explicitly stated in the NIR. These figures are provided in CRF tables 4(KP-I)A.1.1 and 4(KP-I)B.1.3, respectively. According to the report to facilitate the calculation of the assigned amount, the Party will exclude emissions from natural disturbances in accounting for both afforestation/reforestation and forest management</p> <p>The ERT recommends that Bulgaria, in the NIR of its next annual submission, strengthen its QC procedures to ensure that information on its intention to use the natural disturbance provision to exclude emissions from natural disturbances apply to both afforestation/reforestation and forest management areas, to ensure the transparency of the reporting</p>	
KL.10	Forest management – CO ₂	<p>Bulgaria provided in the NIR a technical correction of the FMRL to ensure methodological consistency with the recalculated historical data (emissions from carbon stock changes in living biomass in forest management areas) for 1990–2008. The ERT agrees with the technical correction made, but noted that the technical correction also needs to address the treatment of natural disturbances and harvested wood products. The ERT also noted that Bulgaria indicated in the NIR that two technical corrections are expected to be carried out before the end of the second commitment period</p> <p>The ERT commends the Party for indicating in the NIR the need for additional technical corrections and recommends that Bulgaria include in its next annual submission an estimate of when the technical corrections are expected to be in place</p>	Yes. Accuracy*
KL.11	Forest management – CO ₂	<p>The ERT noted that the FMRL value reported in the NIR equals –8.168 Mt CO₂ eq, which is in accordance with the appendix to decision 2/CMP.7, while in the CRF information table on accounting for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol Bulgaria reported an FMRL value equal to –8.169 Mt CO₂ eq</p> <p>The ERT recommends that Bulgaria provide, in the CRF information table on accounting for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol of its next annual submission, correct information on the FMRL in accordance with the FMRL value for Bulgaria from the appendix to decision 2/CMP.7 (i.e. –8.168 Mt CO₂ eq)</p>	Yes. Consistency*
KL.12	Harvested wood products – CO ₂	<p>The ERT noted that Bulgaria provided estimates of emissions from harvested wood products in the NIR and CRF tables 4.Gs1 and 4.Gs2, but did not provide transparent information in the NIR on how the harvest production from forest management and deforestation are estimated</p> <p>The ERT recommends that Bulgaria provide in the next NIR transparent information on the</p>	Yes. Transparency*

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue ^a and/or a problem ^b ? If yes, classify by type
calculation of emissions from harvested wood products			

Abbreviations: AD = activity data, BOD = biochemical oxygen demand, C = confidential, CRF = common reporting format, DOC = degradable organic carbon, EF = emission factor, ERT = expert review team, ERU = emission reduction unit, EU ETS = European Union Emissions Trading System, FAO = Food and Agriculture Organization of the United Nations, FMRL = forest management reference level, GHG = greenhouse gas, IE = included elsewhere, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPPU = industrial processes and product use, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, Kyoto Protocol Supplement = *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*, LULUCF = land use, land-use change and forestry, MCF = methane conversion factor, NA = not applicable, NE = not estimated, NIR = national inventory report, NO = not occurring, NR = not reported, QA/QA = quality assurance/quality control, UNFCCC Annex I inventory reporting guidelines = “Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”, 2006 IPCC Guidelines = *2006 IPCC Guidelines for National Greenhouse Gas Inventories*.

^a Recommendations are related to issues as defined in decision 13/CP.20, annex, paragraph 81, or problems as identified in decision 22/CMP.1, annex, paragraph 69, identified by the ERT during the review. Encouragements are made to the Party to address all findings not related to such issues.

^b An asterisk is included next to each issue type that is also a problem, as defined in decision 22/CMP.1, annex, paragraphs 68 and 69, including those that lead to an adjustment or a question of implementation.

VI. Application of adjustments

11. The ERT has not identified the need to apply any adjustments to the 2016 annual submission of Bulgaria.

VII. Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol

12. Bulgaria has elected commitment period accounting and therefore the issuance and cancellation of units for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol are not applicable for the 2016 review.

