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Climate Change

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Report on the individual review of the annual submission of Bulgaria submitted in 2018*

Note by the expert review team

Summary

Each Party included in Annex I to the Convention must submit an annual greenhouse gas inventory covering emissions and removals of greenhouse gas 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 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 2018 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 8 to 13 October 2018 in Bonn.

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* In the symbol for this document, 2018 refers to the year in which the inventory was submitted, not to the year of publication.

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Contents

Abbreviations and acronyms

2006 IPCC Guidelines	*2006 IPCC Guidelines for National Greenhouse Gas Inventories*
AAU	assigned amount unit
AD	activity data
Annex A sources	source categories included in Annex A to the Kyoto Protocol
AR	afforestation and reforestation
ARD	afforestation, reforestation and deforestation
ARR	annual review report
Article 8 review guidelines	"Guidelines for review under Article 8 of the Kyoto Protocol"
CaO	calcium oxide
CER	certified emission reduction
CH_4	methane
CKD	cement kiln dust
CM	cropland management
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CPR	commitment period reserve
CRF	common reporting format
DOC	degradable organic carbon
EEA	European Environment Agency
EF	emission factor
EMEP	European Monitoring and Evaluation Programme
EMEP/EEA guidebook 2016	*EMEP/EEA Air Pollutant Emission Inventory Guidebook 2016*
ERT	expert review team
ERU	emission reduction unit
EU	European Union
EU ETS	European Union Emissions Trading System
FM	forest management
FMRL	forest management reference level
$Frac_{GASF}$	partitioning factor for the fraction of synthetic nitrogen fertilizer applied to soils that volatilizes as nitrogen oxides and ammonia
GHG	greenhouse gas
GM	grazing land management
HFC	hydrofluorocarbon
IE	included elsewhere
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
IPPU	industrial processes and product use
k value	methane generation rate constant
KP-LULUCF activities	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*
LPG	liquefied petroleum gas
LULUCF	land use, land-use change and forestry
MAFF	Ministry of Agriculture, Food and Forestry of Bulgaria
MCF	methane conversion factor
MgO	magnesium oxide
MMS	manure management systems

MSW	municipal solid waste
N	nitrogen
NA	not applicable
NCV	net calorific value
NE	not estimated
Nex	nitrogen excretion rate
NF_3	nitrogen trifluoride
NIR	national inventory report
NMVOC	non-methane volatile organic compound
NO	not occurring
N_2O	nitrous oxide
PFC	perfluorocarbon
QA/QC	quality assurance/quality control
RMU	removal unit
RV	revegetation
SEF	standard electronic format
SFE	state forest enterprise
SF_6	sulfur hexafluoride
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"
UNFCCC review guidelines	"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"
WDR	wetland drainage and rewetting

I. Introduction[1]

1.   This report covers the review of the 2018 annual submission of Bulgaria organized by the secretariat in accordance with the Article 8 review guidelines (adopted by decision 22/CMP.1 and revised by decision 4/CMP.11). In accordance with the Article 8 review guidelines, this review process also encompasses the review under the Convention as described in the UNFCCC review guidelines, particularly in part III thereof, namely the "UNFCCC guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention" (decision 13/CP.20). The review took place from 8 to 13 October 2018 in Bonn, and was coordinated by Ms. Claudia do Valle and Mr. Sohel Pasha (secretariat). Table 1 provides information on the composition of the ERT that conducted the review of Bulgaria.

Table 1
Composition of the expert review team that conducted the review of Bulgaria

Area of expertise	Name	Party
Generalist	Ms. Agita Gancone	Latvia
	Ms. Emma Salisbury	United Kingdom of Great Britain and Northern Ireland
Energy	Mr. Sangay Dorji	Bhutan
	Mr. Erick Masafu	Kenya
	Mr. Dingane Sithole	Zimbabwe
IPPU	Ms. Ingrid Person Rocha e Pinho	Brazil
	Ms. Ann Marie Ryan	Ireland
	Ms. Kristina Saarinen	Finland
Agriculture	Mr. Paulo Cornejo	Chile
	Mr. Steen Gyldenkaerne	Denmark
	Ms. Janka Szemesova	Slovakia
LULUCF	Mr. Nagmeldin Elhassan	Sudan
	Ms. Inge G. C. Jonckheere	Belgium
	Mr. Dinh Hung Nguyen	Viet Nam
Waste	Mr. Gustavo Mozzer	Brazil
	Mr. Hans Oonk	Netherlands
Lead reviewers	Ms. Person Rocha e Pinho	
	Ms. Salisbury	

2.   The basis of the findings in this report is the assessment by the ERT of the Party's 2018 annual submission in accordance with the Article 8 review guidelines. The ERT notes that the individual inventory review of Bulgaria's 2017 annual submission did not take place in 2017 owing to insufficient funding for the review process.

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[1] At the time of publication of this report, Bulgaria had submitted its instrument of ratification of the Doha Amendment; however, 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.

3.   The ERT has made recommendations that Bulgaria resolve the findings related to issues,[2] including issues designated as problems.[3] Other findings, and, if applicable, the encouragements of the ERT to Bulgaria to resolve them, are also included. The assessment by the ERT takes into account that Bulgaria does not have a quantified emission limitation or reduction commitment for the second commitment period of the Kyoto Protocol inscribed in the third column of Annex B in the Doha Amendment to the Kyoto Protocol.

4.   A draft version of this report was communicated to the Government of Bulgaria, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

5.   Annex I shows annual GHG emissions for Bulgaria, including totals excluding and including the LULUCF sector, indirect CO_2 emissions and emissions by gas and by sector. Annex I also contains background data related to emissions and removals from KP-LULUCF activities, if elected, by gas, sector and activity for Bulgaria.

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

II.   Summary and general assessment of the 2018 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

Assessment				*Issue or problem ID#(s) in table 3 and/or 5ᵃ*
Dates of submission	Original submission: 12 April 2018 (NIR), 14 April 2018, Version 1 (CRF tables), 12 April 2018 (SEF-CP1-2017 and SEF-CP2-2017)			
	Revised submission: 21 January 2019, Version 2 (CRF tables), 10 May 2018 (SEF-CP1-2017 and SEF-CP2-2017)			
	Unless otherwise specified, the values from the latest submission are used in this report			
Review format	Centralized			
Application of the requirements of the UNFCCC Annex I inventory reporting guidelines and *2013 Supplement to the 2006 Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas*	1. Have any issues been identified in the following areas:			
	(a) Identification of key categories		Yes	G.7
	(b) Selection and use of methodologies and assumptions		Yes	E.5, E.10, I.10, I.29, L.6, L.11, L.15, L.18
	(c) Development and selection of EFs		Yes	E.6, E.9, I.4, L.8
	(d) Collection and selection of AD		Yes	E.4, E.8, W.15
	(e) Reporting of recalculations		No	
	(f) Reporting of a consistent time series		Yes	E.16

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[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.

Assessment				*Issue or problem ID#(s) in table 3 and/or 5ª*
Inventories: Wetlands (if applicable)	(g)	Reporting of uncertainties, including methodologies	Yes	G.9, G.10
	(h)	QA/QC	QA/QC procedures were assessed in the context of the national system (see para. 2 in this table)	
	(i)	Missing categories/completeness*ᵇ*	Yes	L.13, L.19
	(j)	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	2. Have any issues been identified related to the 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	
	3. Have any issues been identified related to the 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	
	4. Have any issues been identified related to reporting of information on ERUs, CERs, AAUs and RMUs and on discrepancies reported in accordance with decision 15/CMP.1, annex, chapter I.E, in conjunction with decision 3/CMP.11, taking into consideration any findings or recommendations contained in the standard independent assessment report?		No	
	5. Have any issues been identified in 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, in conjunction with decision 3/CMP.11, including any changes since the previous annual submission?		Yes	G.4
	6. Have any issues been identified related to the reporting of LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as follows:			
	(a)	Reporting requirements in decision 2/CMP.8, annex II, paragraphs 1–5	Yes	KL.14, KL.15

Assessment				Issue or problem ID#(s) in table 3 and/or 5[a]
	(b)	Demonstration of methodological consistency between the reference level and reporting on FM in accordance with decision 2/CMP.7, annex, paragraph 14	Yes	KL.19
	(c)	Reporting requirements of decision 6/CMP.9	Yes	KL.10
	(d)	Country-specific information to support provisions for natural disturbances, in accordance with decision 2/CMP.7, annex, paragraphs 33 and 34	Yes	KL.2, KL.16, KL.18
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	
		Did the Party submit a revised estimate to replace a previously applied adjustment?	NA	The Party does not have a previously applied adjustment
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	
Question of implementation		Did the ERT list any question of implementation?	No	

[a] The ERT identified additional issues and/or problems in the energy, IPPU, agriculture, LULUCF and waste sectors and for LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol that are not listed in this table but are included in table 3 and/or 5.

[b] Missing categories for which methods are provided in the 2006 IPCC Guidelines 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 previous review reports that were included in the previous review report, published on 21 June 2017.[4] 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 2018 annual submission and provided the rationale for its determination, which takes into consideration the publication date of the previous review report and national circumstances.

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[4] FCCC/ARR/2016/BGR. The ERT notes that the individual inventory review of Bulgaria's 2017 annual submission did not take place during 2017. As a result, the latest published ARR reflects the findings of the review of the Party's 2016 annual submission.

Table 3
Status of implementation of issues and/or problems raised in the previous review report of Bulgaria

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
General			
G.1	Kyoto Protocol units (G.8, 2016) Transparency	Provide information on changes in accordance with decision 13/CMP.1, annex, paragraph 45 (up-to-date 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).	Resolved. Bulgaria provided links to the information in the NIR (section 12.4, p.410).
G.2	NIR (G.5, 2016) Transparency	Include all references and sources of information used in the NIR, in line with decision 24/CP.19, annex I, paragraph 50.	Not resolved. Bulgaria included a list of references only in the IPPU sector its NIR and only for certain categories (section 4.7.1, p.240). During the review, the Party stated that reference documents are referred to in the narrative of the relevant chapters of the NIR, and that it will follow the recommendation of the ERT to include in its next NIR references in a separate chapter with a list of all references used in the NIR.
G.3	QA/QC and verification (G.4, 2016) Transparency	Clearly indicate in chapter 1 of the 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.	Addressing. Bulgaria indicated in its NIR (section 1.3.1, p.46) that, in preparing the inventory, the QC experts (AD provider and Executive Environment Agency's sectoral experts) applied each of the specific procedures set out in the checklist for each of the categories under their responsibility. During the review, the Party provided the QA/QC checklist. Corresponding sectoral chapters did not discuss any additional QA/QC checks that are done for certain categories.
Energy			
E.1	Feedstocks, reductants and other non-energy use of fuels – all fuels – CO_2 (E.6, 2016) (E.6, 2015) Transparency	Explain in the NIR 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.	Resolved. Bulgaria explained in its NIR (section 3.3.3, p.74) that the 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.
E.2	1.A Fuel combustion – sectoral approach – solid fuels – CO_2 (E.7, 2016) (E.7,	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	Resolved. Bulgaria reported in its NIR (section 3.3.8.8, p.90) that coal AD for the period 1988–2003 were disaggregated on the basis of shares of the consumption of anthracite and other bituminous coal for 2004–2014 and the NCVs

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	2015) Transparency	CO_2 estimates applying accordingly the country-specific CO_2 EFs to each type of fuel for 1988–2003, and provide information on the followed approach in the NIR.	were recalculated, which led to recalculations for all subcategories for the period.
E.3	1.A.1.b Petroleum refining – liquid fuels – CO_2, CH_4 and N_2O (E.8, 2016) (E.8, 2015) Comparability	Reallocate emissions from the use of refinery fuels to restore a catalyst under category 1.B.2.a.4 fugitive emissions – oil – refining/storage, as this combustion is performed only to restore the catalyst's activity and not for energy purposes.	Not resolved. During the review, Bulgaria indicated that the calculations are available but, owing to a technical omission, the emissions were reported in category 1.A.1.b instead of reallocating them to category 1.B.2.a.4 (fugitive emissions – oil – refining/storage). The Party also indicated that it will include an additional check in the QA/QC checklist to ensure that the emissions are reported in the correct category in the 2019 annual submission.
E.4	1.A.1.b Petroleum refining – natural gas – CO_2 (E.9, 2016) (E.9, 2015) Comparability	Collect relevant AD related to the energy and non-energy use of natural gas and report accordingly CO_2 emissions from hydrogen production under subcategory 1.B.2.c.ii venting/gas, ensuring that the feedstock for the hydrogen plant is not also reported as fuel.	Not resolved. During the review, Bulgaria indicated that calculations are available but, owing to a technical omission, the emissions were reported in category 1.A.1.b instead of reallocating them to subcategory 1.B.2.c.ii venting/gas. The Party also indicated that it will include an additional check in the QA/QC checklist to ensure that the emissions are reported in the correct category for the 2019 annual submission.
E.5	1.A.3.b Road transportation – liquid fuels – CO_2 (E.3, 2016) (E.3, 2015) (E.28, 2014) Accuracy	Conduct a tier 2 estimation of CO_2 emissions from gasoline using country-specific EFs (CO_2 emission estimates resulting from the COPERT model may serve to cross-check the tier 2 estimates).	Not resolved. Bulgaria reported challenges in obtaining gasoline and diesel quality parameters from the liquid fuel producer in Bulgaria and from imports from neighbouring countries (section 3.3.12.3.5, p.136). It did not indicate clear plans with steps and timelines on development of the country-specific EFs. During the review, Bulgaria indicated that it expects the liquid fuel producer in Bulgaria to be able to provide the necessary test results in 2019, after which it will work on using a country-specific EF for the 2020 annual submission.
E.6	1.A.3.b Road transportation – liquid fuels – CO_2 (E.10, 2016) (E.10, 2015) Accuracy	Provide CO_2 emission estimates in accordance with the 2006 IPCC Guidelines by using country-specific EFs for the used liquid fuels, as category 1.A.3.b road transportation is a key category for CO_2 emissions.	Not resolved. During the review, Bulgaria indicated that it expects the liquid fuel producer in Bulgaria to be able to provide the necessary test results in 2019, after which it will work on using a country-specific EF for the 2020 annual submission.
E.7	1.A.3.e.ii Other (other transportation) – liquid fuels – CO_2, CH_4 and N_2O (E.11, 2016) (E.11. 2015) Transparency	Provide an explanation for the allocation of emissions from off-road transportation activities at airports and harbours in the NIR.	Resolved. Bulgaria indicated in its NIR (section 3.3.12.6.3, p.146) that quantities of fuel used at airports and harbours were reported under road transport.
E.8	1.B.1.a Coal mining and handling – mining activities –	Clarify which type of coal was used as AD for the estimates across the time series and, if the Party used the	Addressing. Bulgaria indicated in its NIR (section 3.4.6, p.161) that, according to Bulgarian coal mine operators, lignite is the main type of

