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Report on the technical review of the third biennial report of Bulgaria

Developed country Parties were requested by decision 2/CP.17 to submit their third biennial report to the secretariat by 1 January 2018. This report presents the results of the technical review of the third biennial report of Bulgaria, conducted by an expert review team in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention".

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Abbreviations and acronyms

AEA	annual emission allocation
Annex II Party	Party included in Annex II to the Convention
AR4	Fourth Assessment Report of the Intergovernmental Panel on Climate Change
BR	biennial report
CH_4	methane
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CTF	common tabular format
EEA	European Environment Agency
ERT	expert review team
ESD	effort-sharing decision
ESR	effort-sharing regulation
EU	European Union
EU ETS	European Union Emissions Trading System
ExEA	Executive Environment Agency of Bulgaria
GDP	gross domestic product
GHG	greenhouse gas
HFC	hydrofluorocarbon
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
MoEW	Ministry of Environment and Water of Bulgaria
NA	not applicable
NC	national communication
NE	not estimated
NF_3	nitrogen trifluoride
NO	not occurring
non-ETS sectors	sectors not covered by the European Union Emissions Trading System
N_2O	nitrous oxide
PaMs	policies and measures
PFC	perfluorocarbon
SF_6	sulfur hexafluoride
TNAPCC	Third National Action Plan on Climate Change
UNFCCC reporting guidelines on BRs	"UNFCCC biennial reporting guidelines for developed country Parties"
UNFCCC reporting guidelines on NCs	"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications"
WAM	'with additional measures'
WEM	'with measures'

I. Introduction and summary

A. Introduction

1. This is a report on the in-country technical review of the BR3[1] of Bulgaria. The review was organized by the secretariat in accordance with the "Guidelines for the technical review of information reported under the Convention related to greenhouse gas inventories, biennial reports and national communications by Parties included in Annex I to the Convention", particularly "Part IV: UNFCCC guidelines for the technical review of biennial reports from Parties included in Annex I to the Convention" (annex to decision 13/CP.20).

2. In accordance with the same decision, a draft version of this report was transmitted to the Government of Bulgaria, which provided comments that were considered and incorporated into this final version of the report.

3. The review was conducted from 4 to 9 February 2019 in Sofia by the following team of nominated experts from the UNFCCC roster of experts: Ms. Laura Aranguren (Colombia), Mr. Viorel Nelu Bellmondo Blujdea (Romania), Ms. Medea Inashvili (Georgia), Mr. Naoki Matsuo (Japan) and Ms. Noura Mohamed Lotfy (Egypt). Ms. Inashvili and Mr. Matsuo were the lead reviewers. The review was coordinated by Ms. Veronica Colerio (UNFCCC secretariat).

B. Summary

4. The ERT conducted a technical review of the information reported in the BR3 of Bulgaria in accordance with the UNFCCC reporting guidelines on BRs (annex I to decision 2/CP.17).

1. Timeliness

5. The BR3 was submitted, as an annex to the NC7, on 29 December 2017, before the deadline of 1 January 2018 mandated by decision 2/CP.17. The CTF tables were submitted on 29 December 2017 and resubmitted on 22 February 2018 to address issues raised during the review.

2. Completeness, transparency of reporting and adherence to the reporting guidelines

6. Issues and gaps identified by the ERT related to the reported information are presented in table 1. The information reported by Bulgaria in its BR3 mostly adheres to the UNFCCC reporting guidelines on BRs. The ERT noted that although the BR3-specific aspects of the report are included as an annex to the NC7, the whole contents of the NC7 are assumed to also be part of the BR3 as an integrated report to avoid duplication of information.

Table 1
Summary of completeness and transparency of mandatory information reported by Bulgaria in its third biennial report

Section of BR	*Completeness*	*Transparency*	*Reference to description of recommendations*
GHG emissions and trends	Complete	Mostly transparent	Issue 1 in table 3
Assumptions, conditions and methodologies related to the attainment of the quantified economy-wide emission reduction target	Complete	Transparent	

[1] The BR submission comprises the text of the report and the CTF tables, which are both subject to the technical review.

Section of BR	*Completeness*	*Transparency*	*Reference to description of recommendations*
Progress in achievement of targets	Mostly complete	Mostly transparent	Issues 1, 2 and 4 in table 5 Issue 1 in table 7 Issues 2 and 4 in table 11
Provision of support to developing country Parties[a]	NA	NA	NA

Note: A list of recommendations pertaining to the completeness and transparency issues identified in this table is included in chapter III below. The assessment of completeness and transparency by the ERT in this table is based only on the "shall" reporting requirements.

[a] Bulgaria is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3, 4 and 5, of the Convention.

II. Technical review of the information reported in the third biennial report

A. Information on greenhouse gas inventory arrangements, emissions, removals and trends

(a) Technical assessment of the reported information

7. Total GHG emissions[2] excluding emissions and removals from LULUCF decreased by 43.2 per cent between 1990 and 2016, whereas total GHG emissions including net emissions or removals from LULUCF decreased by 41.1 per cent over the same period. Table 2 illustrates the emission trends by sector and by gas for Bulgaria.

Table 2
Greenhouse gas emissions by sector and by gas for Bulgaria for the period 1990–2016

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2015*	*2016*	*1990–2016*	*2015–2016*	*1990*	*2016*
Sector									
1. Energy	73 503.72	40 772.76	46 044.06	45 520.81	42 386.48	–42.3	–6.9	70.7	71.8
A1. Energy industries	38 676.85	24 076.86	31 638.28	30 316.87	27 127.91	–29.9	–10.5	37.2	45.9
A2. Manufacturing industries and construction	17 768.46	7 228.39	3 156.65	2 861.86	2 910.22	–83.6	1.7	17.1	4.9
A3. Transport	6 604.56	5 510.01	8 007.94	9 237.63	9 350.49	41.6	1.2	6.4	15.8
A4. and A5. Other	8 132.72	2 579.06	2 112.03	1 920.70	1 964.52	–75.8	2.3	7.8	3.3
B. Fugitive emissions from fuels	2 321.12	1 378.44	1 129.16	1 183.75	1 033.33	–55.5	–12.7	2.2	1.7
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NA	NA	NA	NA
2. IPPU	10 046.88	7 210.14	4 444.69	5 769.03	6 062.36	–39.7	5.1	9.7	10.3

[2] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of CO_2 eq excluding LULUCF, unless otherwise specified. Values in this paragraph are calculated on the basis of the Party's 2018 annual submission, version 1.

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2015*	*2016*	*1990–2016*	*2015–2016*	*1990*	*2016*
3. Agriculture	12 461.57	5 205.33	5 454.64	6 236.25	6 529.07	–47.6	4.7	12.0	11.1
4. LULUCF	–14 870.36	–9 427.62	–9 121.17	–6 330.01	–6 536.39	–56.0	3.3	NA	NA
5. Waste	7 977.03	6 380.67	4 604.56	4 221.86	4 081.82	-48.8	–3.3	7.7	6.9
6. Other	NO	NO	NO	NO	NO	NA	NA	NA	NA
Gas[a]									
CO_2	78 672.94	45 213.93	47 792.80	48 132.69	45 287.39	–42.4	–5.9	75.7	76.7
CH_4	16 149.61	10 149.40	7 736.22	7 339.68	7 048.43	–56.4	–4.0	15.5	11.9
N_2O	9 162.96	4 166.06	4 337.06	5 035.39	5 304.70	–42.1	5.3	8.8	9.0
HFCs	NO, NA	33.02	663.05	1 222.10	1 400.45	NA	14.6	NA	2.4
PFCs	NO, NA	NO, NA	0.06	0.03	0.02	NA	–15.8	NA	0.0
SF_6	3.69	6.49	18.76	18.07	18.75	407.5	3.8	0.0	0.0
NF_3	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	NA	NA	NA	NA
Total GHG emissions without LULUCF	**103 989.21**	**59 568.90**	**60 547.96**	**61 747.96**	**59 059.73**	**–43.2**	**–4.4**	**100.0**	**100.0**
Total GHG emissions with LULUCF	**89 118.85**	**50 141.28**	**51,426.79**	**55 417.94**	**52 523.35**	**–41.1**	**–5.2**	**NA**	**NA**

Source: GHG emission data: Bulgaria's 2018 annual submission, version 1.

[a] Emissions by gas without LULUCF and without indirect CO_2.

8. The decrease in the total emissions was driven mainly by factors such as the deep economic recession due to the collapse of the centralized planned economy (1988–1991), economic crises (1998 and 2008) and the underlying continuous change in economic structure from heavy industry to service sectors.

9. Between 1990 and 2016, GHG emissions from the energy sector decreased by 42.3 per cent (31,117.24 kt CO_2 eq), owing mainly to the structural change of the economy. The trend in GHG emissions from fuel combustion showed notable decreases in manufacturing industries and construction (83.6 per cent or 14,858.24 kt CO_2 eq) and energy use in service sectors (75.8 per cent or 6,168.20 kt CO_2 eq) in this period. For the energy supply industry sector, the ERT observed a decrease in emissions of 29.9 per cent (1990–2016), which was mainly caused by the decline of final energy consumption for stationary sources, while the shift to less carbon-intense fuels was limited. During the review, Bulgaria clarified that there has been a shift from on-site energy use to energy supply industries. On the other hand, GHG emissions from the transportation sector show a rapid increase (41.6 per cent or 2,745.93 kt CO_2 eq for 1990–2016) driven by a strong growth in demand for automobile-based transport.