VIII. Questions of implementation

13. No questions of implementation were identified by the ERT during the review.

Annex I

Overview of greenhouse gas emissions and removals for Bulgaria for submission year 2016 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

1. Tables 6–9 provide an overview of total greenhouse gas emissions and removals, as submitted by Bulgaria.

Table 6
Total greenhouse gas emissions for Bulgaria, base year^a–2014^b
 (kt CO₂ eq)

	Total GHG emissions excluding indirect CO ₂ emissions		Total GHG emissions including indirect CO ₂ emissions ^c		Land-use change (Article 3.7 bis as contained in the Doha Amendment) ^d	KP-LULUCF activities (Article 3.3 of the Kyoto Protocol) ^e	KP-LULUCF activities (Article 3.4 of the Kyoto Protocol)	
	Total including LULUCF	Total excluding LULUCF	Total including LULUCF	Total excluding LULUCF			CM, GM, RV, WDR ^d	FM
FMRL								–8 168.00
Base year	98 830.64	114 105.32	NA	NA	NA		NA	
1990	88 541.25	103 440.59	NA	NA				
1995	60 874.55	74 224.24	NA	NA				
2000	48 980.05	59 111.22	NA	NA				
2010	50 999.04	60 249.31	NA	NA				
2011	55 974.27	65 567.22	NA	NA				
2012	50 817.42	60 434.07	NA	NA				
2013	45 176.19	55 284.61	NA	NA		–1 031.08	NA	–7 696.03
2014	46 206.72	57 470.45	NA	NA		–1 239.68	NA	–7 769.52

Abbreviations: CM = cropland management, FM = forest management, FMRL = forest management reference level, GHG = greenhouse gas, GM = grazing land management, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable, RV = revegetation, WDR = wetland drainage and rewetting.

^a “Base year” refers to the base year under the Kyoto Protocol, which is 1988 for CO₂, CH₄ and N₂O and 1995 for HFCs, PFCs, SF₆ and NF₃. Bulgaria has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

^b Emissions/removals reported in the sector other (sector 6) are not included in total GHG emissions.

^c The Party has not reported indirect CO₂ emissions in common reporting format table 6.

^d The value reported in this column refers to 1990.

^e Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

Table 7

Greenhouse gas emissions by gas for Bulgaria, excluding land use, land-use change and forestry, 1988–2014^a(kt CO₂ eq)

<i>Year</i>	<i>CO₂^b</i>	<i>CH₄</i>	<i>N₂O</i>	<i>HFCs</i>	<i>PFCs</i>	<i>Unspecified mix of HFCs and PFCs</i>	<i>SF₆</i>	<i>NF₃</i>
1988	86 868.16	17 096.78	10 132.16	NO	NO	NO	3.30	NO
1990	78 187.69	16 430.84	8 818.37	NO	NO	NO	3.69	NO
1995	57 187.02	12 051.21	4 977.78	3.33	NO	NO	4.90	NO
2000	44 877.15	10 189.34	4 005.22	33.02	NO	NO	6.49	NO
2010	47 672.78	7 782.64	4 118.31	663.05	0.06	NO	12.47	NO
2011	53 016.71	8 015.20	3 768.25	752.81	0.06	NO	14.19	NO
2012	48 114.22	7 643.92	3 833.32	823.27	0.05	NO	19.29	NO
2013	42 531.99	7 526.89	4 237.59	968.38	0.04	NO	19.72	NO
2014	45 137.96	7 420.51	3 807.67	1 088.66	0.03	NO	15.62	NO
Per cent change 1988–2014	-48.0	-56.6	-62.4	NA	NA	NA	373.2	NA

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

^a Emissions/removals reported in the sector other (sector 6) are not included in total greenhouse gas emissions.

^b Bulgaria did not report indirect CO₂ emissions in common reporting format table 6.