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	CH_4 (E.12, 2016) (E.12, 2015) Accuracy	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.	coal currently produced and it is not upgraded. The Party also indicated that coal upgrade facilities were closed about a decade ago and that data for the beginning of the time series were not available from the Ministry of Energy. During the review, the Party indicated that data for 2012–2015 obtained from individual mines confirmed that there were no discrepancies with the information provided in the energy balance. However, such information could not be obtained for years from the base year to 2011. The Party also indicated that it was currently collecting data from coal mines as part of a study on emissions from abandoned underground mines (see ID#s E.9 below and E.15 in table 5).
E.9	1.B.1.a Coal mining and handling – solid fuels – CO_2 and CH_4 (E.4, 2016) (E.4, 2015) (E.30, 2014) Accuracy	Develop a country-specific EF for fugitive CH_4 emissions from underground coal mining and handling to enable a higher-tier method to be applied for this category.	Addressing. During the review, Bulgaria indicated that in 2017 it held several meetings with institutions and national experts on this issue. As a result a study was commissioned in 2018 on the status of abandoned underground mines in Bulgaria. The results of the study are expected to be available in 2019, after which Bulgaria will work on preparing a country-specific EF for fugitive CH_4 emissions from underground coal mining and handling for the 2020 annual submission. Bulgaria did not indicate clear plans to apply a tier 2 method for active underground coal mining.
E.10	1.B.1.a Coal mining and handling – solid fuels – CH_4 (E.13, 2016) (E.13, 2015) Accuracy	Collect the relevant AD 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, provide adequate evidence in the NIR.	Addressing. The Party continued to use proxy data from Hungary to estimate emissions from abandoned underground coal mines and provided an explanation in its NIR (section 3.4.6, p.161). During the review, Bulgaria indicated that in 2017 it held several meetings with institutions and national experts on this issue. As a result, a study was commissioned in 2018 on the status of abandoned underground mines in Bulgaria. The results of the study are expected to be available in 2019, after which Bulgaria will work on preparing a country-specific EF for abandoned underground mines for the 2020 annual submission.
E.11	1.B.2.a Oil – liquid fuels – CO_2 and CH_4 (E.14, 2016) (E.14, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Ensure consistency between the AD on exploration and production of oil reported in the NIR and the CRF tables.	Not resolved. Bulgaria explained in its NIR (section 3.4.2, p.156) that domestic AD on oil production are treated as confidential as required by the National Statistical Institute because there are a limited number of oil and gas companies in the country. However, in CRF table 1.B.2 figures for indigenous oil and gas production were reported, and in NIR table 106 (pp.157 and 158) the AD were indicated as confidential.
E.12	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.16, 2016) (E.16,	Collect appropriate AD and estimate CH_4 and CO_2 emissions in accordance with the 2006 IPCC Guidelines for 1988–2007 and	Resolved. Bulgaria indicated in its NIR (section 3.4.3, p.160) and 2016 CRF table 1.B.2 that CO_2 and CH_4 emissions from natural gas were estimated using data from the national energy balance and Bulgartransgaz (the operator of the

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	2015) Accuracy	provide the rationale for the EFs selected.	Chiren natural gas storage facility). Emissions from transmission and storage were updated for the years 1988–2007 to account for storage.
E.13	1.B.2.b Natural gas – gaseous fuels – CO_2 and CH_4 (E.15, 2016) (E.15, 2015) Transparency	Include an explanation for the allocation of the CO_2 and CH_4 emissions from exploration of natural gas in the NIR.	Resolved. Bulgaria explained in its NIR (section 3.4.3, p.160) that the emission estimates for the exploration of natural gas were included with the estimates for oil exploration because exploration refers to both oil and natural gas.

IPPU

ID#	Issue and/or problem classification	Recommendation made in previous review report	ERT assessment and rationale
I.1	2. General (IPPU) (I.2, 2016) (I.2, 2015) (35, 2014) (40, 2013) Adherence to the 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 for the industrial processes sector.	Resolved. Bulgaria addressed the inconsistency of data between the CRF tables and the NIR and the incorrect use of notation keys noted by the previous ERT. No further deviations were detected.
I.2	2. General (IPPU) (I.1, 2016) (I.1, 2015) (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.	Resolved. The ERT noted that regarding information on ethylene, dichloroethylene and methanol production, the issue is resolved as Bulgaria has already included information on the status of these activities in its NIR (section 4.3.8.1, p.198). Regarding styrene production, Bulgaria has not reported emissions but the ERT notes that there are no methods provided in the 2006 IPCC Guidelines for this chemical (see vol. 3, chapter 3, section 3.9.1) and the Party has not reported this category historically.
I.3	2.A.1 Cement production – CO_2 (I.13, 2016) (I.13, 2015) Accuracy	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 CO_2 emissions from cement production taking into account the year-specific parameters.	Resolved. Recalculations were performed using collected data for CaO and MgO for 2010–2015 and the Party provided sufficient information on CaO and MgO content during the review.
I.4	2.A.1 Cement production – CO_2 (I.14, 2016) (I.14, 2015) Accuracy	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.	Not resolved. Bulgaria informed the previous ERT in 2016 that the emission estimation approach was being assessed as a result of the additional information received. Bulgaria did not change the CKD factor and continued to use a value of 1.00. In response to the follow-up question from the current ERT on justifying the use of the CKD factor, Bulgaria stated that factories were built to return captured dust back to the furnace (i.e. without a CKD); that after 2010, to comply with additional emission standards, factories built extra facilities where dust did not go back to the furnace; and that CO_2 data from 2010 had now been adjusted in line with EU ETS verified reports. However, this information was not presented in the NIR. The ERT believes that future ERTs should consider

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			this issue further to ensure that there is not an underestimation of emissions for this category.
I.5	2.A.1 Cement production – CO_2 (I.13, 2016) (I.13, 2015) Transparency	Provide in the NIR information that is consistent with the data used for the emission estimates (in chapter 4.2.1.7 of the NIR Bulgaria reported that an average percentage CaO and MgO content in the period 2000–2009 was used for the emission calculations for the period 2010–2014, while section 4.2.1.3.2 stated that CO_2 emissions for 2014 were taken from EU ETS operators' annual emissions reports).	Not resolved. Bulgaria stated in its NIR (section 4.2.1.6, p.171) that recalculations were performed using collected data for CaO and MgO for 2010–2015, but the data were not presented in the NIR. During the review, Bulgaria indicated that it was unclear what kind of information had to be reported in the NIR. In response to the question of the ERT under ID# I.4 above, Bulgaria provided sufficient information during the review, but that information was not presented in the NIR.
I.6	2.A.3 Glass production – CO_2 (I.15, 2016) (I.15, 2015) Transparency	Include in the NIR the rationale for using the average CO_2 EF for 2007–2008 to establish the CO_2 EF for 1988–2006.	Resolved. Bulgaria included the justification for the use of the CO_2 EF for 2007–2008 to establish the CO_2 EF for 1988–2006 in its NIR (section 4.2.3.3.2, p.175).
I.7	2.A.4 Other process uses of carbonates – CO_2 (I.4, 2016) (I.4, 2015) (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 2009–2012 would be more accurate than the EFs applied for prior to 2008, and, if appropriate, conduct the necessary recalculations using the applied EFs for 1988–2007.	Resolved. Bulgaria recalculated emissions using an EF published in European Commission regulation 601/2012 for the whole time series and described use of the revised data in the NIR (section 4.2.4.3.2, p.178).
I.8	2.A.4 Other process uses of carbonates – CO_2 (I.16, 2016) (I.16, 2015) Accuracy	Revise the EFs used for estimating CO_2 emissions from ceramics production for the entire time series following the tier 1 method provided in the 2006 IPCC Guidelines. If using the EF of 0.09642 t CO_2/t ceramics produced provided in European Commission regulation 601/2012, provide the rationale for choosing this EF (e.g. results of comparison made with other EU member States, and applicability to national circumstances).	Resolved. Bulgaria recalculated the emissions using the default EF provided in European Commission regulation 601/2012 for the whole time series. The rationale for the choice of this EF is described in the NIR (section 4.2.4.3.2, p.178).
I.9	2.B.1 Ammonia production – CO_2 (I.17, 2016) (I.17, 2015) Accuracy	Correct the CO_2 emissions from ammonia production reported in the CRF tables for 1988 and 1989 using the information provided in the NIR.	Resolved. Bulgaria corrected these emission estimates in CRF table 2(I).A-Hs1 and information is consistent with data reported in NIR table 119.
I.10	2.B.1 Ammonia production – CO_2 (I.18, 2016) (I.18, 2015) Accuracy	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 provide this information in the NIR.	Not resolved. Bulgaria did not provide the information in the NIR. During the review, Bulgaria stated that there was no further information or data on urea production, which stopped in 2003, that the urea produced was intended for export, and that in Bulgaria urea had been used only as a fertilizer in agriculture and reported accordingly. Regarding current

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			practices, Bulgaria stated that urea had not been used in denitrification plants (to reduce N_2O emissions from different production processes) before 2012 and had been used in transport since the introduction of the EU standard for heavy-duty vehicles in 2009. According to the Party, there was also no evidence that urea had been used in the pharmaceutical and cosmetic industry in the country. The ERT believes that future ERTs should consider this issue further to ensure that there is not an underestimate of emissions from this category.
I.11	2.B.1 Ammonia production – CO_2 (I.5, 2016) (I.5, 2015) (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.	Resolved. Consistent with the information provided to the ERT during the review of the 2014 annual submission, Bulgaria indicated that the emissions decrease between 2011 and 2012 was owing to the shrinking market for ammonia. In addition, the Party noted that, due to the decline in demand, one of the operators performed basic capital repairs concerning the optimization of the ammonia manufacturing process (section 4.3.1.2, p.186).
I.12	2.B.1 Ammonia production – CO_2 (I.6, 2016) (I.6, 2015) (39, 2014) (44, 2013) Transparency	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 in the inventory.	Not resolved. Bulgaria did not include in its NIR a fully transparent description of how emissions of CO_2 recovered for use in urea production are accounted for in the inventory, including the source of the equation used for the CO_2 emission estimate nor of how emissions from the downstream use of the urea are accounted for elsewhere in the inventory.
I.13	2.B.8 Petrochemical and carbon black production – CO_2 (I.20, 2016) (I.20, 2015) Completeness	Further investigate and report in the annual submission whether domestic production of ethylene, ethylene dichloride and vinyl chloride monomer occurred in the period from 1988 to the latest reported year, collect necessary data and calculate CO_2 emissions according to the 2006 IPCC Guidelines and provide information on the methodology, AD and EFs used; otherwise, 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.	Resolved. Bulgaria reported CO_2 emissions for ethylene production for 1988–2009 and CO_2 emissions from ethylene dichloride and vinyl chloride monomer for 1988–2005 and correct notation keys were used in CRF table 2(I)s1 (see ID# I.27 in table 5).
I.14	2.B.8 Petrochemical and carbon black production – CO_2 (I.19, 2016) (I.19, 2015) Transparency	Report in the CRF tables the correct notation key (i.e. "NO" for AD for methanol production) and CO_2 and CH_4 emissions for the entire time series and provide the corresponding explanation in the NIR.	Resolved. The correct notation key was used in CRF table 2(I)s1 for AD for the entire time series and relevant information was provided in the NIR (section 4.3.8.1).
I.15	2.B.8 Petrochemical and carbon black production – CH_4	Include information in the NIR for this category on AD sources, EFs and associated parameters, methods	Resolved. Bulgaria, in its NIR (section 4.3.8, p.198), included information on the method and data sources, along with the relevant EFs and

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(I.11, 2016) (I.11, 2015) (46, 2014) (53, 2013) Transparency	and assumptions to ensure that all estimates can be independently verified.	associated parameters used (see also ID# I.2 above).
I.16	2.C.1 Iron and steel production – CO_2 and CH_4 (I.21, 2016) (I.21, 2015) Transparency	Include an explanation for the allocation of CO_2 and CH_4 emissions from sinter production for 1988–2008 to improve the transparency of the reporting.	Resolved. Bulgaria reported CO_2 and CH_4 emissions from sinter production for 1988–2008 under basic oxygen furnace steel production, as explained in its NIR (section 4.4.4, p.208).
I.17	2.C.1 Iron and steel production – CO_2 and CH_4 (I.22, 2016) (I.22, 2015) Transparency	Change the notation key for pellet production AD and CO_2 and CH_4 emissions from "IE" to "NO" for the entire time series and include an explanation in the NIR.	Resolved. Bulgaria changed the notation key to "NO" for the entire time series and stated in its NIR (section 4.4.5, p.208) that no pellet production was occurring.
I.18	2.C.3 Aluminium production – CO_2 (I.23, 2016) (I.23, 2015) Transparency	Change the notation key for CO_2 emissions from aluminium production from "NO" to "NA" and include an explanation of the aluminium production process.	Resolved. Bulgaria changed the notation key to "NA" for the entire time series and explained in its NIR (section 4.4.7, p.210) that there is no primary aluminium production in Bulgaria but only secondary production, for which fuel-related emissions are reported under the energy sector.
I.19	2.C.5 Lead production – CO_2 (I.24, 2016) (I.24, 2015) Comparability	Report process emissions from lead production in the IPPU sector and ensure that there is no double counting of emissions under the energy sector. If the consumption cannot be separated into energy and non-energy use of fuels, report the associated CO_2 emissions in the IPPU sector only and provide supporting information on the process, methodology, AD and EFs used in the NIR of its next annual submission, corresponding to both the energy sector and the IPPU sector.	Resolved. The emissions were moved to IPPU in both the CRF tables and the NIR (p.211). The ERT did not identify any cases of double counting.
I.20	2.C.6 Zinc production – CO_2 (I.25, 2016) (I.25, 2015) Comparability	Report process emissions from zinc production in the IPPU sector and ensure that there is no double counting of emissions under the energy sector. If the consumption cannot be separated into energy and non-energy use of fuels, report the associated CO_2 emissions in the IPPU sector only and provide information on the process, methodology, AD and EFs used in the NIR of its next annual submission, corresponding to both the energy sector and the IPPU sector.	Resolved. The emissions were moved to IPPU in both the CRF tables and the NIR (p.213). The ERT did not identify any cases of double counting.
I.21	2.D.1 Lubricant use – CO_2 (I.26, 2016) (I.26,	Continue to report CO_2 emissions from lubricants used in industrial	Resolved. The CO_2 emissions reported from lubricant use continue to include both industrial

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	2015) Transparency	applications for the entire time series.	applications and transportation for the entire time series.
I.22	2.D.3 Other (non-energy products from fuels and solvent use) – CO_2 (I.27, 2016) (I.27, 2015) Accuracy	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 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.	Resolved. In response to the list of potential problems and further questions by the previous ERT, Bulgaria used an average CO_2 emission rate from a cluster of countries with similar national circumstances based on population. Bulgaria continued to use the cluster approach and included this information in its NIR (section 4.5.4.3.2, p.223) to improve the methodology and to address the accuracy issue.
I.23	2.F.1 Refrigeration and air conditioning – HFCs (I.28, 2016) (I.28, 2015) Accuracy	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 per cent for all equipment (amount in operating systems)) without making a difference for the installation year, in accordance with the 2006 IPCC Guidelines.	Resolved. Bulgaria applied a 10 per cent product life factor for all equipment and all gases for the entire time series for which the activity occurred. Bulgaria included relevant information in its NIR (section 4.7.1.2.1, p.232).
I.24	2.F.1 Refrigeration and air conditioning – HFCs (I.29, 2016) (I.29, 2015) Accuracy	Revise the 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 per cent for all equipment (amount in operating systems)) without making a difference for the year of import, in accordance with the 2006 IPCC Guidelines.	Resolved. Bulgaria applied a product life factor of 0.3 per cent for HFC-134a for all equipment for the years 1991–2016. Bulgaria included relevant information in its NIR (section 4.7.1.2.2, p.232).
I.25	2.G.3 N_2O from product uses – N_2O (I.30, 2016) (I.30, 2015) Consistency	Collect actual AD for 2013, 2014 and the latest reported year and revise the estimates of N_2O emissions from medical applications as appropriate, and provide relevant information in the NIR on the methodology used.	Resolved. Updated AD were collected and N_2O emissions were recalculated for the years 2010–2014. The methodology was documented in the NIR (section 4.8.3.3, p.243).