10. Between 1990 and 2016, GHG emissions from IPPU decreased by 39.7 per cent (3,984.52 kt CO_2 eq), owing mainly to a decline in the production of metal, mineral and chemical products driven by economic crises. Between 1990 and 2016, GHG emissions from the agriculture sector decreased by 47.6 per cent (5,932.50 kt CO_2 eq), owing mainly to systematic declines in the agricultural land area due to abandonment of arable lands and reduction in livestock populations. The LULUCF sector was a net sink of 6,536.39 kt CO_2 eq in Bulgaria in 2016; net GHG removals have decreased by 56.0 kt CO_2 eq since 1990. The trend was mainly driven by the fall in removals from the category forest land, driven by the decline in the rate of forest growth as the average forest age increases. Between 1990 and 2016, GHG emissions from the waste sector decreased by 48.8 per cent (3,895.21 kt CO_2 eq), owing mainly to a steady decline in the population.

11. As shown in table 2, CO_2, CH_4 and N_2O emissions decreased by 42.4, 56.4 and 42.1 per cent, respectively, during 1990–2016. The main sources of these GHGs are the energy sector for CO_2, and the agriculture and waste sectors for CH_4 and N_2O. On the other hand, emissions from the IPPU sector (HFCs and SF_6) increased considerably to 1,400.45 kt CO_2 eq and 18.75 kt CO_2 eq, respectively, in 2016 (i.e. over 10-fold during the period 1995–2006), driven by the substitution of ozone-depleting substances for fluorinated gases in many applications, while PFC and NF_3 emissions were negligible.

12. The summary information provided by the Party on GHG emissions was consistent with the information reported in its 2017 annual submission.

13. In brief, Bulgaria's national inventory arrangements were established in accordance with the provisions of decision 19/CMP.1. The bases for Bulgaria's national inventory system are the Environmental Protection Act (last amendment 2012); the statute on the organization and structure of ExEA (final update in 2014); Order No. 296/04.12.2015 by the Executive Director of ExEA on sector experts and quality control experts; Order No. RD-218/05.03.2010 by the Minister of Environment and Water on quality assurance experts; and regulations of the Council of Ministers No. 261/05.09.2014 and SG 76/2014 on the organization of the national inventories of hazardous substances and GHGs in the ambient air. Bulgaria's reporting obligations under the Convention are administered, coordinated and managed by MoEW, which is the national focal point for reporting under the Convention. ExEA has been responsible for the whole process of inventory planning, preparation and management since 2008 because it has been identified as the responsible organization for the preparation of Bulgaria's national GHG inventory under the Convention and its Kyoto Protocol and is designated as the single national entity (updated status since 2014). The directorates and departments of ExEA that are directly involved in the operation of Bulgaria's national inventory system are the Environmental Monitoring and Assessment Directorate with the Emission Inventory Department and Waste Department, and the Permit Regime Directorate with the Integrated Pollution Prevention and Control Department and the Emission Trading Permit Department. The changes in the arrangements since the BR2 include the Orders issued since 2013 (see above) and the adoption since 2013 of three policy documents that are directly linked to the national GHG inventory arrangements, namely the Climate Change Mitigation Law, the National Green Investment Scheme and the National Adaptation Strategy.

(b) Assessment of adherence to the reporting guidelines

14. The ERT assessed the information reported in the BR3 of Bulgaria and identified an issue relating to transparency and adherence to the UNFCCC reporting guidelines on BRs. The finding is described in table 3.

Table 3
Findings on greenhouse gas emissions and trends from the review of the third biennial report of Bulgaria

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in CTF table 1 Issue type: transparency Assessment: recommendation	Bulgaria reported its historical GHG emissions in CTF table 1 as a part of its BR3. The ERT noted that the base year in CTF table 1 is 1988 and there is no explanation of this presented as a footnote or comment. The ERT noted that Bulgaria, as a member State of the EU, has a base year of 1990, which is correctly reflected in, for example, CTF table 2(a). During the review Bulgaria clarified several country-specific aspects related to the base year and explained that CTF table 1 has been generated automatically. The ERT recommends that Bulgaria provide transparent information explaining the national circumstances that led to different base years being used in different parts of the report by, for example, providing an explanatory footnote to CTF table 1.

Note: Item listed under reporting requirement refers to the CTF table number in the annex to decision 19/CP.18. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on BRs.

B. Quantified economy-wide emission reduction target and related assumptions, conditions and methodologies

1. Technical assessment of the reported information

15. For Bulgaria the Convention entered into force on 10 August 1995. Under the Convention Bulgaria, after joining the EU in 2007, committed to contributing to the achievement of the joint EU economy-wide emission reduction target of 20 per cent below the 1990 level by 2020. The EU offered to move to a 30 per cent reduction target on the condition that other developed countries commit to a comparable target and developing countries contribute according to their responsibilities and respective capabilities under a new global climate change agreement.

16. The target for the EU and its member States is formalized in the EU 2020 climate and energy package. The legislative package regulates emissions of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 using global warming potential values from the AR4 to aggregate the GHG emissions of the EU until 2020. Emissions and removals from the LULUCF sector are not included in the quantified economy-wide emission reduction target under the Convention. The EU generally allows its member States to use units from the Kyoto Protocol mechanisms as well as new market mechanisms for compliance purposes, subject to a number of restrictions in terms of origin and type of project and up to an established limit. Companies can make use of such units to fulfil their requirements under the EU ETS.

17. The EU 2020 climate and energy package includes the EU ETS and the ESD. The EU ETS covers mainly point emissions sources in the energy, industry and aviation sectors. An EU-wide emissions cap has been put in place for the period 2013–2020 with the goal of reducing emissions by 21 per cent below the 2005 level by 2020. Emissions from non-ETS sectors are regulated through member State specific targets that add up to a reduction at the EU level of 10 per cent below the 2005 level by 2020.

18. Under the ESD, Bulgaria has a target of limiting its emission growth to 20 per cent above the 2005 level by 2020 for non-ETS sectors. National emission targets for non-ETS sectors for 2020 have been translated into binding quantified AEAs for the period 2013–2020. Bulgaria's AEAs change following a linear path from 26,933.216 kt CO_2 eq in 2013 to 26,543.226 kt CO_2 eq in 2020.[3] During the review, Bulgaria explained that it intends to use borrowing and selling as the flexibility measures associated with the AEAs sometime in the future.

19. Bulgaria provided information in its BR3 on other relevant national targets associated with some national PaMs. Measures in the energy sector aim to modify the energy mix by increasing the share of renewables in final energy consumption to 16 per cent by 2020 (including a 10 per cent share of biofuels in final consumption in the transport sector). The implementation of the energy efficiency measures and policies set out in Bulgaria's National Energy Strategy aims to improve energy efficiency by approximately 25 per cent by 2020, which contributes to a reduction of 50 per cent in the energy intensity of its GDP by 2020. In the transport, agriculture and LULUCF sectors PaMs have specific targets (e.g. number of biogas installations constructed, area of afforestation achieved).

2. Assessment of adherence to the reporting guidelines

20. The ERT assessed the information reported in the BR3 of Bulgaria and recognized that the reporting is complete, transparent and adhering to the UNFCCC reporting guidelines on BRs. No issues relating to the topics discussed in this chapter of the review report were raised during the review.

[3] European Commission decision 2017/1471 of 10 August 2017 amending decision 2013/162/EU of 26 March 2013 to revise member States' AEAs for the period from 2017 to 2020.

C. Progress made towards the achievement of the quantified economy-wide emission reduction target

1. Mitigation actions and their effects

(a) Technical assessment of the reported information

21. Bulgaria provided information on its package of PaMs implemented, adopted and planned, by sector and by gas, in order to fulfil its commitments under the Convention and its Kyoto Protocol. Bulgaria reported on its policy context and provided limited information about the legal and institutional arrangements put in place to implement its commitments and monitor and evaluate the effectiveness of its PaMs. During the review, the Party provided additional information about the legal and institutional arrangements defined under the third National Action Plan on Climate Change (May 2012) to monitor and report PaMs, including its progress report released in June 2017.

22. Bulgaria provided information on a set of PaMs similar to those previously reported, with the exception of PaMs no longer in place. Within each sector, PaMs are organized first into priority axes and then subdivided into PaMs with direct and indirect impacts on the reduction of GHG emissions. Each policy or measure includes a textual description, supplemented by a summary table with additional information about GHGs covered, status of implementation and estimated mitigation impacts in kt CO_2 eq. During the review the Party explained that no changes had been made since the previous submission to its institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress made towards its target (see issue 4 in table 5).

23. Bulgaria did not report on its self-assessment of compliance with its emission reduction target and national rules for taking action against non-compliance. During the review, the Party explained that the compliance issue is considered under Bulgaria's EU membership commitments (see issue 5 in table 5).

