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

Developed country Parties were requested by decision 2/CP.17 to submit their fourth biennial report to the secretariat by 1 January 2020. This report presents the results of the technical review of the fourth 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". The review took place from 22 to 26 June 2020 remotely.

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Contents

Abbreviations and acronyms

AEA	annual emission allocation
Annex I Party	Party included in Annex I to the Convention
Annex II Party	Party included in Annex II to the Convention
AR	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
ERT	expert review team
ESD	European Union effort-sharing decision
EU	European Union
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
GDP	gross domestic product
GHG	greenhouse gas
GWP	global warming potential
HFC	hydrofluorocarbon
IPPU	industrial processes and product use
LULUCF	land use, land-use change and forestry
NA	not applicable
NAPCC	National Action Plan on Climate Change
NC	national communication
NE	not estimated
NECP	National Energy and Climate Plan
NF_3	nitrogen trifluoride
NO	not occurring
N_2O	nitrous oxide
PaMs	policies and measures
PFC	perfluorocarbon
RES	renewable energy source(s)
SF_6	sulfur hexafluoride
UNFCCC reporting guidelines on BRs	“UNFCCC biennial reporting guidelines for developed country Parties”
UNFCCC reporting guidelines on CTF tables	“Common tabular format for ‘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 centralized technical review of the BR4[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 did not provide any comments.

3. The review was conducted together with the review of three other Annex I Parties from 22 to 26 June remotely[2] by the following team of nominated experts from the UNFCCC roster of experts: Elijah Chibwe (Zambia), Eric De Brabanter (Luxembourg), Baasansuren Jamsranjav (Mongolia), Juan José Rincón Cristóbal (Spain), Babacar Sarr (Senegal) and Verica Taseska Gjorgievska (North Macedonia). Ms. Baasansuren and Mr. De Brabanter were the lead reviewers. The review was coordinated by Veronica Colerio and Nalin Srivastava (secretariat).

B. Summary

4. The ERT conducted a technical review of the information reported in the BR4 of Bulgaria in accordance with the UNFCCC reporting guidelines on BRs (annex I to decision 2/CP.17).

1. Timeliness

5. The BR4 was submitted on 30 December 2019, before the deadline of 1 January 2020 mandated by decision 2/CP.17. The CTF tables were also submitted on 30 December 2019. The BR4 was resubmitted on 29 Jun 2020 to address issues raised during the review. Bulgaria included in the resubmission information on changes to its national inventory system; its institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of progress towards its target; historical and projected emissions of GHGs from international bunkers; and a sensitivity analysis of projections together with a revised set of CTF tables incorporating relevant changes to address the issues identified during the review. Unless otherwise specified, the information and values from the latest submission are used in this report.

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 BR4 mostly adheres to the UNFCCC reporting guidelines on BRs.

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

Section of BR	*Completeness*	*Transparency*	*Reference to description of recommendation(s)*
GHG emissions and removals	Complete	Transparent	

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

[2] Owing to the circumstances related to the coronavirus disease 2019, the technical review of the BR submitted by Bulgaria had to be conducted remotely.

Section of BR	*Completeness*	*Transparency*	*Reference to description of recommendation(s)*
Quantified economy-wide emission reduction target and related assumptions, conditions and methodologies	Complete	Mostly transparent	Issue 1 in table 3
Progress in achievement of targets	Mostly complete	Mostly transparent	Issues 1–2 in table 5 Issue 1 in table 7 Issue 1 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 chap. 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 3–5, of the Convention.

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

A. Information on greenhouse gas emissions and removals related to the quantified economy-wide emission reduction target

1. Technical assessment of the reported information

7. Total GHG emissions[3] excluding emissions and removals from LULUCF decreased by 43.2 per cent between 1990 and 2018, whereas total GHG emissions including net emissions or removals from LULUCF decreased by 40.2 per cent over the same period. The changes in total emissions were driven mainly by factors such as the Party's transition from a centrally planned economy to a market-based economy, which led to a decrease in power production from thermal power stations, structural changes in industry and a decline in cattle and sheep populations and in the use of fertilizers in agriculture.