Agriculture

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
A.1	3. General (agriculture) (A.2, 2016) (A.2, 2015) (52, 2014) Adherence to the UNFCCC Annex I inventory reporting guidelines	Improve QA/QC procedures for 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).	Resolved. NIR table 178 (formerly table 176) has been updated to reflect the entire time series; no inconsistencies were identified between NIR tables 164–166 and table 178 (formerly tables 165–167 and 176); and no inconsistencies were identified between section 5.4.3 and table 174 (formerly section 6.4.3 and table 172).

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
A.2	3. General (agriculture) (A.11, 2016) (A.11, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Justify and document country-specific uncertainty values for AD.	Resolved. Bulgaria included information on uncertainty values applied for AD and EFs, both default and country-specific values, in its NIR (section 5.4.3, p.268).
A.3	3. General (agriculture) (A.11, 2016) (A.11, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Revise the uncertainty values for the EFs in accordance with the 2006 IPCC Guidelines.	Resolved. Bulgaria revised the uncertainty values for the EFs in accordance with the 2006 IPCC Guidelines and documented such information in its NIR (section 5.4.3, p.268, table 174).
A.4	3. General (agriculture) (A.9, 2016) (A.9, 2015) Transparency	Provide information in the NIR 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.	Not resolved. In its NIR (section 5.4.2.3, p.263) Bulgaria did not include specific information on all AD applied for the entire time series (e.g. crop production; total annual crop area harvested; and annual area of crop burned) or a detailed explanation of how the AD are collected and regulated in Bulgaria's agricultural statistics. During the review, Bulgaria provided the ERT with the sources of information and additional documentation on national studies and agricultural statistics.
A.5	3. General (agriculture) (A.10, 2016) (A.10, 2015) Transparency	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.	Addressing. Although Bulgaria reported AD for synthetic fertilizer for the entire time series in its CRF tables, it did not include the same in its NIR as recommended by the previous ERT. The source of the information was provided in the NIR (section 5.7.2.3, p.284) where the differences between national and international sources regarding synthetic fertilizer use were clarified, as recommended.
A.6	3.A Enteric fermentation – CH_4 (A.3, 2016) (A.3, 2015) (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.	Resolved. Bulgaria included detailed descriptions of all parameters and AD applied for the enteric fermentation category estimations in its NIR (section 5.4, p.258), particularly for young cattle.
A.7	3.A.1 Cattle – CH_4 (A.12, 2016) (A.12, 2015) Accuracy	Use country-specific digestible energy percentage for mature dairy cattle and default values from the 2006 IPCC Guidelines for other mature cattle and growing cattle and report the corresponding CH_4 emission estimates.	Resolved. Bulgaria applied a country-specific digestible energy percentage for mature dairy cattle as indicated in its NIR (section 5.4.2.2, p.260) and reported in CRF table 3.As2. Regarding other mature cattle and growing cattle, Bulgaria used default values from the 2006 IPCC Guidelines and reported the corresponding CH_4 emission estimates in CRF table 3.As1.
A.8	3.A.1 Cattle – CH_4 (A.13, 2016) (A.13,	Revise the CH_4 emission estimates for enteric fermentation for mature dairy cattle on the basis of a revised and consistent time series of milk	Resolved. Bulgaria revised, applied in the calculations and reported a consistent time series

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	2015) Accuracy	production and fat content from 1988 to the latest reported year.	of milk production and fat content as indicated in its NIR (section 5.4.2.3.2, p.266).
A.9	3.A.2 Sheep – CH_4 (A.14, 2016) (A.14, 2015) Transparency	Provide detailed information on all parameters used for estimating CH_4 emissions from enteric fermentation for sheep and justify the CH_4 EF used, which is lower than the IPCC default value.	Resolved. Bulgaria included information on all parameters used for estimating CH_4 emissions from enteric fermentation for sheep, as well as justification for the country-specific CH_4 EF used in its NIR (section 5.4.2.2, p.259).
A.10	3.A.4 Other livestock – CH_4 (A.15, 2016) (A.15, 2015) Transparency	Document and justify the recommended approach from the 2006 IPCC Guidelines (i.e. multiplying the default EF of reference by $(380/300)^{0.75}$).	Not resolved. Bulgaria did not include, as previously done in its NIR, an explanation of how the EF was estimated taking into account the average country-specific animal weight (380 kg). The ERT notes that in response to the previous recommendation, the Party applied a default EF for buffalo of 66 kg CH_4/head/year, which is higher than the default EF in the 2006 IPCC Guidelines (55 kg CH_4/head/year) (volume 4, chapter 10, table 10.10).
A.11	3.A.4 Other livestock – CH_4 (A.15, 2016) (A.15, 2015) Transparency	Report the corresponding CH_4 emission estimates for enteric fermentation for buffalo.	Resolved. Bulgaria reported the corresponding CH_4 emissions from enteric fermentation for buffalo applying the revised EF as indicated in its NIR (section 5.4.1, table 161, p.258) and CRF table 3.As1.
A.12	3.B Manure management – CH_4 (A.16, 2016) (A.16, 2015) Transparency	Provide information on the tier 2 method used for estimating emissions from sheep and poultry.	Resolved. Bulgaria included information on the tier 2 method used for sheep and poultry in its NIR (section 5.5.2.1, p.271).
A.13	3.B Manure management – CH_4 (A.16, 2016) (A.16, 2015) Transparency	Provide information on all parameters used for estimating CH_4 emissions (manure management) from sheep and poultry in the NIR and justify why the EF values deviate from the default values in the 2006 IPCC Guidelines.	Addressing. Bulgaria included information on sources for all the parameters used. However, the ERT noted that more detailed information about parameters (e.g. country-specific MCF values for poultry) is needed to fully understand the rationale behind the estimations.
A.14	3.B Manure management – CH_4 (A.17, 2016) (A.17, 2015) Transparency	Document and justify the selection of EFs used to estimate CH_4 emissions from manure management for swine and buffalo.	Resolved. Bulgaria provided documentation and justification of the EFs selected to estimate CH_4 emissions from swine (tier 2) and buffalo (tier 1) in its NIR (section 5.5.2, p.270).
A.15	3.B Manure management – N_2O (A.19, 2016) (A.19, 2015) Transparency	Provide consistent information on the method used in the NIR and CRF tables for cattle, swine and poultry.	Resolved. Bulgaria provided consistent information on the method used in its NIR (section 5.5.2.2, p.273) and CRF table Summary3s2 for cattle, swine and poultry.
A.16	3.B Manure management – N_2O (A.19, 2016) (A.19, 2015) Transparency	Provide all parameters used for estimating N_2O emissions from manure management.	Resolved. Bulgaria included information on all parameters used for estimating N_2O emissions from manure management in its NIR (section 5.5.2.2, p.273).

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
A.17	3.B Manure management – CH_4 and N_2O (A.4, 2016) (A.4, 2015) (54, 2014) (61, 2013) Accuracy	Justify the use of a MCF of 90 per cent and make efforts to develop a country-specific value.	Resolved. Bulgaria applied country-specific MCFs for the main animal categories (cattle, sheep, swine and poultry) in CRF table 3.B(a)s2.
A.18	3.B.1 Cattle – CH_4 (A.18, 2016) (A.18, 2015) Transparency	Document the explanation provided by the Agricultural University of Plovdiv to justify the choice of dry lot management system.	Not resolved. Bulgaria did not document the explanation provided by the Agricultural University of Plovdiv to justify its choice of dry lot management system.
A.19	3.C Rice cultivation – CH_4 (A.20, 2016) (A.20, 2015) Transparency	Describe and document in the NIR the parameters and assumptions (e.g. cultivation period, agronomic practices) used for estimating CH_4 emissions from rice cultivation.	Resolved. Bulgaria included in its NIR (section 5.6.2.2, p.280) a description and documented information on the parameters and assumptions used for its CH_4 estimations.
A.20	3.D.a.2.b Sewage sludge applied to soils – N_2O (A.21, 2016) (A.21, 2015) Transparency	Document and clearly report that the application of sewage sludge to soils did not occur before 2007 and provide details of the corresponding legislation.	Not resolved. Bulgaria documented and reported explicitly in its NIR (section 5.7.2.1, p.283) that sewage sludge has been applied since 2007. However, the Party did not provide details of the corresponding legislation.
A.21	3.D.a.5 Mineralization/ immobilization associated with loss/gain of soil organic matter – N_2O (A.22, 2016) (A.22, 2015) Transparency	Include information on the method used to estimate N_2O emissions from mineralization/immobilization associated with loss/gain of soil organic matter.	Resolved. Bulgaria included in its NIR (section 5.7.2.1, p.282) information on the method and AD sources used to estimate N_2O emissions.
A.22	3.D.a.6 Cultivation of organic soils (i.e. histosols) – N_2O (A.23, 2016) (A.23, 2015) Completeness	Gather information and determine whether cultivation of organic soils occurred in the past in Bulgaria and, if the activity has occurred, make efforts to estimate and report the corresponding emissions in the annual submission.	Resolved. Bulgaria estimated and reported in CRF table 3.D and its NIR (section 5.7.2.1, p.282) N_2O emissions from the cultivation of organic soils for the entire time series.
A.23	3.H Urea application – CO_2 (A.24, 2016) (A.24, 2015) Accuracy	Identify a proxy variable to obtain an accurate and consistent time series of CO_2 emissions from urea application for 1988–2006.	Resolved. Bulgaria implemented a proxy variable based on the total consumption of N fertilizers to obtain an accurate and consistent time series of CO_2 emissions, as reported in CRF table 3.G-I and as indicated in its NIR (section 5.10.2.1, p.289).

LULUCF

ID#	Issue and/or problem classification	Recommendation made in previous review report	ERT assessment and rationale
L.1	Land representation – all gases (L.5, 2016) (L.5, 2015) Accuracy	Revise the land representation time series and, if appropriate, create grassland and cropland subcategories that could better reflect the actual land cover and use in the country, to ensure adequate and consistent data over time.	Resolved. Bulgaria provided information on grassland and cropland subcategories in its NIR (section 6.2.2, p.295) and moved the relevant land areas to the corresponding subcategories.

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
L.2	4. General (LULUCF) – all gases (L.6, 2016) (L.6, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Strengthen QC activities to ensure that information included in the NIR is consistent with the data reported in the CRF tables.	Resolved. The only inconsistency identified in the previous review report was related to inconsistencies between the areas affected by forest fires reported in the NIR and in CRF table 4(V) (see ID# L.14 below). The ERT considers that improvements to QC activities were implemented; therefore this issue was resolved.
L.3	4. General (LULUCF) – all gases (L.7, 2016) (L.7, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	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.	Resolved. For situations where a tier 1 method was used and where it is assumed there were no changes in carbon stock, Bulgaria used the notation key "NE".
L.4	4. General (LULUCF) (L.1, 2016) (L.1 2015) (66, 2014) Transparency	Include in the NIR information on private forests.	Resolved. Bulgaria provided information on private forests in its NIR (section 6.3.1.2, p.302).
L.5	4.A.1 Forest land remaining forest land – CO_2 (L.2, 2016) (L.2, 2015) (67, 2014) (74, 2013) Accuracy	Apply a higher-tier method to estimate emissions and removals from the dead organic matter and soil carbon pools.	Not resolved. Bulgaria provided a reference in its NIR (section 6.3.2.1.2, p.306) to a report by the European Commission's Joint Research Centre on the contribution of LULUCF to the 2030 EU climate and energy policy, which was supposed to contain documentation on how carbon stock changes in dead organic matter and soils had been estimated and which methods had been used. The ERT could not find any such information in the referenced document. During the review, Bulgaria stated that it was not possible to move to higher-tier methods for its 2017 and 2018 annual submissions, which would require complex estimation procedures, but that it would try to engage the scientific community in addressing the challenge of estimating carbon stock changes in these pools in the next few years and hopefully be able to move to higher-tier methods by 2020. The ERT noted that Bulgaria will do this before the end of the second commitment period, since Bulgaria used the same methods to estimate removals and emissions from forest land remaining forest land as it did to estimate removals and emissions from FM under KP-LULUCF and the estimates for these two categories should be comparable.
L.6	4.A.1 Forest land remaining forest land – CO_2 (L.8, 2016) (L.8, 2015) Accuracy	Provide estimates of changes in carbon stock in biomass by applying the gain–loss method in future annual submissions for verification purposes.	Not resolved. Changes in carbon stock in biomass using the gain–loss method were not provided in the NIR. During the review, Bulgaria indicated its intention to apply this approach for future submissions but did not specify when.