24. The key overarching related cross-sectoral policy in the EU is the 2020 climate and energy package, adopted in 2009, which includes the revised EU ETS and the ESD. The package is supplemented by renewable energy and energy efficiency legislation and legislative proposals on the 2020 targets for CO_2 emissions from cars and vans, the carbon capture and storage directive, and the general programmes for environmental conservation, namely the 7th Environment Action Programme and the clean air policy package.

25. In operation since 2005, the EU ETS is a cap-and-trade system that covers all significant energy-intensive installations (mainly large point emissions sources such as power plants and industrial facilities), which produce 40–45 per cent of the GHG emissions of the EU. It is expected that the EU ETS will guarantee that the 2020 target (a 21 per cent emission reduction below the 2005 level) will be achieved for sectors under the scheme. Bulgaria joined the EU ETS in 2007. The third phase of the EU ETS started in 2013 and the system now includes aircraft operations (since 2012) as well as N_2O emissions from chemical industry, PFC emissions from aluminium production and CO_2 emissions from some industrial processes, which were not covered in the previous phases of the EU ETS (since 2013).

26. The ESD became operational in 2013 and covers sectors outside the EU ETS, including transport (excluding domestic and international aviation, and international maritime transport), residential and commercial buildings, agriculture and waste, together accounting for 55–60 per cent of the GHG emissions of the EU. The aim of the ESD is to decrease GHG emissions in the EU by 10 per cent below the 2005 level by 2020 and it includes binding annual targets for each member State for 2013–2020.

27. Bulgaria highlighted its participation as an EU member State in the EU-wide mitigation actions that are under development, namely the ESR (842/2013) and a regulation on LULUCF (841/2013), as part of the EU climate and energy framework 2020–2030. The associated target of Bulgaria under ESR is 0 per cent in 2030 in comparison with the 2005

level. The ERT was informed that Bulgaria prepared a new strengthened package of PaMs in late 2018, which is currently under EU review, with a view to meeting the 2030 ESR target.

28. Bulgaria's third National Action Plan on Climate Change for 2013–2020 provides measures and targets for the reduction of GHG emissions, for improvements for energy efficiency across all sectors and for introduction of renewable energy sources. Mitigation actions are consistent with Bulgaria's participation in the EU ETS and its commitments under the EU climate and energy package. The mitigation actions are stated as being consistent with the potential of the national economy to reduce emissions. Among the mitigation actions that are critical for Bulgaria's contribution to attaining the EU-wide 2020 emission reduction target are predominantly those in the energy sector followed by the transport and waste sectors, as assessed in the "First official report on the implementation of the TNAPCC 2013–2020".

29. Bulgaria highlighted the domestic mitigation actions that are under development, such as utilizing energy efficiency potential, which are expected to have effect until 2020. Bulgaria is developing market mechanisms and incentives to reduce fuel and energy consumption (marketing of 'white' certificates/certificates of energy savings) in order to respond to the EU policy on improving the energy efficiency in end-use consumption by saving annually fuel and energy equivalent to 1.5 per cent of the total energy provided on the market for the previous year (excluding energy in transport) until 2020. In the residential and commercial sector a significant impact is expected from the renovation of communal, public and state buildings. A rate of 3 per cent of the total floor area of heated and/or cooled central government buildings is renovated each year to meet at least the minimum energy performance (i.e. the target for the number of retrofitted state-owned and municipal buildings is 1,500 per year by 2020). Among the mitigation actions that provide a foundation for significant emission reductions for Bulgaria are the use of biomass and waste as an alternative fuel in combustion units of installations, the rehabilitation and modernization of the existing road infrastructure and the introduction of mandatory energy efficiency schemes (reduction of end-use consumption of fuel and energy). Table 4 provides a summary of the reported information on the PaMs of Bulgaria.

Table 4
Summary of information on policies and measures reported by Bulgaria

Sector	*Key PaMs*	*Estimate of mitigation impact by 2020 (kt CO_2 eq)*	*Estimate of mitigation impact by 2030 (kt CO_2 eq)*
Policy framework and cross-sectoral measures	EU ETS	NE	NE
	ESD	NE	NE
Energy	Fuel substitution from coal to natural gas	2 700	2 700
	Improvement of energy production efficiency in existing coal-fired power plants	466	585
Transport	Introduction of intelligent transport systems along the national and urban road networks	170	170
	Increasing the share of electric public transport – railways, trolley, tram, metro	127	127
	Increasing the share of biofuels	101	101
Renewable energy	Increasing the share of energy from renewable sources in the electricity generation mix	NE	NE
	Increasing the share of heating and cooling based on renewable energy sources	61	70

Sector	*Key PaMs*	*Estimate of mitigation impact by 2020 (kt CO_2 eq)*	*Estimate of mitigation impact by 2030 (kt CO_2 eq)*
Energy efficiency	Increase in high-efficiency combined heat and power production	200	200
	Programme for accelerated gasification	370	310
IPPU	Audits for energy efficiency	119	119
Agriculture	Improvement of the use and management of manure, including the introduction of low-carbon practices for processing manure (e.g. composting, transformation of manure into biogas under anaerobic conditions)	0.24	0.24
	Encouraging the use of suitable crop rotation, especially with crops fixing atmospheric nitrogen	1	1
Waste	Capture and burning of biogas in all new and existing regional landfills	634	634
	Introduction of anaerobic stabilization of sludge with management capture and burning of biogas in new plants and plants under reconstruction in settlements with a population of over 20,000	128	128
	Construction of installations for mechanical and biological treatment and installations for treatment and recovery of compost and biogas	728	728

Note: The estimates of mitigation impact are estimates of emissions of CO_2 or CO_2 eq avoided in a given year as a result of the implementation of mitigation actions.

(b) Policies and measures in the energy sector

30. **Energy supply.** In Bulgaria more than 70 per cent of gross energy demand is supplied by importation of fuels. The country is highly dependent on imported natural gas and crude oil, with the traditional sole origin being the Russian Federation. According to the information provided in the NC7, the share of fuels for electricity production in 2015 was gaseous fuels (48.8 per cent), followed by imported coal (31.8 per cent), local coal (16.8 per cent), nuclear energy (2.1 per cent), liquid fuels (0.3 per cent) and biofuels (0.2 per cent); natural gas was the main fuel for the production of heat. The energy industries are responsible for the largest amount of GHG emissions in the country, accounting for 30,316.87 kt CO_2 eq in 2015. About 92 or 93 per cent of total GHG emissions in the sector is related to electricity generation, 6 or 7 per cent comes from thermal energy generation and about 1 per cent is emitted by the transmission of natural gas. About 70 per cent of the total emissions from electricity generation is produced by only three large power plants burning lignite coal.

31. Bulgaria has established a target for saving primary energy under the "Energy Strategy of Bulgaria until 2020" [4] within the framework of EU strategy Europe 2020. The target is to reduce primary energy intensity against GDP by 50 per cent by 2020 compared with the 2005 level. The result achieved so far, according to the NC7, is a reduction of more than 23 per cent against the baseline development scenario specified in the Energy Strategy (page 26), which is consistent with the intensity target.

32. Measures for the energy supply sector covered by the EU ETS include (1) improvement of energy production efficiency in existing coal-fired power plants and (2) fuel

[4] Available at: https://www.me.government.bg/files/useruploads/files/epsp/23_energy_strategy2020%D0%95ng_.pdf.

substitution from coal to natural gas. These two main policies expect emission reductions of around 3,166 kt CO_2 per year by 2020. The ERT noted that in the "First official report on the implementation of the third national action plan on climate change 2013–2020" the Ministry of Energy has proposed withdrawal of measure (2) because it is economically unsuitable for operators of coal-fired plants, whereas for measure (1) the results reported are around 423.8 kt CO_2 eq in 2014.

33. **Renewable energy sources.** A policy on increasing the share of electrical energy from renewable energy sources in the electricity generation matrix by 2020 was adopted in the National Action Plan for Renewable Energy and the Renewable Energy Act, whereby the target set was 16 per cent in terms of share of renewables in final energy consumption by 2020, including a 10 per cent share of biofuels in transport final consumption.

34. Under the PaMs reported by Bulgaria in its NC7 targeting renewable energy sources the main PaMs, in terms of GHG emission reductions, are (1) increasing the share of electrical energy from renewable energy sources in the electricity generation mix and (2) increasing the share of heating and cooling based on renewable energy sources. Together these two measures are intended to support compliance with the national target and achieve a 16 per cent share of renewables in the final energy consumption by 2020. The ERT noted that in the "First official report on the implementation of the third national action plan on climate change 2013–2020" the shares of electricity generation from renewable energy in gross final consumption of energy are 18.9 per cent (2013), 18.9 per cent (2014) and 19.1 per cent (2015), amounting to a total of 3,837 kt CO_2 eq for the period of implementation of the measure until 2014. Additionally, there is a 28.3 per cent share of renewable energy sources for heating and cooling in gross final energy consumption in 2014. From the information provided by the Party, the ERT understands that Bulgaria is on track to comply with the target set for 2020.