8. Table 2 illustrates the emission trends by sector and by gas for Bulgaria. Note that information in this paragraph and table 2 is based on Bulgaria's 2020 annual submission, version 1.0, which has not yet been subject to review. All emission data in subsequent chapters are based on Bulgaria's BR4 CTF tables unless otherwise noted. The emissions reported in the 2020 annual submission differ from the data reported in CTF table 1 (see issue 1, table 3).

Table 2
Greenhouse gas emissions by sector and by gas for Bulgaria for 1990–2018

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2017*	*2018*	*1990–2018*	*2017–2018*	*1990*	*2018*
Sector									
1. Energy	71 271.69	40 763.64	46 219.59	44 939.01	41 197.21	–42.2	–8.3	70.0	71.3
A1. Energy industries	36 539.60	24 029.36	31 334.57	27 671.99	23 539.63	–35.6	–14.9	35.9	23.1
A2. Manufacturing industries and construction	17 765.06	7 225.66	3 158.14	3 602.11	4 269.97	–76.0	18.5	17.5	4.2
A3. Transport	6 604.56	5 510.01	8 013.46	9 495.52	9 700.62	46.9	2.2	6.5	9.5
A4. and A5. Other	8 132.72	2 579.06	2 112.03	2 006.28	1 837.83	–77.4	–8.4	8.0	1.8

[3] 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.

	GHG emissions (kt CO_2 eq)					*Change (%)*		*Share (%)*	
	1990	*2000*	*2010*	*2017*	*2018*	*1990–2018*	*2017–2018*	*1990*	*2018*
B. Fugitive emissions from fuels	2 229.75	1 419.55	1 601.40	2 163.11	1 849.15	–17.1	–14.5	2.2	1.8
C. CO_2 transport and storage	NO	NO	NO	NO	NO	NA	NA	NA	NA
2. IPPU	10 084.04	7 230.48	4 441.44	6 407.65	6 525.73	–35.3	1.8	9.9	6.4
3. Agriculture	12 461.57	5 205.33	5 454.64	6 555.36	6 415.69	–48.5	–2.1	12.2	6.3
4. LULUCF	–19 323.90	–18 321.96	–12 660.04	–8 396.67	–8 460.61	–56.2	0.8	NA	NA
5. Waste	7 977.03	6 380.58	4 611.06	3 780.74	3 676.96	–53.9	–2.7	7.8	3.6
6. Other[a]	NO	NO	NO	NO	NO	NA	NA	NA	NA
Gas[b]									
CO_2	76 698.98	45 305.03	47 862.93	47 505.16	43 551.60	–43.2	–8.3	75.3	75.3
CH_4	15 936.77	10 068.65	7 844.18	7 001.14	6 753.67	–57.6	–3.5	15.7	11.7
N_2O	9 154.90	4 166.83	4 337.75	5 342.27	5 239.79	–42.8	–1.9	9.0	9.1
HFCs	NO, NA	33.02	663.05	1 816.64	2 252.53	–	24.0	–	3.9
PFCs	NO, NA	NO, NA	0.06	0.03	0.01	–	–53.3	–	0.0
SF_6	3.69	6.49	18.76	17.51	17.99	387.1	2.7	0.0	0.0
NF_3	NO, NA	NO, NA	NO, NA	NO, NA	NO, NA	–	–	–	–
Total GHG emissions excluding LULUCF	**101 794.3**	**59 580.0**	**60 726.7**	**61 682.8**	**57 815.6**	**–43.2**	**–6.3**	**100.0**	**100.0**
Total GHG emissions including LULUCF	**82 470.4**	**41 258.1**	**48 066.7**	**53 286.1**	**49 355.0**	**–40.2**	**–7.4**	**NA**	**NA**

Source: GHG emission data: Bulgaria's 2020 annual submission, version 1.0.
[a] Emissions and removals reported under the sector other (sector 6) are not included in the total GHG emissions.
[b] Emissions by gas without LULUCF. The Party did not report indirect CO_2 emissions.