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
L.7	4.A.2 Land converted to forest land – CO_2 (L.3, 2016) (L.3, 2105) (68, 2014) Transparency	Include in the NIR a detailed description of the method and data used for calculating living biomass for cropland and grassland.	Resolved. Bulgaria provided information in its NIR (sections 6.4.3 and 6.5.3, p.316 and p.325, respectively).
L.8	4.A.2 Land converted to forest land – CO_2 (L.9, 2016) (L.9, 2015) Accuracy	Develop country-specific values for both deadwood and litter.	Addressing. Bulgaria provided information on the reporting of litter and on reported changes in soil carbon stock in NIR sections 6.3.2.2.2.2 (p.308) and 6.3.2.2.3 (p.309), respectively. However, it continued to report deadwood using a tier 1 assumption from the 2006 IPCC Guidelines and, accordingly, used the notation key "NE" to report deadwood in CRF table 4.A.
L.9	4.B Cropland – CO_2 (L.10, 2016) (L.10, 2015) Transparency	Include in the NIR information on how changes in carbon stock in the dead organic matter pool are estimated and, in the case of the use of a tier 1 method, report "NE" in the corresponding CRF tables.	Resolved. Bulgaria provided information in its NIR (section 6.4.1, p.314) on how it reported dead organic matter using a tier 1 method and reported "NE" in CRF table 4.B.
L.10	4.B.1 Cropland remaining cropland – CO_2 (L.11, 2016) (L.11, 2015) Transparency	Include in the NIR an explanation of the default assumptions from the 2006 IPCC Guidelines that were used for below-ground biomass of perennial trees in agricultural systems.	Resolved. Bulgaria provided information in the NIR (section 6.4.3.1.2, p.317) on its use of the root-to-shoot ratio applicable to the conditions in the United States of America and justified its selection.
L.11	4.B.1 Cropland remaining cropland – CO_2 (L.12, 2016) (L.12, 2015) Accuracy	Develop country-specific estimates for all pools, in particular those that are significant.	Not resolved. Bulgaria continued to apply default methods for estimating all carbon pools. During the review, Bulgaria indicated that it will address this issue in future submissions but did not specify when.
L.12	4.C.1 Grassland remaining grassland – CO_2 (L.13, 2016) (L.13, 2015) Accuracy	Include in the NIR information on changes in carbon stock in the dead organic matter pool.	Not resolved. No additional information was provided in the NIR. During the review, Bulgaria indicated that it will address this issue in future submissions but did not specify when.
L.13	4.C.2 Land converted to grassland – CO_2 (L.14, 2016) (L.14, 2015) Completeness	Include consideration of the dead organic matter pool in the NIR to ensure the completeness of the reporting.	Not resolved. Bulgaria continues to report the carbon stock change for land converted to grassland as "NE" or "NO". During the review, Bulgaria indicated that it will address this issue in future submissions but did not specify when.
L.14	4(V) Biomass burning – CH_4 and N_2O (L.15, 2016) (L.15, 2015) Accuracy	Provide the recalculated figures for CH_4 and N_2O emissions in the annual submission.	Resolved. Bulgaria provided consistent data in CRF table 4(V) and its NIR (section 6.3.1.1, table 207, p.301).

Waste

| W.1 | 5.A Solid waste disposal on land – | Make further efforts to increase transparency by reporting on the | Addressing. In its NIR (section 7.2.3.2, p.345), Bulgaria clarified that a detailed description of |

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	CH$_4$ (W.2, 2016) (W.2, 2015) (74, 2014) Transparency	industrial waste amounts and the types considered.	methodology for collecting information about industrial waste assimilated to MSW in the country would be provided later. During the review, Bulgaria provided a transcript of the current methodology for collecting MSW, noting that companies may use their own landfills to dispose of specific waste generated by their activities.
W.2	5.A Solid waste disposal on land – CH$_4$ (W.12, 2016) (W.12, 2015) Transparency	Provide separate data on the amount of sludge disposed to landfills in the NIR.	Resolved. In its NIR (section 7.2.3.2, table 236, p.344), Bulgaria provided AD for sludge for 2005–2016 and provided an extrapolated value for 2004 (see ID# W.15 in table 5).
W.3	5.A Solid waste disposal on land – CH$_4$ (W.14, 2016) (W.14, 2015) Transparency	Document the revised waste composition and DOC values used for the revised CH$_4$ emission estimates.	Resolved. Bulgaria documented the revised waste composition and DOC values in its NIR (section 7.2.3.2, p.346).
W.4	5.A Solid waste disposal on land – CH$_4$ (W.15, 2016) (W.15, 2015) Transparency	Document the application of the oxidation factor of zero for unmanaged solid waste disposal sites when reporting the corresponding CH$_4$ emission estimates.	Resolved. In its NIR (section 7.2.3.2, p.350), Bulgaria clarified that the oxidation factor of zero was used for unmanaged solid waste disposal sites when reporting the corresponding CH$_4$ emission estimates for the entire time series.
W.5	5.A Solid waste disposal on land – CH$_4$ (W.16, 2016) (W.16, 2015) Transparency	Document the application of the k value in line with the 2006 IPCC Guidelines when reporting the corresponding CH$_4$ emission estimates.	Resolved. In its NIR (section 7.2.3.2, p.350), Bulgaria clarified that the k value used for estimation of CH$_4$ from bulk waste was adjusted for the entire time series to reflect the default value from the 2006 IPCC Guidelines.
W.6	5.A.2 Unmanaged waste disposal sites – CH$_4$ (W.13, 2016) (W.13, 2015) Accuracy	Report appropriate DOC values for the time series 1950–2001 in accordance with the default waste composition from the 2006 IPCC Guidelines.	Resolved. In its NIR (section 7.2.3.2, p.347), Bulgaria clarified that both default waste composition and default DOC values in different MSW components were used in the calculations. The default waste composition and default DOC values adhered to the 2006 IPCC Guidelines (vol. 5, chapter 2, tables 2.3 and 2.4, respectively). The ERT did not identify any errors in the CH$_4$ emissions reported in CRF table 5.A.
W.7	5.D Wastewater treatment and discharge – CO$_2$, CH$_4$ and N$_2$O (W.18, 2016) (W.18, 2015) Transparency	Include transparent information on the allocation of the emissions from CH$_4$ recovery and carefully classify the CH$_4$ recovered from wastewater treatment plants to the correct type of fuel.	Resolved. In its NIR (section 7.5.3.3, p.364), Bulgaria indicated that emissions from the utilization of recovered CH$_4$ were reported in the energy sector under fuel combustion subcategory 1.A.4. The CH$_4$ recovered was properly classified as gaseous fuels and biomass.
W.8	5.D.1 Domestic wastewater – CH$_4$ (W.17, 2016) (W.17, 2015) Transparency	Document the AD and the method used to estimate CH$_4$ emissions from latrines.	Resolved. In its NIR (section 7.5.3.2.1, p.361), Bulgaria clarified that, according to the National Statistical Institute, wastewater treated in latrines was one of four categories of CH$_4$ emission sources from wastewater treatment. The MCF used to calculate emissions was 0.1, which was

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
			the IPCC default value for latrines, used by small families in dry climates. The historic distribution of wastewater treatment from 1988 to 2016 is detailed in the NIR (table 246, p.262).

KP-LULUCF

KL.1	General (KP-LULUCF) – CH$_4$ and N$_2$O (KL.8, 2016) (KL.8, 2015) Accuracy	Provide revised values for the background level and margin for AR and FM, and 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.	Resolved. The background level and margin were revised in CRF table 4(KP-1)B.1.3 and CRF table 4(KP-1)A.1.1. Bulgaria provided information in the NIR (section 11.4.4, p.405) on revised background level and margin values as well as the methods used to estimate these based on other natural disturbance events (see ID#s KL.16 and KL.18 in table 5).
KL.2	General (KP-LULUCF) – all gases (KL.9, 2016) (KL.9, 2015) Transparency	Strengthen QC procedures to ensure that information in the NIR on the intention to use the natural disturbance provision to exclude emissions from natural disturbances apply to both AR and FM areas, to ensure the transparency of the reporting.	Addressing. Bulgaria, in its NIR (section 11.5.2.4, pp.407–408), provided information on background level and margin values and stated its intention to apply natural disturbance provisions for FM. However, the first sentence of section 11.5.2.4 (p.407) mistakenly refers to AR only rather than to both AR and FM.
KL.3	AR – CO$_2$ (KL.5, 2016) (KL.5, 2015) Accuracy	Strengthen QC procedures to avoid errors in table entries as well as inconsistencies in the reporting of data in the NIR and the CRF tables, and provide the correct area under AR for 1990 in the next annual submission.	Resolved. The original submission of CRF table NIR-2 of 14 April 2018 reflected the correct entries for 1990.
KL.4	AR – CO$_2$ (KL.4, 2016) (KL.4, 2015) Adherence to the UNFCCC Annex I inventory reporting guidelines	Consistently apply the notation keys, 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".	Resolved. Bulgaria followed the recommendation (net carbon stock change in deadwood per area was reported as "NE" in CRF table 4(KP-I)A.1 and justification was provided in NIR section 6.3.2.2.2.1, p.308).
KL.5	AR – CO$_2$ (KL.4, 2016) (KL.4, 2015) Comparability	Include an explanation in the documentation box of the CRF tables where the notation key "IE" is used.	Not resolved. While carbon stock changes in below-ground biomass were reported using the notation key "IE", the ERT could not find any information in the NIR or CRF tables to clarify precisely where they were included.
KL.6	AR – CO$_2$ (KL.2, 2016) (KL.2 2015) (90, 2014) Transparency	Transparently describe in the NIR how the carbon loss on land subject to AR is estimated.	Not resolved. The NIR does not contain information on carbon loss in areas subject to AR.
KL.7	AR – CH$_4$ and N$_2$O (KL.8, 2016) (KL.8. 2015) Accuracy	Strengthen QC procedures to ensure that the estimated figures for the background level and margin for AR and FM are accurately reported.	Resolved. Background level and margin values were reported accurately in both NIR table 261 (p.406) and CRF table 4(KP-I)A.1.1 suggesting QC procedures have been strengthened.
KL.8	Deforestation – CO$_2$ (KL.6, 2016))	Strengthen QC procedures to avoid errors in table entries as well as inconsistencies in the reporting of data in the NIR and the CRF tables	Resolved. The original submission of CRF table NIR-2 of 14 April 2018 reflected the correct entries for 1990.

ID#	Issue and/or problem classification[a, b]	Recommendation made in previous review report	ERT assessment and rationale
	(KL.6, 2015) Accuracy	and provide the correct area under deforestation for 1990 in the next annual submission.	
KL.9	Deforestation – CO_2 (KL.3, 2016) (KL.3, 2015) (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 2014 NIR in accordance with the value reported in CRF table 5(KP-I)A.2).	Resolved. The same figure was consistently reported in CRF table 4(KP-1)A.2 and under "Deforestation" in NIR table 264 (p.409).
KL.10	FM – CO_2 (KL.7, 2016) (KL.7, 2015) Accuracy	Strengthen QC procedures to avoid errors in table entries as well as inconsistencies in the reporting of data in the NIR and the CRF tables and provide the correct area under FM for 1990 in the next annual submission.	Resolved. The original submission of CRF table NIR-2 of 14 April 2018 reflected the correct entries for 1990.
KL.11	FM – CO_2 (KL.10, 2016) (KL.10, 2015) Accuracy	Include an estimate of when the additional technical corrections are expected to be in place.	Resolved. Bulgaria, in its NIR (section 11.5.2.3, p.407), provided the information requested by the previous ERT. A technical correction will be made to the FMRL in the 2017–2018 period taking into account data from the national forest inventory (2016) and estimates of harvested wood products will be updated in line with the Kyoto Protocol Supplement.
KL.12	FM – CO_2 (KL.11, 2016) (KL.11, 2015) Consistency	Provide, in the CRF information table on accounting for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, 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 CO_2 eq).	Resolved. The CRF information table on accounting now reflects the FMRL inscribed in the annex to decision 2/CMP.7 (see ID# KL.20 in table 5).
KL.13	Harvested wood products – CO_2 (KL.12, 2016) (KL.12, 2015) Transparency	Provide in the NIR transparent information on the calculation of emissions from harvested wood products.	Not resolved. Additional information was not provided in the NIR. During the review, Bulgaria stated that it will implement the recommendation of the previous ERT in its 2019 NIR.

[a] References in parentheses are to the paragraph(s) and the year(s) of the previous review report(s) where the issue and/or problem was raised. Issues are identified in accordance with paragraphs 80–83 of the UNFCCC review guidelines and classified as per paragraph 81 of the same guidelines. Problems are identified and classified as problems of transparency, accuracy, consistency, completeness or comparability in accordance with paragraph 69 of the Article 8 review guidelines, in conjunction with decision 4/CMP.11.

[b] The review of the 2017 annual submission of Bulgaria did not take place during 2017 and, as such, the 2017 ARR was not available at the time of this review. Therefore, the recommendations reflected in table 3 are taken from the 2016 annual review report. For the same reason, the year 2017 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 2018 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

ID#	Previous recommendation for the issue identified	Number of successive reviews issue not addressed[a]
General		
	No such general issues were identified	
Energy		
E.5	Conduct a tier 2 estimation of CO_2 emissions from gasoline using country-specific EFs (CO_2 emission estimates resulting from the COPERT model may serve to cross-check the tier 2 estimates)	4 (2014–2016 and 2018)
E.9	Develop a country-specific EF for fugitive CH_4 emissions from underground coal mining and handling to enable a higher-tier method to be applied for this category	4 (2014–2016 and 2018)
IPPU		
I.12	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 in the inventory	5 (2013–2016 and 2018)
Agriculture		
	No such issues for the agriculture sector were identified	
LULUCF		
L.5	Apply a higher-tier method to estimate emissions and removals from the dead organic matter and soil carbon pools	5 (2013–2016 and 2018)
Waste		
W.1	Make further efforts to increase transparency by reporting on the industrial waste amounts and the types considered	4 (2014–2016 and 2018)
KP-LULUCF		
KL.6	Transparently describe in the NIR how the carbon loss on land subject to AR is estimated	4 (2014–2016 and 2018)

[a] The review of the 2017 annual submission of Bulgaria did not take place during 2017. Therefore, the year 2017 is not taken into account when counting the number of successive years in table 4. In addition, as the reviews of the 2015 and 2016 annual submissions were held in conjunction with each other, they are not considered successive years and 2015/2016 is considered as one year.

V. Additional findings made during the individual review of the 2018 annual submission

10. Table 5 contains findings made by the ERT during the individual review of the 2018 annual submission of Bulgaria that are additional to those identified in table 3.