35. **Energy efficiency.** According to its commitments within the EU framework, Bulgaria has set a target to reduce the energy intensity of its GDP by 50 per cent by 2020. In order to reach this target, Bulgaria reported, among others, one energy efficiency measure to increase the efficiency of cogeneration for electricity and heating production. The target of the measure is to reduce GHG emissions by about 200 kt CO_2 eq per year by 2020. Bulgaria's energy strategy (Article 21(1)(8) of the Energy Act) states that the Energy and Water Regulatory Commission is in charge of price regulation and setting preferential prices for electricity generated by high-efficiency cogeneration. According to the results reported, in 2013, 36 companies involved in cogeneration obtained 38 certificates of origin, followed in 2014 by 31 companies obtaining 34 certificates. At the end of 2014, GHG emission reductions amounted to 169 kt CO_2 eq.

36. **Residential and commercial sectors.** The National Energy Strategy of Bulgaria envisages access to the gas distribution system by 30 per cent of households in 2020. The ERT noted that the current level is not reported, although the NC7 reported an alternative pessimistic scenario where only 15 per cent of households would access the gas distribution system. A key mitigation action under implementation is the replacement of obsolete and inefficient equipment used for heating and air conditioning, including financial incentives combining existing schemes with mandatory co-financing by the beneficiary. The measure involves activities to control and inspect heating and air-conditioning installations, in accordance with the regulation adopted pursuant to Article 15 of directive 2009/125/EC establishing a framework for the setting of eco-design requirements for energy-related products. The measure expects emission reductions of around 9 kt CO_2 eq per year by 2020.

37. During the review, the Party provided the main results of the measures in the document "First official report on the implementation of the third national action plan on climate change 2013–2020". The ERT noted that the measures in this sector accounted for 283.7 kt CO_2 eq per year in total.

38. **Transport sector.** The main policy in Bulgaria for the transport sector is the Integrated Transport Strategy, which outlines the principal objectives for the development of the sector by 2030. These objectives are an increase in the effectiveness and competitiveness of the sector, improvement of transport connectivity and access (internal and external) and limiting the negative effects of sector development.

39. The transport sector in Bulgaria reached emissions of 9,237.63 kt CO_2 eq in 2015. The highest contributors to GHG emissions are passenger cars, heavy-duty vehicles, light-duty vehicles and motorcycles and mopeds. According to decision 06/2009/EC, Bulgaria was assigned an individual target allowing it to increase emissions from non-ETS sectors (e.g. the transport sector) by 20 per cent of total GHG emissions by 2020 compared with the 2005 level. According to the third National Action Plan on Climate Change for 2013–2020 there is an additional transport sector target to reduce GHG emissions by about 20 per cent below the 2008 level by 2030. The ERT noted that the transport sector is the only sector which has shown a large growth in GHG emissions (41.6 per cent increase for 1990–2016, while others experienced large decreases).

40. Among the PaMs reported by Bulgaria in its BR3, the most significant in terms of GHG emission reductions are focused on the introduction of intelligent transport systems along the national and the urban road networks, increasing the share of electric public transport and increasing the share of biofuels. The overall expected effect of these three measures is 398 kt CO_2 eq by 2020. During the review, Bulgaria provided results of the implementation of these measures through the "First official report on the implementation of the third national action plan on climate change 2013–2020". The three measures achieved an emission reduction of 986,56 kt CO_2 eq in 2013–2016. The ERT further noted that despite the high share of aged vehicles strongly influencing GHG emissions from the transport sector Bulgaria has not reported PaMs that address this issue.

41. The NC7 includes information on how Bulgaria promotes and implements the decisions of the International Civil Aviation Organization and the International Maritime Organization to limit emissions from aviation and marine bunker fuels. In April 2015 an EU regulation was adopted on the monitoring, reporting and verification of CO_2 from marine transport. This regulation took effect in 2018 and Bulgaria is in the process of implementing it. International aviation has been included in the EU ETS since the beginning of 2012.

42. **Industrial sector.** The industry sector is the one that most drastically reduced its CO_2 emissions (83.6 per cent for 1990–2016). The main instrument for reducing GHG emissions from industry in Bulgaria until 2020 is the EU ETS. National-level measures relate to higher energy efficiency in industry and use of alternative fuels, supported by the Energy Efficiency for Competitive Industry programme that provides low-interest loans to small and medium-sized enterprises. During the review, the ERT noted that there were no activities implemented during 2013–2016 for this measure.

(c) Policies and measures in other sectors

43. **Industrial processes.** The ERT noted that Bulgaria has not reported any measures targeting exclusively industrial processes emissions. The principal measure to mitigate emissions from industrial processes is the implementation of energy efficiency audits in industrial systems with annual energy consumption over 3,000 MWh, which is mainly for energy-related CO_2 but also includes emissions of HFCs and PFCs. The measure supports projects to install absorption chillers, refurbish boiler aggregates/boilers, improve thermal insulation and replace old boilers with condensing boilers, among other energy efficiency projects. The expected GHG emission reduction effect of the measure, including all CO_2, HFC and PFC mitigation, is 119 kt CO_2 eq by 2020. During the review, the Party provided the main results of the measure through the publication "First official report on the implementation of the third national action plan on climate change 2013–2020". The report indicates that the Operational Programme for Development of the Competitiveness of the Bulgarian Economy 2007–2013 has financed projects whereby 465 enterprises have received a total of 327,706,326.04 Bulgarian lev in grants to promote and develop energy efficiency and the green economy; and that the GHG emission reductions resulting from the supported projects amounted to approximately 126.60 kt CO_2 per year.

44. **Agriculture.** In 2016 the agriculture sector accounted for 11.1 per cent of the total annual national GHG emissions. Bulgaria has several measures to reduce emissions from the major sources in the sector. The measures are consistent with the national circumstances of the sector and the EU Common Agricultural Policy for 2014–2020. Thus, the opportunities for mitigation are linked to the implementation of direct payments, market support and rural development measures. The main implemented mitigation actions are encouraging the use of

suitable crop rotation, expansion of the use of nitrogen-fixing crops and increasing the rate of land reclamation using herbaceous species typical for the region and soil treatment methods. Mitigation measures are planned and promoted by improving the knowledge of farmers regarding humus conservation activities (e.g. precise fertilization, green manure, liming, soil cultivation, prevention of stubble burning, anti-erosion measures). Mitigation measures targeting CH_4 emissions include encouraging extensive grassland husbandry, improving the management and use of manure and introducing low-carbon practices for processing manure (e.g. composting, transformation of manure into biogas under anaerobic conditions).

45. **LULUCF.** The limited potential for GHG mitigation is highlighted by the small estimated impact of all proposed measures, which is 9.1 kt CO_2 by 2020. Mitigation actions focus on increasing carbon sequestration in all carbon pools across various land categories, both forests and non-forest land. The BR3 mentions that such activities also address other environmental concerns, namely, supporting biodiversity preservation (e.g. maintenance of forests of high conservation value) and combating land degradation. Actual mitigation actions on non-forest land are limited to the restoration and sustainable management of wetlands. Mitigation in forestry is well represented by afforestation/reforestation (i.e. increased areas of urban and suburban parks and green zones, anti-erosion afforestation) and forest management (e.g. restoration and maintenance of protective forest belts, conservation of carbon stocks in forests, increasing the potential of forests for carbon sequestration). Maintaining long-term carbon stocks in wood products is supported only through awareness campaigns for expanding the use of wood products to substitute products from non-renewable, polluting and energy-intensive materials. Actions in the forestry sector are supported technically and financially through the National Strategy for Development of the Forestry Sector for 2013–2020.

46. **Waste management.** Bulgaria is implementing, under EU legislation, waste management policies to reduce GHG emissions. The ERT noted that Bulgaria is making efforts to prevent waste and reduce the amount of waste going to landfill, while managing existing landfill sites. The main PaMs reported in the BR3 are focused on the capture and burning of biogas in all new and existing regional landfills; introducing anaerobic stabilization of sludge with management capture and burning of biogas; and constructing installations for mechanical and biological treatment and treatment and recovery of compost and biogas. The total expected effect for the three main PaMs is 1,490 kt CO_2 eq by 2020.

(d) Response measures

47. Bulgaria did not report on the assessment of the economic and social consequences of its response measures. It did not present any initiatives aimed at minimizing the adverse impacts of its measures. In its most recent national inventory report (2018) Bulgaria stated that its response measures are aimed at energy efficiency and the renovation of technologies, and the national climate change legislation is mostly based on similar EU legislation on climate change that ensures minimization of possible adverse impacts of response measures on developing country Parties.

(e) Assessment of adherence to the reporting guidelines

48. The ERT assessed the information reported in the BR3 of Bulgaria and identified issues relating to completeness and transparency. The findings are described in table 5.