9. In brief, Bulgaria's national inventory arrangements were established in accordance with the provisions of decision 19/CMP.1. Along with other regulations, Bulgaria's Environmental Protection Act provides the basis for the Party's national inventory system. All activities related to the preparation of the Party's GHG inventory are coordinated and managed at the national level by the Ministry of Environment and Water. The Executive Environment Agency is the single national entity responsible for the overall process of national GHG inventory planning, preparation and management. There have been no changes in these arrangements since the BR3.

2. Assessment of adherence to the reporting guidelines

10. The ERT assessed the information reported in the BR4 of Bulgaria and recognized that the reporting is complete, transparent and thus 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.

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

1. Technical assessment of the reported information

11. For Bulgaria the Convention entered into force on 10 August 1995. Under the Convention Bulgaria 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.

12. 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 GWP 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 for compliance purposes, subject to a number of restrictions in terms of origin and type of project and up to an established limit. Operators and airline operators can use such units to fulfil their requirements under the EU ETS, and member States can use such units for their national ESD targets, within specific limitations.

13. The EU 2020 climate and energy package includes the EU ETS and the ESD (see paras. 25–26 below. The EU ETS covers mainly point emissions sources in the energy, industry and aviation sectors. An EU-wide emission cap has been put in place for 2013–2020 with the goal of reducing emissions by 21 per cent below the 2005 level by 2020. Emissions from ESD 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.

14. The European Commission set out its vision for a climate-neutral EU in November 2018, and in December 2019 presented the European Green Deal as a road map with actions for making the EU economy sustainable. The European Council endorsed in December 2019 the objective of making the EU climate-neutral by 2050. As part of the European Green Deal, the Commission proposed in March 2020 to enshrine the 2050 climate-neutrality target into the first European Climate Law. The European Green Deal calls for increased ambition in the 2030 emission reduction target to at least 50 per cent below the 1990 level. Member States will set out any increased ambition in the update of their NECPs.

15. Bulgaria has a national target of limiting its emission growth to 20 per cent above the 2005 level by 2020 for sectors under the ESD. This target has been translated into binding quantified AEAs for 2013–2020. Bulgaria's AEAs change following a path from 26,933.22 kt CO_2 eq in 2013 to 26,543.23 kt CO_2 eq in 2020.[4]

16. In its BR4, Bulgaria reported on the nationally determined contribution of the EU submitted under the Paris Agreement, which was adopted by the EU under the 2030 climate and energy framework. Under its nationally determined contribution, the EU has pledged to reduce emissions by at least 40 per cent by 2030 compared with the 1990 level. Under this target, emissions from EU ETS sectors will have to be cut by 43 per cent by 2030 compared with the 2005 level,[5] while emissions from ESD sectors will need to be cut by 30 per cent by 2030 compared with the 2005 level. This target under the ESD has been translated into individual binding targets for EU member States.[6] Emissions and removals from the LULUCF sector are included in the EU climate target for the first time through the EU LULUCF regulation (regulation 2018/841). Each member State must ensure that the LULUCF sector does not create debits (the 'no debit' rule). According to the effort-sharing regulation, the national target of Bulgaria is to ensure that emissions from sectors covered by the effort-sharing regulation remain at the 2005 level by 2030.

2. Assessment of adherence to the reporting guidelines

17. The ERT assessed the information reported in the BR4 of Bulgaria and identified an issue relating to transparency and thus adherence to the UNFCCC reporting guidelines on BRs. The finding is described in table 3.

Table 3
Findings on the assumptions, conditions and methodologies related to the quantified economy-wide emission reduction target from the review of the fourth biennial report of Bulgaria

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation*
1	Reporting requirement specified in paragraph 5	The Party reported the possible scale of contribution of market-based mechanisms under the Convention as "NA" in CTF table 2(e)I but did not explain the use of this notation key.

[4] European Commission decision 2017/1471 amended decision 2013/162/EU to revise member States' AEAs for 2017–2020.

[5] EU directive to enhance cost-effective emission reductions and low-carbon investments (directive 2018/410).

[6] EU effort-sharing regulation (regulation 2018/842).

No.	Reporting requirement, issue type and assessment	Description of the finding with recommendation
	Issue type: transparency	During the review, the Party explained that it used the notation key "NA" because it does not intend to use the market-based mechanisms under the Convention.
	Assessment: recommendation	The ERT recommends that the Party clearly explain the use of market-based mechanisms in achieving its emission reduction target in CTF table 2(e)I by explaining any notation keys used, for example, through footnotes to the table.