Table 5
Additional findings made during the individual review of the 2018 annual submission of Bulgaria

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
General			
G.4	Article 3, paragraph 14, of the Kyoto Protocol	Bulgaria reported in its NIR (section 15, p.418) information on the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The ERT noted that the related information reported in the 2018 NIR was the same as that in the 2016 NIR. During the review, Bulgaria confirmed that no changes had been made to the above information since the previous submission. The ERT recommends that Bulgaria highlight any changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol.	Yes. Adherence to reporting guidelines under Article 7, paragraph 1, of the Kyoto Protocol
G.5	CRF tables	Bulgaria reported the notation keys "IE" and "NE" for several categories; for example, "IE" for categories 1.A.3.v (CO_2 emissions), 1.A.4.c.iii (CO_2, CH_4 and N_2O emissions) and 1.B.2.b.1 (CO_2, CH_4 and N_2O emissions); and "NE" for some LULUCF categories (e.g. 4.B.1 CO_2 emissions from dead organic matter and mineral soils). In the 2018 NIR (p.57), the Party stated that CRF table 9 provides information regarding completeness. However, the ERT noted that this table is blank for the entire time series for sources and sinks reported as "NE" or as "IE". During the review, Bulgaria stated that this was due to confusion around which parts of the CRF tables were compiled manually and which were compiled automatically in CRF Reporter. The Party informed the ERT that CRF table 9 will be completed using CRF Reporter for the next annual submission. The ERT recommends that Bulgaria complete CRF table 9 using CRF Reporter.	Yes. Comparability
G.6	CRF tables	According to the 2006 IPCC Guidelines, it is good practice to fill in information for all entries in all tables used by countries to summarize their inventory data. The ERT noted that Bulgaria's CRF table 6 is not filled in completely. Some information regarding the notation keys "NE", "IE" and "NO" is missing. During the review, the Party informed the ERT that this was due to confusion around which parts of the CRF tables were compiled manually and which were compiled automatically in CRF Reporter. The Party informed the ERT that CRF table 6 will be completed using CRF Reporter for the next annual submission. The ERT recommends that Bulgaria fill in information for all entries in CRF table 6.	Yes. Comparability
G.7	Key category analysis	According to the UNFCCC Annex I inventory reporting guidelines each Party, in its NIR, must provide a summary table with the key categories identified for the latest reported year (by level and trend) and should use table 4.4 of volume 1 of the 2006 IPCC Guidelines. The ERT noted that Bulgaria did not include a summary table in its NIR with the key categories identified for the latest reported year (by level and trend). During the review, Bulgaria provided the summary table for key categories identified for the latest reported year (by level and trend). The ERT recommends that Bulgaria include the summary table for key categories identified for the latest reported year (by level and trend) (e.g. in section 1.5 of its NIR).	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines

ID#	Finding classification	Description of the finding with recommendation or encouragement	*Is finding an issue and/or a problem?[a] If yes, classify by type*
G.8	QA/QC and verification	Bulgaria, in its NIR (section 1.3.1, p.43), provided information on QA/QC activities, including the responsibilities of all engaged institutions for the implementation of QA/QC procedures. During the review, Bulgaria provided the QA/QC plan and QA/QC checklists for all sectors, but did not provide any information on the kind of QA/QC activities that were performed by the inventory compiler in preparing the NIR, including QC activities to ensure consistency with the CRF tables. In response to questions raised by the ERT during the review, the Party informed the ERT that each sectoral expert should ensure consistency between the NIR and CRF tables. Bulgaria stated that the QC checklist indicated only to "check data for consistency between the CRF tables and calculations", not to "check data for consistency between the CRF tables and NIR". Bulgaria informed the ERT that the QC checklist will be revised for the next inventory cycle.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
		The ERT noted several instances where QA/QC activities were not appropriately implemented. It identified inconsistencies between the NIR and CRF tables (e.g. between aggregate GHG emissions for the agriculture sector and category 3.B for 2016 reported in the NIR (table 158, p.255) and CRF table 10s1 2018 and between N_2O emissions for 2016 reported in the NIR (table 157, p.255) and CRF table 10s4), incorrect cross references (e.g. the annotated outline of the NIR in footnote 9) and old information that had not been removed from the NIR (e.g. source-specific recalculations for category 2.B.8 (petrochemical and carbon black production) in NIR section 4.3.8.7).	
		The ERT recommends that Bulgaria revise the checklist for QC activities and strengthen QA/QC procedures to avoid inconsistencies between the NIR and CRF tables. The ERT also recommends that Bulgaria allocate sufficient time and human resources to the final stages of the inventory compilation process in which cross-sectoral work occurs, enhance its QC procedures so that similar inconsistencies are avoided and document in the NIR any updated procedures implemented.	
G.9	Uncertainty analysis	In the 2018 NIR (table 11, p.57), Bulgaria reported a comparison of the percentage uncertainty in the total GHG emissions reported in the 2018 NIR (uncertainty in total GHG emissions, 14.89 per cent; and overall uncertainty in the trend in total GHG emissions, 2.33 per cent) with those reported in the 2017 NIR (uncertainty in total GHG emissions, 12.75 per cent; and overall uncertainty in the trend in total GHG emissions, 1.84 per cent), but it did not provide an explanation of the increase in uncertainty in the 2018 NIR. During the review, Bulgaria stated that the difference was due to the significant increase in emissions in two categories (3.D.1 direct N_2O emissions from managed soils and 3.D.2 indirect N_2O emissions from managed soils) from 2015 to 2016, as well as the recalculation of emissions for several categories for the base year.	Yes. Transparency
		The ERT recommends that Bulgaria explain the differences in the calculated uncertainty estimates between submissions.	
G.10	Uncertainty analysis	Bulgaria performed a quantitative uncertainty assessment following approach 1 of the 2006 IPCC Guidelines. The uncertainty assessment provided in table 11 of the 2018 NIR, and tables 277 and 278 of annex 2 to the NIR, was performed for the latest inventory year (2016) and the trend between the base year and the latest inventory year. However, in accordance with paragraph 15 of the UNFCCC Annex I inventory reporting guidelines, the quantitative	Yes. Adherence to the UNFCCC Annex

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		uncertainty assessment is to be performed for at least the base year and the latest inventory year and for the trend between these two years. During the review, Bulgaria provided an uncertainty estimate for the base year without LULUCF.	I inventory reporting guidelines
		The ERT recommends that Bulgaria include the quantitative uncertainty assessment for the base year for all source and sink categories in its NIR.	
Energy			
E.14	1.A. Fuel combustion – sectoral approach – liquid fuels – CO_2, CH_4 and N_2O	The ERT noted systematic differences between the IPCC default and internationally reported values that are attributable to NCVs of some liquid fossil fuel for LPG (+14 per cent for 2004–2006), refinery feedstock (–5 per cent for all years) and gas/diesel oil (–1 per cent). During the review, Bulgaria indicated that the NCVs for LPG for 2004–2006 were the original values provided by Lukoil Neftohim oil refinery (Bulgaria's liquid fuel producer). The Party also explained that the National Statistical Institute was not planning to update the figures for periods that were more than 10 years ago, in order to avoid potential discrepancies with internationally reported values.	Yes. Accuracy
		The ERT recommends that Bulgaria provide evidence – in the form of references to reports, publications or reference material – that the calorific values were accurately determined by Lukoil Neftohim oil refinery or use the same value of 46 MJ/kg for the years 2004–2006 instead of the values shown in the national energy balance.	
E.15	1.A.1.c Manufacture of solid fuels and other energy industries – CO_2, CH_4 and N_2O	Although coal is mined through surface and underground operations in Bulgaria, as indicated in its NIR (section 3.4.1, p.155), emissions for category 1.A.1c(iii) (other energy industries) were reported as "NO". During the review, Bulgaria indicated that emissions from fuel combustion in coal mines are reported under subcategory 1. A.1.c.i. (manufacture of solid fuels).	Yes. Comparability
		The ERT recommends that Bulgaria report emissions from fuel combusted during coal mining operations under category 1.A.1.c.iii in line with the 2006 IPCC Guidelines (chapter 2, table 2.1).	
E.16	1.B.1.a Coal mining and handling – CH_4	Bulgaria indicated in its NIR (section 3.4.6, p.161) that, although coal currently produced is not upgraded, information obtained from certain coal mines indicated that some coal upgrade facilities existed previously but were closed down more than a decade ago (see ID# E.8 in table 3).	Not an issue/problem
		Until such a time as Bulgaria can collect data for the missing years (from the base year to 2011) the ERT encourages the Party to use any proxy data or the data splicing techniques referred to in the 2006 IPCC Guidelines (vol. 1, chapter 5) to revise the estimates for the beginning of the period.	
IPPU			
I.26	2.B.1 Ammonia production – CO_2	The ERT noted a lack of transparency in some areas of the NIR (e.g. ammonia production volumes) and some IEF deviations for 1991 and 1998. During the review, Bulgaria checked whether there had been a technical error for	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		these two years but concluded that, even if there had, it would not have led to a change in overall emissions since, under the tier 2 method, emissions from ammonia production are subtracted owing to their use in urea production.	
		The ERT recommends that Bulgaria include the years of urea production (1988–2003) in NIR table 119 for clarity, and include more detailed information regarding the CO_2 emissions from ammonia production used to produce urea, to facilitate a better understanding of the emissions. The ERT also recommends that Bulgaria ensure the title of the relevant chart in its NIR (figure 60, p.186) is correct. The ERT encourages Bulgaria to explore ways of reporting at least the aggregated total ammonia production volumes of all plants.	
I.27	2.B.8 Petrochemical and carbon black production – CO_2 and CH_4	The ERT noted that information about the production of vinyl chloride was not included in the NIR (section 4.3.8, p.198). During the review, Bulgaria confirmed that vinyl chloride production was not occurring in Bulgaria. The ERT recommends that Bulgaria state in its NIR (section 4.3.8) that vinyl chloride production is not occurring.	Yes. Transparency
I.28	2.B.8 Petrochemical and carbon black production – CO_2 and CH_4	Bulgaria stated in its NIR (section 4.3.8.7, p.201) that calculations of the emissions from ethylene and ethylene dichloride production had been included in the reporting for the first time. However, the ERT noted that Bulgaria had already included these emissions in its 2017 NIR. When questioned on the issue during the review, Bulgaria confirmed that the text should be removed. The ERT recommends that Bulgaria revise the text in its NIR to avoid reporting that emissions from ethylene and ethylene dichloride production had been included in the reporting for the first time.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
I.29	2.D.3 Other (non-energy products from fuels and solvent use) – CO_2	The ERT noted that Bulgaria included CO_2 emissions from the road-transport use of urea-based additives in catalytic converters under category 2.D.3.d (also documented in NIR section 4.5.3, p.219) and reported that this was a small but growing source. Bulgaria uses the method set out in the *EMEP/EEA Air Pollutant Emission Inventory Guidebook 2013* (part B, p.48), although there is a method in the 2006 IPCC Guidelines (equation 3.2.2). In response to questions during the review, Bulgaria stated that it was not considering changing the method used because the two equations were essentially the same. In addition, the ERT noted that Bulgaria does not currently include off-road vehicles and other machinery in its inventory. During the review, Bulgaria indicated that, according to vehicle registration data, around 3 per cent of off-road vehicles (tractors) were under 10 years old, while the majority were 11 or more years old (18 per cent were 11–15 years old, 9 per cent 16–20 years old and 70 per cent over 20 years old), and that only a fraction of newer vehicles (with Euro 5 and Euro 6 engines, i.e. under 10 years old) would potentially be equipped with urea-based selective catalytic reduction systems. Bulgaria believes that the volume of emissions from such systems would be insignificant. The ERT recommends that Bulgaria use the method set out in the 2006 IPCC Guidelines to estimate CO_2 emissions from the road-transport use of urea-based additives in catalytic converters under category 2.D.3.d and justify any	Yes. Accuracy

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		differences between the two methods in its NIR. The ERT also recommends that Bulgaria include emissions from urea-based selective catalytic reduction systems in off-road machinery for the entire time series.	
I.30	2.D.3 Other (non-energy products from fuels and solvent use) – CO_2	The ERT noted that the methods used to calculate emissions from paint application, degreasing and dry cleaning and chemical products presented in the NIR (section 4.5.4.3.3, table 133, p.224) were not clearly documented. During the review, Bulgaria explained that the EF of 0.013286 kt CO_2 per 1,000 people was applied to all categories in which solvents were used and that emissions from other product use, printing and domestic solvent use were subtracted from the resulting emissions. In addition, the ERT noted that NMVOC emissions reported under the Convention on Long-range Transboundary Air Pollution and the EU national emission ceilings directive (all category 2.D.3 sources, including emissions from other product use, printing and domestic solvent use, total 13.04 kt NMVOCs) are lower than those reported under category 2.D.3 (36.96 kt NMVOCs). The ERT recommends that Bulgaria document the methods used to calculate emissions from paint application, degreasing and dry cleaning and chemical products clearly in the NIR and also show all numeric calculations for all years (e.g. in tabular format). The ERT encourages Bulgaria to check the NMVOCs reported to the UNFCCC and consider using the same emission data, or the same estimation methods, for its reporting to the UNFCCC as for its reporting under the Convention on Long-range Transboundary Air Pollution and the EU national emission ceilings directive.	Yes. Transparency
Agriculture			
A.24	3. General (agriculture)	The ERT noted that NIR table 157 (p.255) shows N_2O emissions from the agriculture sector (in Gg) of 26.22 (1988), 22.84 (1990), 11.03 (1995), 9.75 (2000), 10.39 (2005) and 12.15 (2010), while CRF table 10s4 shows N_2O emissions (in kt) of 26.10 (1988), 22.72 (1990), 10.97 (1995), 9.69 (2000), 10.33 (2005) and 12.10 (2010). The ERT also noted that NIR table 158 (p.255) shows Gg CO_2 eq emissions from the agriculture sector of 13,804.27 (1988), 12,496.46 (1990), 5,951.47 (1995), 5,222.30 (2000), 5,186.35 (2005) and 5,468.07 (2010), while CRF table 10s1 shows Gg CO_2 eq emissions for the agriculture sector of 13,767.95 (1988), 12,461.57 (1990), 5,933.28 (1995), 5,205.33 (2000), 5,170.04 (2005) and 5,454.64 (2010). During the review, in response to a request for clarification, Bulgaria stated that the numbers in the CRF tables are correct and the necessary amendments will be made in the next submission. The ERT recommends that Bulgaria improve the QA/QC procedures to be applied to resolve inconsistencies within the NIR and between the NIR and the CRF tables regarding total N_2O emissions and total CO_2 eq emissions from the agriculture sector.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
A.25	3. General (agriculture)	Bulgaria, in its NIR (section 5.3.4, p.257), explained that the "comparison of emissions using alternative approaches" was one of its QA/QC activities. However, it did not include any further information on the results of the comparison. In response to a question raised by the ERT during the review, Bulgaria clarified that comparisons had been made using a tier 1 method or a combination of tier 1 and tier 2 methods (e.g. a comparison of N excreted by poultry showed a 4 per cent difference in 2015 between tier 1 and tier 2 methods) and had subsequently decided	Not an issue/problem