Table 5
Findings on mitigation actions and their effects from the review of the third biennial report of Bulgaria

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 6 Issue type: transparency	The Party provided information on sectoral mitigation actions in its BR3. However, in the energy, transport and industry sectors, the PaMs were not transparently described, and the specific measures were not clearly specified. For example, in the measure "Increasing the share of electric energy from renewable energy sources in the electricity mix" the type of instrument is described as a "national action plan in the field of renewable energy" but there

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
	Assessment: recommendation	is no description of the measure that will lead to the increase in the share of renewable energy (e.g. incentives for adoption of renewable energy). During the review Bulgaria explained that relevant information is included in the third National Action Plan on Climate Change. For the energy sector it mentioned national programmes supporting innovations and clean energy technologies as well as regulatory incentives for energy network operators. The ERT recommends that Bulgaria provide in its next BR transparent information on its mitigation actions in the energy, transport and industry sectors. The ERT notes that transparency could be increased if the Party included, for example, in its description of the PaMs not only the objective of the measure but also details of the way in which this objective will be achieved.
2	Reporting requirement specified in CTF table 3 Issue type: transparency Assessment: recommendation	The Party reported information on mitigation actions and their effect under CTF table 3. The ERT noted that cross-cutting measures described in the text of the BR3 are not described under CTF table 3. During the review, Bulgaria explained that it plans to provide consistent information in the textual section of the BR and CTF table 3 in the next submission of its BR. The ERT recommends that Bulgaria provide in its next BR a consistent description for mitigation actions in CTF table 3 and in the BR text.
3	Reporting requirement specified in paragraph 8 Issue type: completeness Assessment: encouragement	The Party did not report in its BR3 detailed information on the assessment of the economic and social consequences of response measures. During the review Bulgaria explained that its response measures are coordinated with the EU regulations and are not expected to have adverse economic or social consequences. The most important continuous activity in this respect is the EU wide-ranging impact assessment system accompanying all new policy initiatives. This approach ensures that potential adverse social, environmental and economic impacts on various stakeholders and third parties are identified and minimized within the legislative process. The ERT encourages Bulgaria to report, to the extent possible, detailed information on the assessment of the economic and social consequences of response measures.
4	Reporting requirement specified in paragraph 7 Issue type: completeness Assessment: recommendation	The Party did not report in its BR3 information on changes in its domestic institutional arrangements, including institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards its economy-wide emission reduction target. During the review Bulgaria explained that it has made only one assessment of its progress in achieving the targets (in the TNAPCC), and that all the compliance-related issues are considered by the Party under its commitments to the EU and non-compliance is regulated by the EU regulations. The ERT recommends that Bulgaria include in its next BR information on changes in its administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards its economy-wide emission reduction target, for example beyond and in connection with the corresponding EU regulations.
5	Reporting requirement specified in paragraph 24	Bulgaria did not report in its BR3 information on the domestic arrangements established for the process of self-assessment of compliance with emission reduction commitments. During the review Bulgaria explained that all the compliance-related issues are considered by the Party under its commitments to the EU and non-compliance is regulated by the EU regulations.

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
	Issue type: completeness Assessment: encouragement	The ERT encourages Bulgaria to report in its next BR, to the extent possible, information on the domestic arrangements established for the process of self-assessment of compliance with emission reduction commitments.

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs or CTF table. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on BRs.

2. Estimates of emission reductions and removals and the use of units from market-based mechanisms and land use, land-use change and forestry

(a) Technical assessment of the reported information

49. For 2014 Bulgaria reported in CTF table 4 annual total GHG emissions excluding LULUCF of 57,505.12 kt CO_2 eq, which is 55.5 per cent below the 1990 level. In 2014 emissions from non-ETS sectors relating to the target under the ESD amounted to 22,900.87 kt CO_2 eq.

50. For 2015 Bulgaria reported in CTF table 4 annual total GHG emissions excluding LULUCF of 61,482.75 kt CO_2 eq, which is 59.3 per cent below the 1990 level. In 2015 emissions from non-ETS sectors relating to the target under the ESD amounted to 25,587.95 kt CO_2 eq.

51. On its use of units from LULUCF activities, Bulgaria reported in CTF tables 4 and 4(a) that it does not use LULUCF units. It also reported that it does not intend to use units from market-based mechanisms. Table 6 illustrates Bulgaria's total GHG emissions, the contribution of LULUCF and the use of units from market-based mechanisms to achieve its target.

Table 6
Summary of information on the use of units from market-based mechanisms and land use, land-use change and forestry by Bulgaria to achieve its target

Year	*Emissions excluding LULUCF (kt CO_2 eq)*	*Contribution of LULUCF (kt CO_2 eq)*[a]	*Emissions including contribution of LULUCF (kt CO_2 eq)*	*Use of units from market-based mechanisms (kt CO_2 eq)*
1990	103 989.21	NA	NA	NA
2010	60 300.91	NA	NA	NA
2011	65 613.59	NA	NA	NA
2012	60 515.65	NA	NA	NA
2013	55 327.23	NA	NA	NA
2014	57 505.12	NA	NA	NA
2015	61 482.75	NA	NA	NA

Sources: Bulgaria's BR3 and CTF tables 1, 4, 4(a)I, 4(a)II and 4(b).

[a] The EU's unconditional commitment to reduce GHG emissions by 20 per cent below the 1990 level by 2020 does not include emissions/removals from LULUCF.

52. In assessing the progress towards the achievement of the 2020 target, the ERT noted that Bulgaria's emission reduction target allows an increase of 20 per cent above the 2005 level by 2020 for non-ETS sectors. As discussed above, in 2014 and 2015 Bulgaria's emissions from non-ETS sectors were 17 and 8 per cent, respectively (4,695.142 and 2,146.725 kt CO_2 eq, respectively) below the AEAs under the ESD.

53. The ERT noted that Bulgaria is making progress towards its emission reduction target by implementing mitigation actions that are delivering significant emission reductions without using units from the market-based mechanisms and contribution of LULUCF. On the basis of the results of the projections under the WEM scenario, the ERT also noted that the Party is making progress towards achieving its target under the Convention.

(b) Assessment of adherence to the reporting guidelines

54. The ERT assessed the information reported in the BR3 of Bulgaria and identified an issue relating to transparency and adherence to the UNFCCC reporting guidelines on BRs. The finding is described in table 7.

Table 7
Findings on estimates of emission reductions and removals and the use of units from the market-based mechanisms and land use, land-use change and forestry from the review of the third biennial report of Bulgaria

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in CTF table 4	The ERT noted that the Party reported total emissions excluding LULUCF for the base year until 2015 and all values are marked by an asterisk which is not explained in the footnote. Other elements relevant for assessing the progress towards the target are reported using the notation key "NA", which is not explained in the footnote.
	Issue type: transparency	During the review the Party resubmitted the CTF tables, although the issues raised above were not addressed.
	Assessment: recommendation	The ERT recommends that Bulgaria explain all notation keys used in a footnote in CTF table 4 in the next submission.

Note: Item listed under reporting requirement refers to the CTF table number in the annex to decision 19/CP.18. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on BRs.

3. Projections overview, methodology and results

(a) Technical assessment of the reported information

55. Bulgaria reported updated projections for 2020 and 2030 relative to actual inventory data for 2015 under the WEM scenario. The WEM scenario reported by Bulgaria includes implemented and adopted PaMs until 2015.

56. In addition to the WEM scenario, Bulgaria reported the WAM scenario. The WAM scenario includes planned PaMs adopted or planned after 2015. Bulgaria provided definitions of its scenarios, explaining that its WEM scenario includes PaMs specified in the third National Climate Change Plan, but measures specific to the WAM scenario were not well described in the NC7 (see issue 1 in table 11). The definitions indicate that the scenarios were prepared according to the UNFCCC reporting guidelines on NCs.

57. The projections are presented on a sectoral basis, using the same sectoral categories as those used in the reporting on mitigation actions, and on a gas-by-gas basis (only for the WEM scenario) for CO_2, CH_4, N_2O, PFCs, HFCs and SF_6 (treating PFCs and HFCs collectively in each case) for 2015–2030 for the WEM scenario only. The projections are also provided in an aggregated format for each sector as well as for a Party total using global warming potential values from the AR4.

58. Bulgaria did not report emission projections for indirect GHGs such as carbon monoxide, nitrogen oxides, non-methane volatile organic compounds or sulfur oxides (see issue 3 in table 11).

59. Emission projections related to fuel sold to ships and aircraft engaged in international transport were not reported separately and were not included in the totals but were provided during the review (see issue 4 in table 11). Bulgaria reported on factors and activities affecting emissions for each sector.

(b) Methodology, assumptions and changes since the previous submission

60. The methodology used for the preparation of the projections is identical to that used for the preparation of the emission projections for the BR2 and NC6. Bulgaria reported supporting information further explaining the methodologies and the changes made since the NC6 and BR2. The methodologies and assumptions are identical to those used for the NC6 and BR2, except for some assumption adjustment due to a change in the starting point of the projections.

61. To prepare its projections, Bulgaria relied on key underlying assumptions in relation to GDP growth rate, population and energy prices of oil, gas and coal. These variables and assumptions, common to the WEM and WAM scenarios, were reported in CTF table 5. The key assumptions have not been updated since the NC6. The ERT noted that the annual GDP growth rate was assumed to be 4.3 per cent in 2020 and 2.8 per cent in 2030, despite the rather high annual rate of population decline, assumed to be –2.8 per cent in 2020 and –3.2 per cent in 2030.