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

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

1. Mitigation actions and their effects

(a) Technical assessment of the reported information

18. 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. Bulgaria reported on its policy context and legal and institutional arrangements in place for implementing its commitments and monitoring and evaluating the effectiveness of its PaMs.

19. Bulgaria provided information on a set of PaMs similar to those previously reported, based on its Third NAPCC. In its BR4, Bulgaria reported 33 measures, of which 10 relate to the energy sector, 7 to the transport sector, 6 to the LULUCF sector, 6 to the agriculture sector and 3 to the waste sector, with 1 being cross-sectoral (energy/waste sector). Bulgaria did not provide in its BR4 information on changes since its previous submission to its institutional, legal, administrative and procedural arrangements used for domestic compliance, monitoring, reporting, archiving of information and evaluation of progress towards its target. The reported information taken from the Party's Third NAPCC on these arrangements was the same as that provided in the BR3. According to the information provided by the Party, an interministerial working group assesses the progress of the implementation of the PaMs presented in the NAPCC.

20. Bulgaria's monitoring and assessment mechanism for its PaMs requires the implementing institutions identified in the NAPCC to report biennially on the implementation of mitigation actions, and their feedback is then included in summary reports on the overall implementation of the NAPCC. The first report on the implementation of the Third NAPCC of Bulgaria, which covers 2013–2016 and was published in 2017, presents information on measures included in the NAPCC, by sector and priority axis, including their mitigation impact (direct and indirect); a performance analysis within the reporting period (such as status of implementation, progress towards achievement of the target milestones and reasons, if any, for delay or failure to achieve the targets); and details of financial resources, as well as proposals submitted by the members of the interministerial working group for changing, updating or withdrawing measures.

21. In its reporting on its PaMs, Bulgaria provided the estimated emission reduction impacts for all of its PaMs. However, the ERT noted that in the summary of PaMs presented in the textual part of the BR4 in the revised submission, Bulgaria reported the cumulative impact of the mitigation actions in 2013–2020 (depending on the start year), while in CTF table 3 the Party reported the mitigation impacts of the mitigation actions (not cumulative) in 2020, 2025 and 2030.

22. Bulgaria reported on its self-assessment of compliance with its emission reduction targets and national rules for taking action against non-compliance. During the review, the Party clarified that one of the main tasks of the interministerial working group referred to in paragraph 19 above is to recommend further actions and measures for achieving the goals set out in the plan if the interim objectives are not being met. At the national level, with regard to non-compliance with policies related to climate change, the administrative procedures and institutional arrangements for enforcement are set by Bulgaria's Climate Change Mitigation

Act. Bulgaria is also obliged to transpose and implement EU-wide legislation, which provides for strict enforcement procedures where member States do not comply.

23. 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. The 2030 climate and energy framework, adopted in 2014, includes more ambitious targets that will be updated as part of the European Green Deal.

24. The achievement of the Energy Union objectives and targets is ensured through a combination of Energy Union initiatives and national policies set out in integrated NECPs. The NECPs are periodically updated to reflect changes to EU policy, such as the implementation of the European Green Deal. Bulgaria's NECP specifies that the Party aims to reduce its total GHG emissions by 49 per cent by 2030 compared with the 1990 level, mainly through its energy sector PaMs. The PaMs targeting decarbonization considered in the NECP primarily involve the continued implementation of the existing and planned energy sector measures outlined in the Third NAPCC out to 2030.

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. 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 that were not covered in the previous phases of the EU ETS (since 2013). Auctioning is the default method for allocating allowances; however, harmonized rules for free allocations, based on benchmark values achieved by the most efficient 10 per cent of installations, are still in place as a safeguard for the international competitiveness of industrial sectors at risk of carbon leakage. For 2030, an emission reduction target of 43 per cent below the 2005 level has been set for the EU ETS.