Table 8
Greenhouse gas emissions by sector for Bulgaria, 1988–2014^{a, b}
 (kt CO₂eq)

<i>Year</i>	<i>Energy</i>	<i>IPPU</i>	<i>Agriculture</i>	<i>LULUCF</i>	<i>Waste</i>	<i>Other</i>
1988	81 276.22	10 976.74	13 350.90	–15 274.68	8 496.54	NO
1990	73 613.31	9 472.80	12 089.20	–14 899.34	8 265.28	NO
1995	51 369.31	9 961.69	5 712.77	–13 349.69	7 180.47	NO
2000	40 958.82	6 743.00	4 983.11	–10 131.17	6 426.29	NO
2010	46 185.16	4 174.19	5 232.82	–9 250.27	4 657.15	NO
2011	51 300.15	4 764.04	4 882.47	–9 592.94	4 620.55	NO
2012	46 438.84	4 521.32	5 001.08	–9 616.64	4 472.83	NO
2013	40 725.19	4 570.75	5 476.32	–10 108.41	4 512.34	NO
2014	43 153.39	4 903.91	5 054.58	–11 263.72	4 358.57	NO
Per cent change 1988–2014	–46.9	–55.3	–62.1	–26.3	–48.7	NA

Abbreviations: IPPU = industrial processes and product use, LULUCF = land use, land-use change and forestry, NA = not applicable, NO = not occurring.

^a Emissions/removals reported in the sector other (sector 6) are not included in total greenhouse gas emissions.

^b Bulgaria did not report indirect CO₂ emissions in common reporting format table 6.

Table 9
Greenhouse gas emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by activity, base year^{a, b}–2014, for Bulgaria
 (kt CO₂ eq)

	<i>Article 3.3 of the Kyoto Protocol</i>			<i>Forest management and elected Article 3.4 activities of the Kyoto Protocol</i>					
	<i>Article 3.7 bis as contained in the Doha Amendment</i>	<i>Land-use change</i>	<i>Afforestation and reforestation</i>	<i>Deforestation</i>	<i>Forest management</i>	<i>Cropland management</i>	<i>Grazing land management</i>	<i>Revegetation</i>	<i>Wetland drainage and rewetting</i>
FMRL					-8 168.00				
Technical correction					-8 207.00				
Base year	NA					NA	NA	NA	NA
2013			-1 186.12	155.03	-7 696.03	NA	NA	NA	NA
2014			-1 326.78	87.11	-7 769.52	NA	NA	NA	NA
Per cent change base year–2014						NA	NA	NA	NA

Abbreviations: FMRL = forest management reference level, NA = not applicable.

^a “Base year” refers to the base year under the Kyoto Protocol, which is 1988 for CO₂, CH₄ and N₂O and 1995 for HFCs, PFCs, SF₆ and NF₃. Bulgaria has not elected any activities under Article 3, paragraph 4, of the Kyoto Protocol. For activities under Article 3, paragraph 3, of the Kyoto Protocol, and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

^b Values in this table include emissions from lands subject to natural disturbances, if applicable.

^c The value reported in this column refers to 1990.

2. Table 10 provides an overview of relevant key data for Bulgaria's reporting under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 10

Key relevant data for Bulgaria under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

<i>Key parameters</i>	<i>Values</i>
Periodicity of accounting	(a) Afforestation/reforestation: commitment period accounting (b) Deforestation: commitment period accounting (c) Forest management: commitment period accounting (d) Cropland management: not elected (e) Grazing land management: not elected (f) Revegetation: not elected (g) Wetland drainage and rewetting: not elected
Election of activities under Article 3, paragraph 4	None
Election of application of provisions for natural disturbances	Yes, for afforestation and reforestation and forest management
3.5% of total base-year GHG emissions, excluding LULUCF	3 993.686 kt CO ₂ eq (31 949.490 kt CO ₂ eq for the duration of the commitment period)
Cancellation of AAUs, ERUs, CERs and/or issuance of RMUs in the national registry for:	
1. Afforestation and reforestation in 2014	NA
2. Deforestation in 2014	NA
3. Forest management in 2014	NA
4. Cropland management in 2014	NA
5. Grazing land management in 2014	NA
6. Revegetation in 2014	NA
7. Wetland drainage and rewetting in 2014	NA

Abbreviations: AAU = assigned amount unit, CER = certified emission reduction, ERU = emission reduction unit, GHG = greenhouse gas, LULUCF = land use, land-use change and forestry, NA = not applicable, RMU = removal unit.