62. Bulgaria provided information on methodologies, models and approaches used in the preparation of the projection scenarios (see issue 6 in table 11). During the review, the ERT confirmed the methodological steps as follows: (1) macroeconomic background (indicators) provided using the model of the Ministry of Finance as input for the following steps; (2) other sector-specific assumptions separately prepared for the WEM and WAM scenarios on the basis of the definitions of the scenarios; (3) sector-specific models prepared using country-specific inputs (for the most important energy-related sectors, the bottom-up LEAP software is used for modelling, while simpler spreadsheet models are constructed for other sectors); (4) sector-wise outputs of the models are aggregated. The interference between sectors is not modelled.

63. Sensitivity analyses were conducted for GDP growth rate (see issue 7 in table 15). The ERT calculated, based on the information provided during the review, that a higher GDP growth case (additional 3.7 per cent/year) results in higher GHG emissions of 3.7 per cent/year and vice versa, which implies that the elasticity of GHG emissions against additional GDP growth is almost one, or emission reduction effect is almost independent of GDP growth.

(c) Results of projections

64. The projected emission levels under different scenarios and information on the Kyoto Protocol targets and the quantified economy-wide emission reduction target are presented in table 8 and the figure below.

Table 8
Summary of greenhouse gas emission projections for Bulgaria

	GHG emissions (kt CO_2 eq per year)	*Changes in relation to base-year[a] level (%)*	*Changes in relation to 1990 level (%)*
Quantified economy-wide emission reduction target under the Convention[b]	NA	NA	NA
Inventory data 1990[c]	103 653.58	NA	NA
Inventory data 2015[c]	61 482.76	–40.7	–40.7
WEM projections for 2020[c]	59 086.83	–43.0	–43.0
WAM projections for 2020[c]	53 325.50	–48.6	–48.6
WEM projections for 2030[c]	55 492.74	–46.5	–46.5

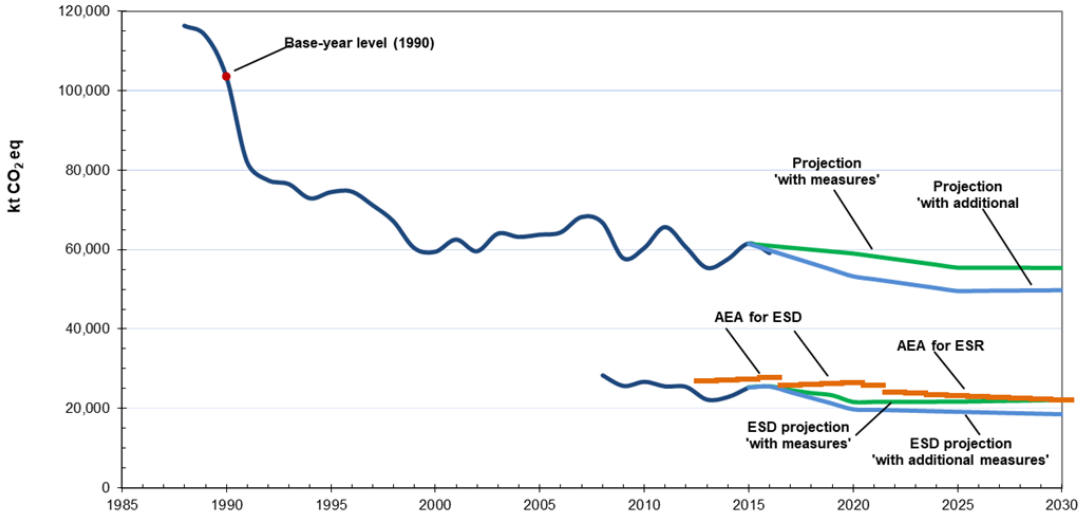
	GHG emissions (kt CO_2 eq per year)	*Changes in relation to base-year[a] level (%)*	*Changes in relation to 1990 level (%)*
WAM projections for 2030[c]	49 826.80	–51.9	–51.9

[a] "Base year" in this column refers to the base year used for the target under the Convention, which for Bulgaria is 1990.

[b] The quantified economy-wide emission reduction target under the Convention is a joint target of the EU and its 28 member States. The target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020.

[c] From Bulgaria's CTF table 6 provided during the review.

Greenhouse gas emission projections reported by Bulgaria



Sources: (1) data for 1990–2016: Bulgaria's 2018 annual inventory submission, version 1; total GHG emissions excluding LULUCF; (2) data for 2015–2030: Bulgaria's NC7 and BR3; total GHG emissions excluding LULUCF; updated projections provided by the Party during the review; (3) AEAs for ESR (2021–2030) from the EEA report "Trends and Projections in Europe 2018: Tracking Progress Towards Europe's Climate and Energy Targets", which are based on the WEM projections.

65. Bulgaria's total GHG emissions excluding LULUCF in 2020 and 2030 are projected to be 59,068.83 and 55,492.74 kt CO_2 eq, respectively, under the WEM scenario, which represents a decrease of 43.0 and 46.5 per cent, respectively, below the 1990 level. Under the WAM scenario, emissions in 2020 and 2030 are projected to be lower than those in 1990 by 48.6 and 51.9 per cent and amount to around 53,325.50 and 49,826.80 kt CO_2 eq, respectively. The 2020 projections suggest that Bulgaria will continue contributing to the achievement of the EU target under the Convention.

66. Bulgaria's target for non-ETS sectors is to limit its emission growth to 20 per cent above the 2005 level by 2020. Bulgaria's AEAs, which correspond to its national emission target for non-ETS sectors, change linearly from 26,933.22 kt CO_2 eq in 2013 to 26,543.23 kt CO_2 eq for 2020. According to the projections under the WEM scenario, emissions from non-ETS sectors are estimated to reach 21,741.58 kt CO_2 eq by 2020. Under the WAM scenario, Bulgaria's emissions from non-ETS sectors in 2020 are projected to be 19,730.46 kt CO_2 eq. The projected levels of emissions under the WEM and WAM scenarios are 18.1 and 25.7 per cent, respectively, below the AEA for 2020. The ERT noted that this suggests that Bulgaria expects to meet its ESD target under both the WEM and the WAM scenario.

67. Bulgaria presented the WEM and WAM scenarios by sector for 2020 and 2030, as summarized in table 9.

Table 9
Summary of greenhouse gas emission projections for Bulgaria presented by sector

	GHG emissions and removals (kt CO_2 eq)					*Change (%)*			
	1990	*2020*		*2030*		*1990–2020*		*1990–2030*	
Sector		*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*
Energy (not including transport)	66 899.02	36 849.33	34 273.00	34 118.94	31 505.00	–44.9	–48.8	–49.0	–52.9
Transport	6 572.96	8 354.00	6 664.00	7 335.00	5 893.00	27.1	1.4	11.6	–10.3
Industrial processes	10 046.88	4 829.50	4 829.50	4 900.80	4 900.80	–51.9	–51.9	–51.2	–51.2
Agriculture	12 127.18	5 065.00	5 005.00	5 454.00	5 391.00	–58.2	–58.7	–55.0	–55.5
LULUCF	–15 023.33	–11 209.00	–10 104.00	–12 265.00	–6 019.00	–25.4	–32.7	–18.4	–59.9
Waste	8 007.54	3 989.00	2 554.00	3 684.00	2 137.00	–50.2	–68.1	–54.0	–73.3
Other (specify)	NO	NO	NO	NO	NO	NA	NA	NA	NA
Total GHG emissions without LULUCF	**103 653.58**	**59 086.83**	**53 325.50**	**55 492.74**	**49 826.80**	**–43.0**	**–48.6**	**–46.5**	**–57.2**

Source: Bulgaria's BR3 CTF table 6 provided during the review.

68. According to the projections reported for 2020 under the WEM scenario, the most significant emission reductions are expected to occur in the energy sector not including transport, amounting to a projected reduction of 30,049.69 kt CO_2 eq (44.9 per cent), followed by the agriculture sector (7,062.18 kt CO_2 eq or 58.2 per cent), the industrial processes sector (5,217.38 kt CO_2 eq or 51.9 per cent) and the waste sector (4,018.54 kt CO_2 eq or 50.2 per cent) in 1990–2020. The ERT noted that only emissions from the transport sector are projected to increase, by 1,781.04 kt CO_2 eq or 27.1 per cent, in that period. The pattern of projected emissions reported for 2030 under the same scenario remains the same. The ERT also noted that the reductions occurred mainly before 2000 and the total emissions have remained almost stable thereafter (–0.5 per cent and –6.5 per cent for 2000–2020 and 2000–2030, respectively), dominated by the energy sector without transport. The emission reductions prior to 2000 were due to the shrinking, reflected in reduced energy consumption, of the majority of the economic sectors, except for the transport sector. Despite this tendency towards stabilization of total emissions but increasing emissions from the transport sector, under the WEM scenario emissions from the transport sector are projected to decrease considerably after 2015, probably as a result of transport demand declining with the population.