26. The ESD became operational in 2013 and covers 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. The EU effort-sharing regulation, successor to the ESD, was adopted in 2018. It sets national emission reduction targets for 2030 ranging from 0 to 40 per cent below the 2005 level, and trajectories with annual limits for 2021–2030, for all member States, and keeps many of the flexibilities of the ESD (see para. 16 above).

27. Bulgaria introduced national-level policies to achieve its targets under the ESD and domestic emission reduction targets. The key policies reported are substituting coal with natural gas and improving production efficiency in existing coal-fired power plants, constructing installations for mechanical and biological treatment of waste and for treatment and recovery of compost and biogas, capture and burning of biogas in all new and existing regional landfills and the use of biomass in combustion units of installations. The mitigation effect of substituting coal with natural gas is the most significant. Other policies that have delivered significant emission reductions are Bulgaria's programme for accelerated gasification, increasing high-efficiency combined production, energy efficiency audits and audits for the implementation of prescribed measures in the industry sector, as well as transport sector policies to introduce intelligent transport systems along national and urban road networks and increase the share of electric public transport, covering railways, trolleybuses, trams and the metro.

28. The ERT noted that a mitigation action of particular interest is the use of biomass in combustion units of installations because it is a cross-sectoral measure that aims to green

industry by incorporating alternative fuels, such as separately collected household waste, sludge from domestic wastewater and waste from the food industry and agriculture, in the combustion processes of industrial installations, while reducing both emissions from fossil fuel combustion and CH_4 emissions from landfills by preventing the landfilling of biodegradable waste.

29. Bulgaria highlighted the domestic mitigation actions that are under development, such as the development and staged implementation of the 1,000 Sunny Roofs national programme and financial support for improving production equipment and technology. The first action is related to the energy sector and aims to improve energy efficiency in buildings and increase the share of RES in heat consumption by commissioning combined systems with solar thermal collectors and heat pumps. The other planned action is related to the agriculture sector and aims to introduce low-carbon technologies and methods in rice production. Among the mitigation actions that provide a foundation for significant additional action are the rehabilitation and modernization of existing road infrastructure (see para. 40 below) and the introduction of a mandatory energy efficiency scheme (see para. 32 below). 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 in 2020 (kt CO_2 eq)*	*Estimate of mitigation impact in 2025 (kt CO_2 eq)*	*Estimate of mitigation impact in 2030 (kt CO_2 eq)*
Policy framework and cross-sectoral measures	EU ETS	NE	NE	NE
	ESD	NE	NE	NE
	EU energy taxation directive (directive 2003/96/EC)	NE	NE	NE
	EU directive on integrated pollution prevention and control (directive 2008/1/EC)	NE	NE	NE
	EU directive establishing a framework for the setting of eco-design requirements for energy-using products (directive 2009/125/EC)	NE	NE	NE
	NAPCC	NE	NE	NE
Energy				
Energy supply	Fuel substitution – from coal to natural gas	2 700.00	2 835.00	2 976.75
Transport	Introducing intelligent transport systems along national and urban road networks	170.00	204.00	245.00
	Increasing the share of electric public transport (railway, trolleybus, tram and metro)	127.00	152.00	183.00
Renewable energy	Increasing the share of heating and cooling from RES	61.00	66.00	70.00
	Development and staged implementation of the national programme 1,000 Sunny Roofs	17.00	17.00	17.00
Energy efficiency	Improving production efficiency in existing coal-fired power plants	466.00	585.00	614.25
	Implementing the measures in Bulgaria's programme for accelerated gasification	370.00	310.00	310.00
	Increasing high-efficiency combined production	200.00	210.00	220.50
	Energy efficiency audits and audits for the implementation of prescribed measures	119.00	125.00	131.00
Agriculture	Management of degraded agricultural land	2.50	2.60	2.80
	Encouraging the use of suitable crop rotation, especially with atmospheric nitrogen-fixing crops	1.00	1.00	1.00
LULUCF	Afforestation of abandoned agricultural land, barren and deforested areas and eroded land or land threatened by erosion outside of forest areas	4.80	4.70	4.70
	Utilization of non-wooded areas intended for afforestation in forest areas	1.70	1.90	2.30