Annex II

Information to be included in the compilation and accounting database

Tables 11 and 12 include the information to be included in the compilation and accounting database for Bulgaria. Data shown are from the original annual submission of the Party, including the latest revised estimates submitted, adjustments (if applicable), as well as the final data to be included in the compilation and accounting database.

Table 11

Information to be included in the compilation and accounting database for 2014, including the commitment period reserve, for Bulgaria

(t CO₂ eq)

	<i>Original submission</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Commitment period reserve	200 651 385			200 651 385
Annex A emissions for 2014				
CO ₂	45 082 925	45 137 960		45 137 960
CH ₄	7 326 138	7 420 510		7 420 510
N ₂ O	3 755 108	3 807 666		3 807 666
HFCs	1 017 391	1 088 661		1 088 661
PFCs	41	33		33
Unspecified mix of HFCs and PFCs	NO			NO
SF ₆	15 616			15 616
NF ₃	NO			NO
Total Annex A sources	57 197 219	57 470 445		57 470 445
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2014				
3.3 Afforestation and reforestation				
		-1 326 782		-1 326 782
3.3 Deforestation				
	87 105			87 105
Forest management and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2014				
3.4 Forest management				
		-7 769 519		-7 769 519

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, NO = not occurring.

^a "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

^b "Final" includes revised estimates, if any, and/or adjustments, if any.

Table 12
Information to be included in the compilation and accounting database for 2013 for Bulgaria
(t CO₂ eq)

	<i>Original submission</i>	<i>Revised estimates</i>	<i>Adjustment^a</i>	<i>Final^b</i>
Annex A emissions for 2013				
CO ₂	42 479 941	42 531 991		42 531 991
CH ₄	7 361 714	7 526 886		7 526 886
N ₂ O	4 186 024	4 237 595		4 237 595
HFCs	898 625	968 375		968 375
PFCs	46	39		39
Unspecified mix of HFCs and PFCs	NO			NO
SF ₆	19 722			19 722
NF ₃	NO			NO
Total Annex A sources	54 946 072	55 284 607		55 284 607
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013				
3.3 Afforestation and reforestation				
		-1 186 118		-1 186 118
3.3 Deforestation				
		155 033		155 033
Forest management and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013				
3.4 Forest management				
		-7 696 033		-7 696 033

Abbreviations: Annex A sources = sources included in Annex A to the Kyoto Protocol, NO = not occurring.

^a "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustments.

^b "Final" includes revised estimates, if any, and/or adjustments, if any.

Annex III

Additional information to support findings in table 2

Missing categories that may affect completeness

The categories for which methods are included in the Intergovernmental Panel on Climate Change (IPCC) *2006 IPCC Guidelines for National Greenhouse Gas Inventories* but were reported as “NE” (not estimated) or for which the expert review team otherwise determined that there may be an issue with the completeness of the reporting in the Party’s inventory are the following:

- (a) Carbon dioxide (CO₂) emissions from ammonia production (see table 5, I.18);
- (b) CO₂ emissions from ethylene, ethylene dichloride and vinyl chloride monomer production (see I.20);
- (c) Methane emissions from cultivation of organic soils (see table 5, A.23);
- (d) CO₂ emissions from land converted to grassland (see table 5, L.14).

Annex IV

Documents and information used during the review

A. Reference documents

Aggregate information on greenhouse gas emissions by sources and removals by sinks for Parties included in Annex I to the Convention. Note by the secretariat. Available at <<http://unfccc.int/resource/webdocs/agi/2015.pdf>>.

Annual status report for Bulgaria for 2016. Available at <<http://unfccc.int/resource/docs/2016/asr/bgr.pdf>>.