69. If additional measures are considered (i.e. under the WAM scenario), the patterns of emission reductions by 2020 presented by sector remain the same with additional and constant emission reductions (5.6 per cent in 2020 and 5.5 per cent in 2030). The ERT noted that the decreasing emission trends for the transport and waste sectors are enhanced under the WAM scenario owing to the additional measures considered.

70. Bulgaria presented the WEM scenario by gas for 2020 and 2030, as summarized in table 10.

Table 10
Summary of greenhouse gas emission projections for Bulgaria presented by gas

	GHG emissions and removals (kt CO_2 eq)					*Change (%)*			
	1990	*2020*		*2030*		*1990–2020*		*1990–2030*	
Gas		*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*
CO_2	78 650.47	56 111.80	NE	51 809.89	NE	–28.7	NA	–34.1	NA
CH_4	16 179.06	6 936.71	NE	6 774.91	NE	–57.1	NA	–58.1	NA
N_2O	8 820.36	3 928.66	NE	4 087.86	NE	–55.5	NA	–53.7	NA
HFCs	NO	437.82	NE	124.45	NE	NA	NA	NA	NA
PFCs	NO	2.08	NE	3.25	NE	NA	NA	NA	NA
SF_6	NO	NO	NO	NO	NO	NA	NA	NA	NA
NF_3	3.69	22.50	NE	26.40	NE	509.1	NA	615.4	NA
Total GHG emissions without LULUCF	**103 653.58**	**67 439.47**	**53 325.50**	**62 826.76**	**49 826.80**	**–43.0**	**–48.6**	**–46.5**	**–51.9**

Source: Bulgaria's BR3 CTF table 6 provided during the review.

71. For 2020 the most significant reductions are projected for CO_2 emissions (22,538.67 kt CO_2 eq (28.7 per cent)), followed by CH_4 (9,242.35 kt CO_2 eq (57.1 per cent)) and N_2O (4,891.69 kt CO_2 eq (55.5 per cent)) between 1990 and 2020.

72. The projections by gas until 2030 under the WEM scenario are dominated by stronger reductions in CO_2 (with an additional 5.4 per cent reduction projected for 2020–2030), while total emissions are expected to decrease by an additional 3.5 per cent in the same period.

73. Bulgaria did not provide projections by gas for the WAM scenario.

(d) Assessment of adherence to the reporting guidelines

74. The ERT assessed the information reported in the BR3 of Bulgaria and identified issues relating to completeness, transparency and adherence to the UNFCCC reporting guidelines on BRs. The findings are described in table 11.

Table 11
Findings on greenhouse gas emission projections reported in the third biennial report of Bulgaria

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
1	Reporting requirement specified in paragraph 29	It was not made clear in the BR3 which planned PaMs were considered in the WAM scenario, and whether existing PaMs (such as in the energy supply sector) were to be further enhanced under a WAM scenario.
	Issue type: transparency	During the review, Bulgaria explained how the projections were made, especially for the WEM scenario, which reflects the TNAPCC and its methodological approach, but did not clearly explain which PaMs were included in the WAM scenario.
	Assessment: encouragement	The ERT encourages Bulgaria to clarify in its next NC which planned PaMs were considered under the WAM scenario. The ERT noted that historically, GHG emissions, such as those related to the growth in the transport sector, have been compensated by the decline in the industry sector, while other sectors' emissions have been almost stable. Recognizing that the transport sector is key the ERT found that the WEM and WAM scenarios show a large shift in this sector's emissions from strong growing trend to decreasing trend (especially for the WAM scenario), but the underlying reasons (e.g. which planned PaMs were considered) are unclear.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
2	Reporting requirement specified in paragraph 35 Issue type: completeness Assessment: recommendation	Bulgaria did not report projections by gas under the WAM scenario in its NC7. Furthermore, CTF table 6(c) includes erroneous inputs for historical emissions for "Total with and without LULUCF" as well as an unclear custom footnote. In addition, CTF table 6(a) for the WEM scenario has erroneous inputs for "Total without LULUCF" for 2020 and 2030. Bulgaria provided corrected CTF tables, although without WAM projections by gas, during the review. The ERT recommends that Bulgaria present its WAM projections on a gas-by-gas basis and provide correct figures in CTF tables 6(a) and (c) in its next submission.
3	Reporting requirement specified in paragraph 35 Issue type: completeness Assessment: encouragement	Bulgaria did not report projections of the indirect GHGs carbon monoxide, nitrogen oxides, non-methane volatile organic compounds or sulfur oxides. During the review, Bulgaria explained that it did not estimate such projections for its NC7. It plans to report projections of indirect GHGs in its next BR. The ERT encourages Bulgaria to report in its next BR projections of indirect GHGs.
4	Reporting requirement specified in paragraph 36 Issue type: completeness Assessment: recommendation	Bulgaria did not report emissions projections related to fuel sold to ships and aircraft engaged in international transport in its BR3. During the review, Bulgaria informed the ERT that the expected emissions from international fuels are 792.81, 790.44, 788.09 and 785.75 kt CO_2 eq for 2020, 2025, 2030 and 2035, respectively. The ERT reiterates the recommendation made in the previous review report that Bulgaria report in its next BR emissions related to fuel sold to ships and aircraft engaged in international transport, to the extent possible, separately and not included in the totals.
5	Reporting requirement specified in paragraph 38 Issue type: completeness Assessment: encouragement	Bulgaria did not include graphs showing the projected scenarios aggregated for all sectors and by gas in its BR3, although it included individual sectoral graphs. During the review, Bulgaria provided aggregated graphs. The ERT encourages Bulgaria to report in its next BR diagrams illustrating its projections in an aggregated format for all sectors and by gas. The ERT noted that relevant analysis and explanations pointing out specific parts of the graph could enhance the transparency of the reporting. The ERT also noted that the disaggregated graph showing EU ETS and ESD emission projections, which Bulgaria provided during the review, could be useful to explain its EU- and country-driven approach to mitigating climate change.
6	Reporting requirement specified in paragraph 42 Issue type: transparency Assessment: encouragement	Bulgaria reported on its methodological approach but the relationship between several tools within the model, as well as the model inputs and outputs, was unclear. During the review, Bulgaria explained the methodological steps as described in paragraph 63 above. The ERT encourages Bulgaria to report in its next BR clear information to facilitate a basic understanding of the models or approaches used.
7	Reporting requirement specified in paragraph 43 Issue type: completeness Assessment: encouragement	Bulgaria did not report the elements described in paragraph 43 of the UNFCCC reporting guidelines on NCs (e.g. strengths and weaknesses of the model, and the approach to overlaps or synergies between different PaMs), which would make the description of the model or approach more transparent. During the review, Bulgaria did not provide further information, for example on strengths and weaknesses of the model, and the approach to overlaps or synergies between different PaMs. The ERT encourages Bulgaria to report in its next NC all the elements mentioned in paragraph 43 of the UNFCCC reporting guidelines on NCs (e.g. for which gases and/or sectors the model or approach was used, the type of model or approach used

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation or encouragement
		and its characteristics, the original purpose for which the model or approach was designed, the strengths and weaknesses of the model, and how the model or approach used accounts for any overlaps or synergies between different PaMs).
8	Reporting requirement specified in paragraph 45 Issue type: completeness Assessment: encouragement	Bulgaria did not report the main differences between the assumptions and methods used for the BR3 and those used for previous BRs. During the review, Bulgaria explained that the assumptions and methods applied were identical to those used for the BR2, except for some assumption adjustment due to a change in the starting point of the projections. Bulgaria stated that it intends to use more integrated methods for its next BR. The ERT encourages Bulgaria to describe how the methods and assumptions used for its BR are different from those used for previous BRs. For example, it should clarify the differences in GHG emissions originated by the different methods or assumptions. Sensitivity analysis of previous and new methods could clarify differences in characteristics.
9	Reporting requirement specified in paragraph 46 Issue type: completeness Assessment: encouragement	Bulgaria reported in its BR3 a sensitivity analysis focused on GDP growth, but it did not include a qualitative or, where possible, a quantitative discussion of the results. During the review, Bulgaria identified several elements that could influence the projections, such as the introduction of a new nuclear power plant and stated that it plans to include in its next submission additional factors that significantly affect GHG emissions. The ERT encourages Bulgaria to discuss in its next BR the sensitivity of the projections to underlying assumptions qualitatively, and, where possible, quantitatively.
10	Reporting requirement specified in paragraph 48 Issue type: transparency Assessment: encouragement	The Party reported factors to understand the emission trends in the past and in the future projections in several sections of its NC7 but not in tabular format. During the review, Bulgaria provided several documents that include the relevant analyses (National Energy Strategy 2020; reference scenarios for 2016; and online operational data from the national energy system operator) but did not present the information in a tabular format. The ERT encourages Bulgaria to report in tabular format factors that can explain emission trends. For example, the ERT noted that historically, Bulgaria has experienced substantial and continuous improvement in the energy intensity of GDP, especially in the period of strong economic growth (–5.1 per cent/year for 1999–2008), while even in the economically stagnant period the ERT observed a considerable improvement in the range of –2 to –3 per cent/year. This improvement could probably be largely attributed to the structural changes in the economy. One such factor could be the improved technological efficiency. Factorization or decomposition of the reasons underlying emission trends can provide useful insights when designing/strengthening the PaMs.