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		that the country-specific data were more accurate. The ERT noted that such comparisons could help the reader to fully understand the impact of different methods used for estimating GHG emissions.	
		The ERT encourages Bulgaria to include the results of any category-specific QA/QC activities undertaken to improve the transparency of its QA/QC and verification processes.	
A.26	3. General (agriculture)	NIR table 183 (p.276) shows the swine population size by subcategory. The total reported population for 2016 is 607,249 heads. However, the ERT noted that NIR table 169 (p.264) shows a total swine population of 608,250 heads for 2016 – the same number reported in CRF table 3.B(b). During the review, Bulgaria explained to the ERT that the difference between the total reported swine populations was caused by an error in the population size of the subcategory for pigs greater than 110 kg and boars, which was 26,347 heads for 2016, not 25,347 heads as reported in NIR table 183. Bulgaria also confirmed that the population reported for swine categories in the CRF tables and NIR table 169 were correct.	Yes. Adherence to the UNFCCC Annex I inventory reporting guidelines
		The ERT recommends that Bulgaria address inconsistencies between NIR tables 169 and 183 on the swine population and between the NIR and its CRF tables.	
A.27	3.B Manure management – CH_4	The applied MCFs in NIR table 177 (p.272) reflect the default values from the 2006 IPCC Guidelines for a cool climate. However, Bulgaria did not specify or justify the temperature chosen from the cool climate allocation range ($\leq$ 10–14 °C) to represent the national weather circumstances. During the review, Bulgaria clarified that 12 °C had been selected according to the National Environment Report (available at http://eea.government.bg/bg/soer/2014/climate/climate0 in Bulgarian only). The ERT considers Bulgaria's response reasonable.	Yes. Transparency
		The ERT recommends that Bulgaria provide in its NIR justification of the specific temperature value chosen (12 °C), especially if the source of the information is available only in Bulgarian, in order to improve transparency.	
A.28	3.B Manure management – N_2O	The NIR (section 5.5.2.1, p.272) explains that N_2O emissions from poultry manure management were estimated by applying an MMS distribution of 50 per cent dry lot and 50 per cent solid storage and default EFs for solid storage (0.005 kg N_2O-N/kg N excreted) and dry lot (0.02 kg N_2O-N/kg N excreted). The ERT was unable to check Bulgaria's estimate. During the review, Bulgaria recognized that its NIR lacked sufficient explanation of N_2O emissions from poultry manure management and indicated that the IEF for poultry is the weighted average of several categories (layers, broilers, turkeys and ducks) and that values for maximum theoretical methane-producing capacity and volatile solids are taken from table 10A-9 in annex 10A.2 of volume 4 of the 2006 IPCC Guidelines. The Party further clarified that MMS distributions are calculated as 50 per cent dry lot and 50 per cent solid storage for poultry, and 100 per cent solid storage for other categories of poultry (turkeys, ducks, etc.).	Yes. Transparency
		The ERT recommends that, to improve transparency, Bulgaria explain in the NIR how the N_2O IEF for poultry is calculated, the sources of parameters chosen for maximum theoretical methane-producing capacity and volatile solids and the MMS distribution chosen.	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
A.29	3.B.1 Cattle – N$_2$O	The NIR (section 5.5.2.2.1, p.274) explains that the Nex values for cattle were recalculated in accordance with new AD on the feeding characteristics of cattle sourced from the Institute of Animal Science. The ERT tried to access the information via the link provided in the NIR to check the values and methods applied but was unsuccessful. During the review, Bulgaria provided information on the feeding characteristics of cattle in the country. The information was available in Bulgarian only, although the Party had annotated the information used in the Nex estimations in English. The ERT recommends that Bulgaria provide a detailed explanation in its NIR of the methods and values applied to estimate Nex for cattle in order to improve transparency.	Yes. Transparency
A.30	3.B.3 Swine – CH$_4$	The NIR (section 5.5.2.1, p.271) explains that Bulgaria applied country-specific values for digestible energy and gross energy for each swine subcategory, determined using data from scientific studies published in the *Global Journal of Science Frontier Research* (volume 14, issue 5). However, the ERT was not provided with any reference for verification. During the review, Bulgaria provided the ERT with the journal and a calculation spreadsheet. The ERT was able to review all of Bulgaria's estimates. The ERT recommends that Bulgaria include a detailed explanation of the methods and values used to estimate CH$_4$ emissions from manure management of swine, in order to improve transparency.	Yes. Transparency
A.31	3.D.a.1 Inorganic N fertilizers – N$_2$O	Bulgaria explained in its NIR (section 5.7.2.1, p.283) that Frac$_{GASF}$ was recalculated using new data from the EMEP/EEA guidebook 2016. NIR table 191 (p.283) shows the AD used for the estimation of Frac$_{GASF}$. The ERT noted that the fertilizer types listed in table 191 represented 91 per cent of the estimated Frac$_{GASF}$ (with urea accounting for 31 per cent, ammonium nitrate 55 per cent, ammonium sulfate 4 per cent and calcium ammonium nitrate 1 per cent). According to table A1.2 (part B.3.D, p.28) of the EMEP/EEA guidebook 2016, ammonium phosphate accounts for the remaining 9 per cent. During the review, Bulgaria clarified that ammonium phosphate had mistakenly been removed from the original table. In addition, the ERT noted that table A1.2 of the EMEP/EEA guidebook 2016 was based on sales data from the International Fertilizer Association for 2014, which showed Bulgaria's country-specific data (by fertilizer) for N production, import, export and consumption. When questioned by the ERT about the applicability of these data to the Party's GHG estimate, Bulgaria stated that the International Fertilizer Association's data pertaining to Bulgaria were unofficial. The ERT recommends that Bulgaria include ammonium phosphate in the emission calculations. The ERT also recommends that Bulgaria include detailed information in its NIR on the rationale for choosing a Frac$_{GASF}$ value from the EMEP/EEA guidebook 2016.	Yes. Accuracy
A.32	3.D.a.1 Inorganic N fertilizers – N$_2$O	Bulgaria reported consumption of 356,913.00 t N for synthetic fertilizers for 2016 in NIR table 194 (p.285) and CRF table 3.D. Bulgaria also reported in its NIR (p.284) that data on the consumption of synthetic fertilizers were provided annually by the Bulgarian Food Safety Agency and National Plant Protection Service and cross-checked with the National State of the Environment Report, which was published annually on the website of the Executive Environment Agency. Furthermore, data were provided annually to Eurostat. However, the ERT noted that the	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
	3.D.b.1 Atmospheric deposition – N$_2$O 3.D.b.2 Nitrogen leaching and run-off – N$_2$O	Eurostat website (http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=aei_fm_usefert&lang=en) reported 365,913.00 t N synthetic fertilizer consumption for 2016 for Bulgaria (i.e. 9,000 t N more than was reported in the NIR and CRF tables). During the review, Bulgaria clarified that it had noted the difference between the reported data and the figures on the Eurostat website and had checked them against the 2017 Agricultural Report (table V.3, p.124) of MAFF. It transpired that the correct figure was 365,913.0 t N for 2016. The ERT thus concluded that the N$_2$O emissions from inorganic N fertilizers had potentially been underestimated for 2016 and included this 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 recalculated emissions from inorganic N fertilizers for 2016 (3.D.a.1), atmospheric deposition for 2016 (3.D.b.1) and nitrogen leaching and run-off for 2016 (3.D.b.2) using the correct figures for the consumption of synthetic fertilizers in 2016. The revised estimates, in the view of the ERT, resolved the problem and were subsequently reported in the official resubmission of the 2018 CRF tables for 2016. The ERT recommends that Bulgaria revise the relevant section of its NIR to reflect the correct AD in table 194 for synthetic fertilizer consumption.	
A.33	3.D.a.2.b Sewage sludge applied to soils – N$_2$O	The NIR (section 5.7.1, p.282) identifies sewage sludge spreading on agricultural soils as a direct N$_2$O emission source. However, Bulgaria did not mention how sewage sludge AD were gathered, managed or coordinated for the waste sector (where volumes of sewage sludge came from) to prevent N$_2$O emissions from being double counted. During the review, Bulgaria explained that the data for sewage sludge were provided by the Waste Monitoring Department of the Executive Environment Agency. Bulgaria also explained that N$_2$O emissions from wastewater treatment and discharge under the waste sector were indicated as "IE" in the CRF tables to prevent N$_2$O emissions from being double counted. To improve the transparency of the reporting, the ERT recommends that Bulgaria include detailed information about the source of sewage sludge applied to agricultural soils and explain how AD are coordinated between the agriculture and waste sectors to prevent N$_2$O emissions from being double counted in the inventory.	Yes. Transparency
A.34	3.D.a.4 Crop residues – N$_2$O	The NIR (section 5.7.2.1, p.283) explains that the annual amount of N in crop residues returned to soils was calculated by applying default values for all parameters given in the 2006 IPCC Guidelines, except for dry matter values, which were based on national values. Annual harvested area of crops and harvested yield for crops were provided by MAFF; dry matter fractions of crops are provided by the University of Agriculture of Plovdiv. However, the ERT noted that Bulgaria did not explicitly include the AD, parameters and other values used to estimate the amount of N in crop residues. During the review, Bulgaria provided the ERT with more detailed information, including the worksheets used to estimate the total amount of 249,275,207.94 kg N/year reported in CRF table 3.D for 2016.	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		The ERT recommends that Bulgaria include detailed information in its NIR on the process and parameters used to estimate N_2O emissions from the crop residues returned to soils (e.g. a table presenting information on the plant waste composition of a list of crops) in order to improve transparency.	
A.35	3.G Liming – CO_2	Bulgaria reports "NO" in CRF table 3.G-I for CO_2 emissions from liming for the entire time series. Bulgaria explained in its NIR (section 5.9, p.288) that no liming has taken place in Bulgaria since 1987. During the review, Bulgaria clarified that, after discussion with the Institute of Soil Science, Agrotechnology and Plant Protection in Sofia, it became clear that liming had not been carried out in the country since 1988. Following agricultural reforms and the closure of so-called "labour cooperative farms", liming became unprofitable. The ERT considers Bulgaria's response reasonable.	Yes. Transparency
		The ERT recommends that Bulgaria explain in the NIR that liming had not been carried out in the country since 1988, following agricultural reforms and the closure of so-called "labour cooperative farms", which made liming unprofitable, in order to improve the transparency of the report.	
LULUCF			
L.15	Land representation – all gases	The ERT noted that the discrepancy between the total area of the six land-use categories and the total land area of the country has been increasing in recent years (as stated in the NIR, section 6.2.2, p.299) and Bulgaria did not provide information on plans to improve land representation. During the review, Bulgaria explained that it was difficult to confirm whether or not the land in question was identifiable because of the multiple sources of data used for land representation. Bulgaria agreed that further investigation is needed to allocate the land to subcategories within the six land-use categories.	Yes. Accuracy
		The ERT recommends that Bulgaria review the assumptions used to assign land areas to other land and avoid unjustifiable increases in the land area that is assigned to the other land category, ensuring that the IPCC's definition is consistently applied and avoiding any possible omission or double counting in the reporting of the LULUCF sector.	
L.16	4.A Forest land – CO_2	In its NIR (section 6.3.1.1, p.300), Bulgaria explained that, despite the increase in forest area in 1988–2016, removals fell from –14,147.70 Gg CO_2 eq in 1988 to –5,927.11 Gg CO_2 eq in 2016. Bulgaria attributes this to a decrease in the rate of forest growth as the average age of forest stands increased steadily over the same period, in addition to cropland and grassland conversion to forest land, which cause carbon loss because of the high carbon content of their soils. The ERT noted that the Party applied the stock difference method, which requires high-quality data. The ERT also noted that the conversion of cropland and grassland to forest land in most cases should lead to an increase in carbon content rather than causing carbon loss. Therefore, the ERT, during the review, made a follow-up request for clarification as to whether this situation may be resulting from the data, methodology and assumptions used for land representation because of a lack of data on land-use change among the six IPCC categories.	Yes. Accuracy
		In response, Bulgaria stated that since 2000 there has been a steady increase in the rate of wood harvesting in Bulgaria, and provided figures to support its statement (e.g. 30 per cent higher in 2002 than in 2001 and almost 70	

|---|---|---|---|
		per cent higher in 2005 and 2010 than in 2001). The Party attributed the decline in removals to the relatively large share of coniferous plantations (60 per cent coniferous forest), since many coniferous plantations (almost 40 per cent) were planted at lower altitudes (below 1,000 m above sea level) in the past 40–50 years (90 per cent of plantations have a stand age of 30–60). The stands are not in good condition and drastically thinning and becoming slowly less productive. In addition, there is a large share of old coppice and low-stem forest (> 40 years) and 30 per cent of the growing stock is in stands aged 50 or more years, which are now intensively harvested.	
		The ERT recommends that Bulgaria review its data on land areas and removals, the assumptions used for land representation and other factors possibly affecting the removals trend in the forest land category (e.g. presence and condition of a large share of coniferous plantations at lower altitudes and the share of old coppice and low-stem forest which are now intensively harvested) and provide clear justification for the resulting removals trend in its submission.	
L.17	4.A.1 Land converted to forest land – CO_2	To estimate carbon stock changes in land converted to forest land, Bulgaria used the gain–loss method (2006 IPCC Guidelines, generic equation 2.4); however, the Party did not clearly document the detailed application of the method, including specifying at which tier it had been applied. Land converted to forest land is a key category and calls for the application of higher-tier methods. During the review, Bulgaria provided clarification on the detailed application of the method and data used, which was in line with the IPCC tier 2 method for land converted to forest land.	Yes. Transparency
		The ERT welcomes the information provided and recommends that Bulgaria include in its NIR a clarification on the detailed application of the gain–loss method, including data used.	
L.18	4.A.2 Land converted to forest land – CO_2	In its NIR (section 6.3.2.2.1, p.307), Bulgaria described how carbon stock changes in living biomass were estimated. However, it was unclear from the description which IPCC method Bulgaria had followed. Land converted to forest land is a key category and requires the application of a higher-tier method and disaggregated data where possible. The description of the methods used to estimate carbon stock change in living biomass for forest land remaining forest land evidenced the need to disaggregate by forest type (coniferous and deciduous). For land converted to forest land Bulgaria used an average value of annual biomass increment but did not clearly describe how the value had been derived and applied to all areas of land converted to forest land for the reported year regardless of forest type. During the review, Bulgaria clarified how the average annual biomass increment value had been derived, and agreed that further stratification of areas by forest type and tree species could be done to improve the estimation of carbon stock changes in living biomass.	Yes. Accuracy
		The ERT recommends that Bulgaria apply higher-tier methods to stratify and disaggregate data by forest type and species in the estimation of carbon stock changes in land converted to forest land, and provide improved estimates.	
L.19	4.B.1 Cropland remaining cropland – CO_2	In CRF table 4.B carbon stock changes in mineral soils for the two subcategories annual crops and perennial crops, under cropland remaining cropland, were reported using the notation key "NE". No information was provided in CRF table 9, and insufficient information was provided in NIR section 6.4.3.1.4, on the use of that notation key. In	Yes. Completeness