FCCC/ARR/2014/BGR. Report on the individual review of the annual submission of Bulgaria submitted in 2014. Available at <<http://unfccc.int/resource/docs/2015/arr/bgr.pdf>>.

FCCC/ARR/2013/BGR. Report of the individual review of the annual submission of Bulgaria submitted in 2013. Available at <<http://unfccc.int/resource/docs/2014/arr/bgr.pdf>>.

“Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks 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 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>>.

“Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories”. Annex to decision 24/CP.19. Available at <<http://unfccc.int/resource/docs/2013/cop19/eng/10a03.pdf#page=4>>.

“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 the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention”. Annex to decision 13/CP.20. Available at <<http://unfccc.int/resource/docs/2014/cop20/eng/10a03.pdf#page=6>>.

“Implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol, including those relating to Articles 5, 7 and 8 of the Kyoto Protocol, Part I: Implications related to accounting and reporting and other related issues”. Decision 3/CMP.11. Available at <<http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf#page=5>>.

“Implications of the implementation of decisions 2/CMP.7 to 4/CMP.7 and 1/CMP.8 on the previous decisions on methodological issues related to the Kyoto Protocol including those relating to Articles 5, 7 and 8 of the Kyoto Protocol, Part II: Implications related to review and adjustments and other related issues”. Decision 4/CMP.11. Available at <<http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf#page=30>>.

Intergovernmental Panel on Climate Change. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. Available at <www.ipcc-nggip.iges.or.jp/public/kpsg>.

Intergovernmental Panel on Climate Change. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. Available at <www.ipcc-nggip.iges.or.jp/public/wetlands/index.html>.

Standard independent assessment report, part 1, for Bulgaria for 2016. Available at <http://unfccc.int/files/kyoto_mechanisms/application/pdf/siar_2016_bgr_1_2.pdf>.

Standard independent assessment report, part 2, for Bulgaria for 2016. Available at <http://unfccc.int/files/kyoto_mechanisms/application/pdf/siar_2016_bgr_1_2.pdf>.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Detelina Petrova (Emissions Inventory Department, Monitoring and Assessment of Environment Directorate, Executive Environment Agency), including additional material on the methodology and assumptions used. The following documents¹ were also provided by Bulgaria:

Bulgarian Association of the Metalurgical Industry. 2012. *Metalurgy in Bulgaria*. Sofia.

The European Commission. 2013. Regulation (EU) No 525/2013 of the European Parliament and of the Council of 21 May 2013. Brussels: Official Journal of the European Union.

The European Commission. 2014. *Commission Implementing Regulation (EU) No 749/2014*. Brussels: Official Journal of the European Union.

¹ Reproduced as received from the Party.

Annex V

Acronyms and abbreviations

AAU	assigned amount unit
AD	activity data
BOD	biochemical oxygen demand
CER	certified emission reduction
CH ₄	methane
CKD	cement kiln dust
CM	cropland management
CH ₄	methane
CO ₂	carbon dioxide
CO ₂ eq	carbon dioxide equivalent
COPERT	Computer Programme to Calculate Emissions from Road Transport
CPR	commitment period reserve
CRF	common reporting format
DOC	degradable organic carbon
EEA	European Environment Agency
EMEP	European Monitoring and Evaluation Programme
EF	emission factor
ERT	expert review team
ERU	emission reduction unit
EU ETS	European Union Emissions Trading System
FM	forest management
FMRL	forest management reference level
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, unspecified mix of HFCs and PFCs, SF ₆ and NF ₃ , without GHG emissions and removals from LULUCF
GM	grazing land management
ha	hectare
HFC	hydrofluorocarbon
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
KP-LULUCF	LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kt	kilotonne
LULUCF	land use, land-use change and forestry
NA	not applicable
N ₂ O	nitrous oxide
NE	not estimated
NF ₃	nitrogen trifluoride
NIR	national inventory report
NO	not occurring
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SF ₆	sulphur hexafluoride

SIAR	standard independent assessment report
UNFCCC	United Nations Framework Convention on Climate Change
WDR	wetland drainage and rewetting