Note: Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs. The reporting on the requirements not included in this table is considered to be complete, transparent and adhering to the UNFCCC reporting guidelines on NCs and on BRs.

D. Provision of financial, technological and capacity-building support to developing country Parties

75. Bulgaria is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3, 4 and 5, of the Convention. However, the Party provided some information in its BR3 on its provision of support to developing country Parties.

76. Bulgaria reported that in 2015 it announced its grant contribution of EUR 100,000 to the Green Climate Fund. The Party also reported on its activities related to technology transfer, but in terms of receiving rather than providing. As a new EU member State, Bulgaria

is a recipient of technology transfer support and uses various EU funds to help it to comply with certain environmental standards and to implement improved environmental policy.

III. Conclusions and recommendations

77. The ERT conducted a technical review of the information reported in the BR3 and CTF tables of Bulgaria in accordance with the UNFCCC reporting guidelines on BRs. The ERT concludes that the reported information mostly adheres to the UNFCCC reporting guidelines on BRs and provides an overview of emissions and removals related to the Party's quantified economy-wide emission reduction target; assumptions, conditions and methodologies related to the attainment of the target; and progress made by the Party in achieving its target.

78. Bulgaria's total GHG emissions excluding LULUCF covered by its quantified economy-wide emission reduction target were estimated to be 43.2 per cent below its 1990 level, whereas total GHG emissions including LULUCF were 41.1 per cent below its 1990 level, in 2016. The decrease in the total emissions was driven mainly by the deep economic recession due to the collapse of the centralized planning economy (in 1988–1991), economic crises (in 1998 and 2008) and the underlying continuous change in economic structure from heavy industry to service sectors.

79. Under the Convention, Bulgaria committed to contributing to the achievement of the joint EU quantified economy-wide emission reduction target of a 20 per cent reduction in emissions below the 1990 level by 2020. The target covers all sectors and CO_2, CH_4, N_2O, HFCs, PFCs and SF_6, expressed using global warming potential values from the AR4. Emissions and removals from the LULUCF sector are not included. The EU generally allows its member States to use units from the Kyoto Protocol mechanisms and new market mechanisms for compliance purposes up to an established limit and subject to a number of restrictions on the origin and the type of project. Companies can make use of such units to fulfil their requirements under the EU ETS.

80. Bulgaria's main policy framework relating to energy and climate change is the third National Action Plan on Climate Change for 2013–2020, which provides measures and targets for reducing GHG emissions and achieving energy efficiency across all sectors. Bulgaria's mitigation actions are consistent with the Party's participation in the EU ETS and its commitments under the EU climate and energy package as an EU member State. The mitigation actions are stated as being consistent with the potential of the national economy for reducing emissions. Among the mitigation actions that are critical for Bulgaria's contribution to attaining the EU-wide 2020 emission reduction target are those in the energy sector (e.g. improvement of energy production efficiency in existing coal-fired power plants) and waste sector (e.g. capture and burning of biogas at all new and existing regional landfills).

81. For 2015 Bulgaria reported in CTF table 4 total GHG emissions excluding LULUCF of 61482.75 kt CO_2 eq. Bulgaria reported that it does not intend to use units from market-based mechanisms to achieve its target.

82. Bulgaria's total GHG emissions excluding LULUCF in 2020 and 2030 are projected to be 59,068.83 and 55,492.74 kt CO_2 eq, respectively, under the WEM scenario, which represents a decrease of 43.0 and 46.5 per cent, respectively, below the 1990 level. Under the WAM scenario, emissions in 2020 and 2030 are projected to be lower than those in 1990 by 48.6 and 51.9 per cent and amount to around 53,325.50 and 49,826.80 kt CO_2 eq, respectively. The 2020 projections suggest that Bulgaria will continue contributing to the achievement of the EU target under the Convention.

83. Bulgaria's target for non-ETS sectors is to limit its emission growth to 20 per cent above the 2005 level by 2020. Bulgaria's AEAs, which correspond to its national emission target for non-ETS sectors, change linearly from 26,933.22 kt CO_2 eq in 2013 to 26,543.23 kt CO_2 eq for 2020. According to the projections under the WEM scenario, emissions from non-ETS sectors are estimated to reach 21,741.6 kt CO_2 eq by 2020. Under the WAM scenario, Bulgaria's emissions from non-ETS sectors in 2020 are projected to be 19,730.46 kt CO_2 eq. The projected levels of emissions under the WEM and WAM scenarios are 18.1 and 25.7 per

cent, respectively, below the AEA for 2020. The ERT noted that this suggests that Bulgaria expects to meet its ESD target under both the WEM and the WAM scenario.

84. Bulgaria is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3, 4 and 5, of the Convention. However, Bulgaria provided some information on its provision of support to developing country Parties. Bulgaria reported that in 2015 it announced its grant contribution of EUR 100,000 to the Green Climate Fund.

85. In the course of the review, the ERT formulated the following recommendations for Bulgaria to improve its adherence to the UNFCCC reporting guidelines on BRs in its next BR:

(a) To improve the completeness of its reporting by:

(i) Providing information on changes in its administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards its economy-wide emission reduction target (see issue 4 in table 5);

(ii) Providing projections by gas for the WAM scenario (see issue 2 in table 11);

(iii) Providing emissions projections relating to fuel sold to ships and aircraft engaged in international transport, to the extent possible, separately and not included in the totals (see issue 4 in table 11);

(b) To improve the transparency of its reporting by:

(i) Explaining the national circumstances that led to different base years being used in different parts of the report by, for example, providing an explanatory footnote to CTF table 1 (see issue 1 in table 3);

(ii) Elaborating and specifying descriptions of the PaMs in the energy, transport and industry sectors (see issue 1 in table 5);

(iii) Providing consistent descriptions of mitigation actions in CTF table 3 and the BR text (see issue 2 in table 5);

(iv) Explaining all notation keys used in a footnote in CTF table 4 (see issue 1 in table 7).

Annex

Documents and information used during the review

A. Reference documents

Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention. Available at https://unfccc.int/topics/mitigation/workstreams/pre-2020-ambition/compilation-of-economy-wide-emission-reduction-targets-to-be-implemented-by-parties-included-in-annex-i-to-the-convention.

2017 GHG inventory submission of Bulgaria. Available at https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/submissions/national-inventory-submissions-2017.

2018 GHG inventory submission of Bulgaria. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/national-inventory-submissions-2018.

BR3 of Bulgaria. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-reports-annex-i-parties/third-biennial-reports-annex-i.

BR3 CTF tables of Bulgaria. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-reports-annex-i-parties/third-biennial-reports-annex-i.

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

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part II: UNFCCC reporting guidelines on national communications". FCCC/CP/1999/7. Available at http://unfccc.int/resource/docs/cop5/07.pdf.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Annex to decision 15/CMP.1. Available at http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Annex III to decision 3/CMP.11. Available at http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf.

"Guidelines for review under Article 8 of the Kyoto Protocol". Annex to decision 22/CMP.1. Available at http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf.

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

NC7 of Bulgaria. Available at https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/national-communications-and-biennial-reports-annex-i-parties/seventh-national-communications-annex-i.

Report on the individual review of the annual submission of Bulgaria submitted in 2016. FCCC/ARR/2016/BGR. Available at https://unfccc.int/process/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories/greenhouse-gas-inventory-review-reports-2016.

Report of the technical review of the second biennial report of Bulgaria. FCCC/TRR.2/BGR. Available at https://unfccc.int/node/66151.

Report on the technical review of the sixth national communication of Bulgaria. FCCC/IDR.6/BGR. Available at https://unfccc.int/node/66151.

Revisions to the guidelines for review under Article 8 of the Kyoto Protocol. Annex I to decision 4/CMP.11. Available at http://unfccc.int/resource/docs/2015/cmp11/eng/08a01.pdf.

"Trends and Projections Europe 2018: Tracking Progress Towards Europe's Climate and Energy Targets". Available at https://www.eea.europa.eu/publications/trends-and-projections-in-europe-2018-climate-and-energy .

"UNFCCC biennial reporting guidelines for developed country Parties". FCCC/SBSTA/2014/INF.6. Annex I to decision 2/CP.17. Available at http://unfccc.int/resource/docs/2011/cop17/eng/09a01.pdf.

B. Additional information provided by the Party

Responses to questions during the review were received from Ms. Detelina Petrova (MoEW), including additional material. The following documents[1] were provided by Bulgaria:

Ministry of Environment and Water. Republic of Bulgaria. First official report on the implementation of the third national action plan on climate change 2013-2020. June 2017. Available at web address: https://www.moew.government.bg/static/media/ups/articles/attachments/Otchet_3NAPCC_final_ENdc802c307573136d4da0575563ea83a3.doc

"Energy Efficiency Trends and Policies in Bulgaria" Available at http://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-bulgaria.pdf.

[1] Reproduced as received from the Party.