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		response to the issues raised during the review, Bulgaria attributed this to administrative and financial constraints. The Party also provided information on its intention to use formulation A, box 2.1, from the 2006 IPCC Guidelines for its next submission. Bulgaria also indicated its intention to further subdivide annual and perennial land by the different agricultural crops and management practices and conduct a study on data availability and the effect of different management practices on soil organic carbon content. Bulgaria stated that it is planning to increase its efforts (administrative and financial) to fulfil the reporting requirements for these pools and provide estimates in its next annual submission.	
		The ERT commends Bulgaria for its clear plan to meet the reporting requirements and provide estimates of carbon stock changes in mineral soils for the two subcategories annual and perennial crops under cropland remaining cropland, and recommends that Bulgaria report estimates of carbon stock changes in mineral soils for the two subcategories annual and perennial crops under cropland remaining cropland as planned.	
Waste			
W.9	5. General (waste)	Bulgaria used the symbol (▲) in NIR table 235 (p.340). During the review, Bulgaria informed the ERT that the symbol referred to which GHGs were estimated for each subcategory, and indicated that the table will be revised for the next annual submission.	Yes. Transparency
		The ERT recommends that Bulgaria improve the transparency of its NIR by providing a footnote to NIR table 235 clearly indicating that the symbol refers to which GHGs are estimated for each subcategory.	
W.10	5.A Solid waste disposal on land – CH$_4$	The ERT noted that the figures for degradable waste and DOC in NIR table 240 (p.347) were not clearly represented (i.e. whether the figures are applied to all the different waste compositions listed on the table rather than for food waste only). During the review, Bulgaria clarified that the figures are applied to all different waste compositions and indicated that the table will be improved for the next annual submission.	Yes. Transparency
		The ERT acknowledges the clarification provided and recommends that Bulgaria improve the transparency of the degradable waste and DOC values presented in the NIR by modifying the format of table 240.	
W.11	5.A Solid waste disposal on land – CH$_4$	In NIR section 7.2.3.2 (p.345), Bulgaria indicated that a detailed description of the methodology for collecting information about industrial waste assimilated to MSW in the country would be provided later (see ID# W.1 in table 3). During the review, Bulgaria provided a description of the current methodology for collecting MSW and indicated that companies may use their own landfills to dispose of specific waste generated by their activities. The ERT notes that the amount of industrial waste disposed of in onsite landfills at industrial sites may not be included in national statistics and therefore these emissions may currently not be reported. This incompleteness in the inventory could potentially lead to the underestimation of emissions from industrial solid waste. The ERT included this issue in the list of potential problems and further questions raised by the ERT.	Yes. Transparency
		In response to the list of potential problems and further questions, Bulgaria clarified that only inert material had been disposed of in private industrial landfills. Bulgaria indicated that this information was documented in accordance	

		with specific exploration and maintenance permissions for those particular landfills. Bulgaria informed the ERT that mineral residues originating from the energy, mining and metallurgy sectors account for the majority of the waste material. In addition, hazardous waste of mineral origin (e.g. filter dust dross or slag, containing or contaminated with heavy metals) may also be disposed of at private industrial landfill sites in specific cells. Bulgaria confirmed that industrial waste containing organic and/or household waste is not allowed to be put into private industrial landfills, but can be disposed of at municipal landfills.	
		On the basis of the justification provided, the ERT concluded that no underestimation of emissions had occurred and therefore no recalculation was necessary.	
		To increase the transparency of the NIR, the ERT recommends that Bulgaria include information on the current methodology for collecting information on MSW, as well as the methods used to quantify or estimate solid waste disposed of by the industrial sector, including solid waste disposed of in specific onsite industrial landfills.	
W.12	5.A Solid waste disposal on land – CH_4	The ERT noted that the calculation of the DOC value reported in an unnumbered table entitled "Default waste composition 1950–2001" in its NIR (section 7.2.3.2, p.347) was not clearly explained. During the review, Bulgaria informed the ERT that the NIR will be revised to correct the table numbering and to improve the table regarding DOC for the next annual submission.	Yes. Transparency
		The ERT recommends that Bulgaria improve the transparency of the DOC value presented in the table entitled "Default waste composition 1950–2001" in the NIR.	
W.13	5.A Solid waste disposal on land – CH_4	In its NIR (section 7.2.2, p.342), Bulgaria did not cite specific references regarding the trend in MSW disposal sites in Bulgaria. During the review, Bulgaria clarified that, according to national statistics, the number of MSW disposal sites in the country had gradually been decreasing since 2000.	Yes. Transparency
		The ERT recommends that Bulgaria improve the transparency of the NIR by clearly reporting on the gradual decrease in MSW disposal sites in the country since 2000.	
W.14	5.D Wastewater treatment and discharge – CH_4	In its NIR (section 7.5.3.2.1, p.361), Bulgaria explained that, according to the National Statistical Institute, four categories of CH_4 emission sources for wastewater treatment had been identified, one being wastewater treated in latrines. The MCF used to calculate emissions was 0.1. The ERT was unable to understand the rationale for using an MCF value of 0.1 for latrines, taking into consideration that, according to the 2006 IPCC Guidelines, the MCF can vary between 0.1 and 0.7. During the review, Bulgaria stated that the MCF value had been selected because of climate conditions in Bulgaria and the average number of persons per family (which is three, according to the National Statistical Institute).The ERT acknowledges the clarification provided, which is in accordance with the 2006 IPCC Guidelines and properly explains the selection of the MCF value.	Yes. Transparency
		The ERT recommends that Bulgaria include in the NIR a description of the national circumstances justifying the use of an MCF of 0.1 for latrines (e.g. regarding climate conditions in Bulgaria and the average number of persons per family) to enhance transparency.	

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
W.15	5.D Wastewater treatment and discharge – CH$_4$	In NIR section 7.2.3.2 (table 236, p.344), Bulgaria provided AD for sludge for 2005–2016 as well as an extrapolated value for 2004. According to the 2006 IPCC Guidelines (volume 5, p.3.12), three to five half-lives of AD are required for an accurate emission estimate. Since the half-life of sludge is four years according to the default values in table 3.4 of the 2006 IPCC Guidelines, 12 to 20 years would be required for adequate quantification of emissions. The ERT therefore asked Bulgaria to provide further evidence of how sludge was handled prior to 2004. During the review, Bulgaria clarified that, before the adoption of the regulation of order and method for the utilization of sewage sludge in agriculture in 2004, sewage sludge had been treated as hazardous waste and landfilled at municipal sites. Bulgaria indicated that it would conduct further extrapolation of the AD for sludge in accordance with the recommendation of the ERT.	Yes. Accuracy
		The ERT recommends that Bulgaria extend the extrapolation of the sludge AD to before 2004.	
KP-LULUCF			
KL.14	General (KP-LULUCF) – all gases	The ERT could not locate in the NIR the spatial assessment unit used to determine the area of accounting for ARD and FM, the reporting of which is required by decision 2/CMP.8, annex II, paragraph 2(c). In the NIR (section 11.2.1, p.382), two values are mentioned: the area of one FM unit subcompartment is 1–25 ha when forested, and the area of the non-forested unit is 0.1 ha. According to decision 2/CMP.8, annex II, paragraph 2(c), the spatial assessment unit used should be the same for determining the area for the accounting of the above-mentioned KP-LULUCF activities. During the review, Bulgaria explained that the spatial assessment concerns the area of subcompartments (1–25 ha) within the area of each SFE, and also that the average area of one subcompartment is 2.5 ha.	Yes. Transparency
		The ERT recommends that Bulgaria clearly report in its NIR the single spatial assessment unit used for determining the areas for the accounting of ARD and FM, as required by decision 2/CMP.8, annex II, paragraph 2(c).	
KL.15	General (KP-LULUCF) – all gases	According to decision 2/CMP.8, annex II, paragraph 2(b), Parties are required to report the geographical location of the boundaries of the areas of ARD and FM. In CRF tables 4(KP-1)A.1, 4(KP-1)A.1.1, 4(KP-I)A.2 and 4(KP-1)B.1, Bulgaria did not provide information on the geographical location of the boundaries of the lands encompassing the KP-LULUCF activities; instead, it included information on the land uses or land-use changes related to the KP-LULUCF activity areas (e.g. grassland converted to forest land, cropland converted to forest land) and disturbances, such as wildfires (the geographical location of which must also be reported). During the review, Bulgaria stated that the boundaries of the areas encompassing the units of lands subject to KP-LULUCF activities are the country's entire territory. The ERT understands, from the information provided by Bulgaria and from the data included in NIR table 254 (p.383), that the areas encompassing the KP-LULUCF activities are located in known SFEs, maps of which are updated every 10 years. Therefore, the ERT requested further clarification as to why Bulgaria did not report the specific geographical location of these land areas (such as the SFE names or compartment numbers and/or their geographical location within the country) for each KP-LULUCF activity in the specified columns of the CRF tables.	Yes. Transparency

		Bulgaria provided a detailed response to the questions of the ERT in this regard, explaining the difficulties encountered in reporting the geographical locations of the land areas in question in line with decision 2/CMP.8. There are around 180 SFEs comprising approximately 1,300,000 subcompartments. SFEs are distributed into 16 administrative divisions but are subject to continuous change (e.g. SFEs can be combined or divided and can fall into one administrative district one year, and then partially or wholly into another district another year). All such circumstances were taken into account when the study on the identification of AR land was performed. For deforestation activities, there are data on the exact location of all land subject to change in designation and, therefore, assumed to be deforested. However, the data used from the Executive Forest Agency pertain to areas subject to change in designation as a whole for the entire country. For FM, all data used are from the national forest inventory and FM plans. These data are gathered at the subcompartment level and then aggregated at the SFE and country level. Land-use change data are based on the whole country owing to the design of the data system. Therefore, further disaggregation of the data by administrative district and/or regional district of forestry could result in omissions or overestimations in the reporting of KP-LULUCF activities. On the basis of the information provided, the ERT is of the view that data could possibly be disaggregated at the SFE and administrative district level, enabling Bulgaria to comply with the related reporting requirement, taking into consideration the information currently available from the data sources mentioned and the data expected from the recent national forest inventory. The ERT recommends that Bulgaria meet the requirements of decision 2/CMP.8, annex II, paragraph 2(b), in reporting the geographical location of the boundaries of the KP-LULUCF land areas in the relevant CRF tables and section of the NIR.	
KL.16	AR – CO_2	The ERT noted a discrepancy in the values of the background level and margin estimated for the application of the natural disturbance provision in the accounting of AR activities. For the background level and margin, respectively, the 2016 annual submission reported values of 0.24 and 0.13 Gg CO_2 eq, while the 2018 annual submission reported values of 4.00 and 2.19 Gg CO_2 eq. The ERT also noted a discrepancy in the data of the same historical period used in the two submissions, which was not clarified in the NIR. During the review, the Party explained that the information in the NIR was not up to date and that the background level and margin would be updated by the end of 2018 and reported in its next annual submission. The ERT welcomes the Party's plans and recommends that Bulgaria include the result of the technical correction to the background level and margin.	Yes. Accuracy
KL.17	FM – CO_2	In its NIR (section 11.3.1, p.392), Bulgaria included information on the methodologies used to estimate carbon stock changes and removals and emissions from ARD. However, Bulgaria did not include information on the methodologies used for estimating carbon stock changes and removals and emissions from FM. During the review, Bulgaria explained that for the estimation of carbon stock changes and removals and emissions for FM it used the same methodology as for its reporting on the forest land remaining forest land category under the Convention. The	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	Is finding an issue and/or a problem?[a] If yes, classify by type
		Party indicated that in its next annual submission it will add the required information to the KP-LULUCF chapter of the NIR to improve transparency.	
		The ERT recommends that Bulgaria provide detailed documentation on the methods and data used to estimate carbon stock changes and associated removals and emissions for all pools under FM.	
KL.18	FM – CO_2	The ERT noted a discrepancy in the value of the background level and margin estimated for applying the natural disturbance provision in the accounting of FM activities. For the background level and margin, respectively, the 2016 annual submission reported values of 738 and 258 Gg CO_2 eq, while the 2018 annual submission reported values of 848 and 532 Gg CO_2 eq (NIR p.408 and CRF table 4(KP-1)B.1.3). The ERT also noted a discrepancy in the data of the same historical period used in the two submissions, which was not clarified in the NIR. Bulgaria, during the review, explained that the information in the NIR was not up to date and that the background level and margin would be reviewed and updated by the end of 2018 and reported in its next annual submission.	Yes. Accuracy
		The ERT welcomes the plans to update the background level and margin by the end of 2018 and recommends that Bulgaria include the result of the technical correction.	
KL.19	FM – CO_2	In its NIR (section 11.5.2.3, p.407), Bulgaria stated that it would make a technical correction to its FMRL inscribed in the annex to decision 2/CMP.7, taking into account the new data from the 2016 national forest inventory, and update estimates for harvested wood products in line with the Kyoto Protocol Supplement. Bulgaria also stated that, as an interim measure to ensure the consistency of reported information, it had recalibrated the model results used in the construction of its current FMRL, resulting in a new FMRL value (–8.145 Mt CO_2 eq). Bulgaria did not provide detailed information on the results of the calibration, or on any changes to the inputs and assumptions used in the model, or provide any justification for the undertaking. The ERT is not clear about the status of the new value and whether it is intended as a technical correction of the 2107–2018 value, or what Bulgaria means by ensuring the consistency of reporting. During the review, Bulgaria clarified that the information on the FMRL in the NIR was not up to date and that the technical correction would be prepared by the end of 2018 and reported in its next annual submission.	Yes. Transparency
		The ERT welcomes the clarification provided on the technical correction of the FMRL and recommends that Bulgaria provide detailed documentation on the updated technical correction, in line with decision 2/CMP.7.	
KL.20	FM – CO_2	The ERT noted that Bulgaria switched the FMRL value selected between the 2016 and 2018 submissions, and although the latest value matches with what is inscribed in the appendix to the annex to decision 2/CMP.7 (–7,950.00 Mt CO_2 eq applying a first-order decay function for harvested wood products), it is different to what is in the report on the review of the report to facilitate the calculation of the assigned amount for the second commitment period of the Kyoto Protocol of Bulgaria (FCCC/IRR/2016/BGR), as discussed in issue ID# KL.12 above (–8,168.00 Mt CO_2 eq). The ERT also noted that the NIR does not transparently specify which value of FMRL is used for the accounting of FM in accordance with decision 2/CMP.7, annex, paragraphs 12–15, although –7,950.00 Mt CO_2 eq is used in table 265 (p.413) of the NIR and in the CRF accounting table.	Yes. Transparency

ID#	Finding classification	Description of the finding with recommendation or encouragement	*Is finding an issue and/or a problem?[a] If yes, classify by type*
		The ERT recommends that Bulgaria transparently specify in the NIR the FMRL value used for the purposes of accounting for the FM in the second commitment period in accordance with decision 2/CMP.7, annex, paragraphs 12–15.	

[a] Recommendations made by the ERT during the review are related to issues as defined in paragraph 81 of the UNFCCC review guidelines, or problems as defined in paragraph 69 of the Article 8 review guidelines. Encouragements are made to the Party to address all findings not related to such issues or problems.

VI. Application of adjustments

11. The ERT did not identify the need to apply any adjustments to the 2018 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 KP-LULUCF activities is not applicable to the 2018 review.

VIII. Questions of implementation

13. No questions of implementation were identified by the ERT during the individual review of the Party's 2018 annual submission.

Annex I

Overview of greenhouse gas emissions and removals for Bulgaria for submission year 2018 and data and information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, as submitted by Bulgaria in its 2018 annual submission

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

Table 6
Total greenhouse gas emissions for Bulgaria, base year[a]–2016
(kt CO_2 eq)

	Total GHG emissions excluding indirect CO_2 emissions		Total GHG emissions including indirect CO_2 emissions[b]		Land-use change (Article 3.7 bis as contained in the Doha Amendment)[c]	KP-LULUCF activities (Article 3.3 of the Kyoto Protocol)[d]	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	FM
FMRL								−7 950.00
Base year	101 523.94	116 758.25	NA	NA	NA		NA	
1990	89 118.85	103 989.21	NA	NA				
1995	61 033.77	74 567.06	NA	NA				
2000	50 141.28	59 568.90	NA	NA				
2010	51 426.79	60 547.96	NA	NA				
2011	60 775.28	65 849.73	NA	NA				
2012	55 665.62	60 779.41	NA	NA				
2013	49 688.02	55 533.69	NA	NA		−999.49	NA	−5 985.43
2014	51 983.13	58 581.58	NA	NA		−1 202.44	NA	−6 011.73
2015	55 417.94	61 747.96	NA	NA		−1 219.71	NA	−5 836.85
2016	52 577.69	59 114.08	NA	NA		−1 432.33	NA	−5 797.34

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

[a] "Base year" refers to the base year under the Kyoto Protocol, which for Bulgaria is 1988 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs, SF_6 and NF_3. 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 FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] The Party did not report indirect CO_2 emissions in CRF table 6.

[c] The value reported in this column refers to 1990.

[d] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely AR and deforestation.

Table 7
Greenhouse gas emissions by gas for Bulgaria, excluding land use, land-use change and forestry, 1988–2016
(kt CO_2 eq)

	$CO_2{}^a$	CH_4	N_2O	HFCs	PFCs	Unspecified mix of HFCs and PFCs	SF_6	NF_3
1988	89 406.53	16 838.36	10 505.14	NO, NA	NO, NA	NO, NA	3.30	NO, NA
1990	78 672.94	16 149.61	9 162.96	NO, NA	NO, NA	NO, NA	3.69	NO, NA
1995	57 536.99	11 877.30	5 144.55	3.33	NO, NA	NO, NA	4.90	NO, NA
2000	45 213.93	10 149.40	4 166.06	33.02	NO, NA	NO, NA	6.49	NO, NA
2010	47 792.80	7 736.22	4 337.06	663.05	0.06	NO, NA	18.76	NO, NA
2011	53 116.47	7 972.47	3 991.08	752.68	0.06	NO, NA	16.97	NO, NA
2012	48 269.49	7 605.03	4 065.60	823.14	0.05	NO, NA	16.10	NO, NA
2013	42 586.00	7 495.53	4 463.33	968.37	0.04	NO, NA	20.42	NO, NA
2014	45 142.47	7 389.64	4 924.60	1 107.96	0.03	NO, NA	16.88	NO, NA
2015	48 132.69	7 339.68	5 035.39	1 222.10	0.03	NO, NA	18.07	NO, NA
2016	45 287.39	7 048.43	5 359.05	1 400.45	0.02	NO, NA	18.75	NO, NA
Per cent change 1988–2016	**–49.3**	**–58.1**	**–49.5**	**NA**	**NA**	**NA**	**468.1**	**NA**

Note: Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions.
[a] Bulgaria did not report indirect CO_2 emissions in CRF table 6.

Table 8
Greenhouse gas emissions by sector for Bulgaria, 1988–2016
(kt CO_2 eq)

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
1988	81 320.11	13 437.95	13 767.95	–15 234.31	8 227.31	NO
1990	73 503.72	10 046.88	12 461.57	–14 870.36	7 977.03	NO
1995	51 180.91	10 453.73	5 933.28	–13 533.29	6 999.15	NO
2000	40 772.76	7 210.14	5 205.33	–9 427.62	6 380.67	NO
2010	46 044.06	4 444.69	5 454.64	–9 121.17	4 604.56	NO
2011	51 150.75	5 019.97	5 105.53	–5 074.44	4 573.47	NO
2012	46 336.92	4 783.26	5 236.18	–5 113.79	4 423.04	NO
2013	40 586.23	4 758.78	5 717.59	–5 845.67	4 471.08	NO

	Energy	IPPU	Agriculture	LULUCF	Waste	Other
2014	42 958.26	5 119.46	6 187.48	–6 598.45	4 316.39	NO
2015	45 520.81	5 769.03	6 236.25	–6 330.01	4 221.86	NO
2016	42 386.48	6 062.36	6 583.42	–6 536.39	4 081.82	NO
Per cent change 1988–2016	**–47.9**	**–54.9**	**–52.2**	**–57.1**	**–50.4**	**NA**

Notes: (1) Emissions/removals reported in the sector other (sector 6) are not included in the total GHG emissions. (2) Bulgaria did not report indirect CO_2 emissions in CRF 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]–2016, for Bulgaria
(kt CO_2 eq)

	Article 3.7 bis as contained in the Doha Amendment[b]	Article 3.3 of the Kyoto Protocol		FM and elected Article 3.4 activities of the Kyoto Protocol				
	Land-use change	AR	Deforestation	FM	CM	GM	RV	WDR
FMRL				–7 950.00				
Technical correction				23.00				
Base year	NA				NA	NA	NA	NA
2013		–1 125.41	125.93	–5 985.43	NA	NA	NA	NA
2014		–1 262.00	59.56	–6 011.73	NA	NA	NA	NA
2015		–1 382.47	162.76	–5 836.85	NA	NA	NA	NA
2016		–1 514.67	82.34	–5 797.34	NA	NA	NA	NA
Per cent change Base year–2016					**NA**	**NA**	**NA**	**NA**

Note: Values in this table include emissions from land subject to natural disturbances, if applicable.

[a] 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 FM under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] The value reported in this column refers to 1990.

2.   Table 10 provides an overview of key relevant 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 in the 2018 annual submission

Key parameters	Values
Periodicity of accounting	(a) AR: commitment period accounting
	(b) Deforestation: commitment period accounting
	(c) FM: commitment period accounting
	(d) CM: not elected
	(e) GM: not elected
	(f) RV: not elected
	(g) WDR: not elected
Election of activities under Article 3, paragraph 4	None
Election of application of provisions for natural disturbances	Yes, for AR and FM
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. AR in 2016	NA
2. Deforestation in 2016	NA
3. FM in 2016	NA
4. CM in 2016	NA
5. GM in 2016	NA
6. RV in 2016	NA
7. WDR in 2016	NA

Annex II

Information to be included in the compilation and accounting database

Tables 11–14 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) and 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 2016, including on the commitment period reserve, for Bulgaria
(t CO_2 eq)

	Original submission	Revised estimate	Adjustment	Final
CPR	200 651 385			200 651 385
Annex A emissions for 2016				
CO_2[a]	45 287 387			45 287 387
CH_4	7 048 425			7 048 425
N_2O	5 304 700	5 359 047		5 359 047
HFCs	1 400 451			
PFCs	23			
Unspecified mix of HFCs and PFCs	NO, NA			
SF_6	18 747			
NF_3	NO, NA			
Total Annex A sources	**59 059 734**	**59 114 080**		**59 114 080**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2016				
3.3 AR	–1 514 670			–1 514 670
3.3 Deforestation	82 343			82 343
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2016				
3.4 FM	–5 797 344			–5 797 344

[a] Bulgaria did not report indirect CO_2 emissions in CRF table 6.

Table 12
Information to be included in the compilation and accounting database for 2015 for Bulgaria
(t CO_2 eq)

	Original submission	Revised estimate	Adjustment	Final
Annex A emissions for 2015				
CO_2[a]	48 132 692			48 132 692
CH_4	7 339 677			7 339 677
N_2O	5 035 392			5 035 392
HFCs	1 222 102			1 222 102
PFCs	28			28
Unspecified mix of HFCs and PFCs	NO, NA			NO, NA
SF_6	18 066			18 066
NF_3	NO, NA			NO, NA
Total Annex A sources	**61 747 956**			**61 747 956**

Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2015

	Original submission	Revised estimate	Adjustment	Final
3.3 AR	−1 382 467			−1 382 467
3.3 Deforestation	162 755			162 755
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2015				
3.4 FM	−5 836 848			−5 836 848

[a] Bulgaria did not report indirect CO_2 emissions in CRF table 6.

Table 13

Information to be included in the compilation and accounting database for 2014 for Bulgaria
(t CO_2 eq)

	Original submission	Revised estimate	Adjustment	Final
Annex A emissions for 2014				
CO_2[a]	45 142 469			45 142 469
CH_4	7 389 638			7 389 638
N_2O	4 924 602			4 924 602
HFCs	1 107 960			1 107 960
PFCs	33			33
Unspecified mix of HFCs and PFCs	NO, NA			NO, NA
SF_6	16 878			16 878
NF_3	NO, NA			NO, NA
Total Annex A sources	**58 581 579**			**58 581 579**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2014				
3.3 AR	−1 262 005			−1 262 005
3.3 Deforestation	59 561			59 561
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2014				
3.4 FM	−6 011 727			−6 011 727

[a] Bulgaria did not report indirect CO_2 emissions in CRF table 6.

Table 14

Information to be included in the compilation and accounting database for 2013 for Bulgaria
(t CO_2 eq)

	Original submission	Revised estimate	Adjustment	Final
Annex A emissions for 2013				
CO_2[a]	42 586 003			42 586 003
CH_4	7 495 530			7 495 530
N_2O	4 463 326			4 463 326
HFCs	968 372			968 372
PFCs	39			39
Unspecified mix of HFCs and PFCs	NO, NA			NO, NA
SF_6	20 419			20 419
NF_3	NO, NA			NO, NA
Total Annex A sources	**55 533 689**			**55 533 689**
Activities under Article 3, paragraph 3, of the Kyoto Protocol for 2013				
3.3 AR	−1 125 414			−1 125 414
3.3 Deforestation	125 926			125 926

	Original submission	*Revised estimate*	*Adjustment*	*Final*
FM and elected activities under Article 3, paragraph 4, of the Kyoto Protocol for 2013				
3.4 FM	–5 985 432			–5 985 432

[a] Bulgaria did not report indirect CO_2 emissions in CRF table 6.

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 2006 IPCC Guidelines that were reported as "NE" or for which the ERT otherwise determined that there may be an issue with the completeness of the reporting in the Party's inventory are the following:

(a) CO_2 emissions from land converted to grassland (see ID# L.13 in table 3);

(b) CO_2 emissions from mineral soils for annual and perennial crops on cropland remaining cropland (see ID# L.19 in table 5).

Annex IV

Documents and information used during the review

A.   Reference documents

Reports of the Intergovernmental Panel on Climate Change

IPCC. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. S Eggleston, L Buendia, K Miwa, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/2006gl.

IPCC. 2014. *2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Hayama, Japan: Institute for Global Environmental Strategies. Available at http://www.ipcc-nggip.iges.or.jp/public/kpsg.

IPCC. 2014. *2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories: Wetlands*. T Hiraishi, T Krug, K Tanabe, et al. (eds.). Geneva, Switzerland: IPCC. Available at http://www.ipcc-nggip.iges.or.jp/public/wetlands/.

Annual review reports

Reports on the individual reviews of the 2013, 2014, 2015 and 2016 annual submissions of Bulgaria, contained in documents FCCC/ARR/2013/BGR, FCCC/ARR/2014/BGR, FCCC/ARR/2015/BGR and FCCC/ARR/2016/BGR, respectively.

Other

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 https://unfccc.int/sites/default/files/resource/AGI%20report_2018.pdf.

Annual Agriculture Report for Bulgaria for 2017. Available at http://www.mzh.government.bg/en/policies-and-programs/reports/agricultural-report/.

Annual status report for Bulgaria for 2018. Available at https://unfccc.int/sites/default/files/resource/asr2018_BGR.pdf.

European Environment Agency. 2013. *EMEP/EEA Air Pollutant Emission Inventory Guidebook 2013*. Luxembourg City: Publications Office of the European Union. Available at https://www.eea.europa.eu/publications/emep-eea-guidebook-2013/at_download/file.

European Environment Agency. 2016. *EMEP/EEA Air Pollutant Emission Inventory Guidebook 2016*. Luxembourg City: Publications Office of the European Union. Available at https://www.eea.europa.eu/publications/emep-eea-guidebook-2016/at_download/file.

B.   Additional information provided by the Party

Responses to questions during the review were received from Ms. Detelina Petrova (Climate Change Policy Directorate of the Ministry of Environment and Water of Bulgaria), including additional material on the methodology and assumptions used. The following documents[1] were also provided by Bulgaria:

L. Kozelov. 2017. *Getting current data, scientific rationale and diet calculations for sheep, pig and cows (digestible energy, average feed rations per day, amount of raw protein in the daily portion and percentage of nitrogen in it).* Institute of Animal Science. Bulgaria.

D. Penkov et al. 2014. *Methods for Determining the Release of Greenhouse Gas Emissions from Pig and Poultry Production in the Republic of Bulgaria.* Global Journal of Science Frontier Research. Volume 14, Issue 5, Version 1.0, p. 41–45. Global Journals Inc. (USA). Online ISSN: 2249-4626.

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[1] Reproduced as received from the Party.