Sector	*Key PaMs*	*Estimate of mitigation impact in 2020 (kt CO_2 eq)*	*Estimate of mitigation impact in 2025 (kt CO_2 eq)*	*Estimate of mitigation impact in 2030 (kt CO_2 eq)*
	Restoration and maintenance of protective forest belts and new anti-erosion afforestation	0.80	1.20	1.50
Waste	Constructing installations for mechanical and biological treatment of waste and for treatment and recovery of compost and biogas	728.00	764.00	802.00
	Capturing and burning biogas in all new and existing regional landfills	634.00	665.00	698.00
	Use of biomass in combustion units of installations	554.00	582.00	611.00

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

30. The ERT noted that in the first official report on the implementation of its Third NAPCC, the Party reported that it has reviewed 87 measures put in place in 2014–2016 or launched before the reporting period. During the review, Bulgaria explained that in the BR4, it only reported measures with a direct impact on GHG emission reduction. The ERT notes that providing information on the criteria for selecting the reported mitigation actions in the next BR could improve the transparency of reporting.

(b) Policies and measures in the energy sector

31. **Energy efficiency.** The EU energy efficiency directive (directive 2012/27/EU) establishes a common framework for the promotion of energy efficiency with a view to meeting the 20 per cent energy efficiency target by 2020 and requires EU members States to submit National Energy Efficiency Action Plans that include information on implemented PaMs to improve energy efficiency and their expected and/or actual impacts. In line with its obligations under the EU energy efficiency directive, in its National Energy Efficiency Action Plan for 2014–2020, Bulgaria set indicative energy-saving targets for final energy consumption of 716 ktoe/year and primary energy consumption of 1,590 ktoe/year (including 169 ktoe/year in energy transformation, transmission and distribution processes). Further, as per its Energy Efficiency Act, Bulgaria distributed these targets to three groups of entities: energy traders, owners of occupied public service buildings with a total floor area of more than 500 m^2 (250 m^2 after 9 July 2015) and owners of industrial systems with an annual energy consumption higher than 3,000 MWh.

32. To help meet its energy efficiency targets, Bulgaria adopted a measure in May 2015 to introduce a mandatory energy efficiency scheme, which aims to improve energy efficiency in end-use consumption by achieving annual energy and fuel savings equivalent to 1.5 per cent of the energy provided by distribution companies and market energy traders in the previous year (excluding energy for transport). The estimated mitigation impact of the measure in 2020 is 18 kt CO_2 eq. Before it introduced this obligatory energy efficiency scheme, Bulgaria set the legislative framework and designed its structure and operation mechanism. Energy efficiency PaMs targeting individual sectors are discussed below.

33. **Energy supply and renewables.** The energy sector is the largest GHG emitter in Bulgaria, accounting for 73 per cent of total GHG emissions in 2017. Energy industries, particularly electricity and heat generation, are responsible for 62 per cent of emissions in the energy sector. The energy supply PaMs reported in the Party's BR4 include measures related to switching to less carbon-intensive fuels and to RES, such as substituting coal with natural gas, improving production efficiency in existing coal-fired power plants, increasing the share of high-efficiency combined production and increasing the share of heating and cooling from RES. The EU ETS and competition in the electricity market encourage the transition to less carbon-intensive fuels. The aforementioned fuel substitution measure envisages the gradual replacement of coal-based capacity with natural gas, increasing new gas capacity from 100 to 600 MW between 2014 and 2020. This measure has the highest mitigation impact of all PaMs (2,700 kt CO_2 eq in 2020).

34. The mitigation measure to improve production efficiency in existing coal-fired power plants aims to reduce the carbon intensity of electricity generation in coal-fired power plants

by 5–7 per cent, which is expected to lead to a 466 kt CO_2 eq emission reduction in 2020. According to the Energy Strategy of Bulgaria, the combined heat and energy produced as a result of the measure to increase the share of high-efficiency combined production will account for 15 per cent of the energy mix in 2020. In addition to contributing to the overall efficiency of fuel use and primary energy savings, this is expected to reduce GHG emissions by 200 kt CO_2 eq in 2020.

35. According to the legally binding commitments contained in the EU directive on the promotion of the use of energy from renewable sources (directive 2009/28/EC), Bulgaria has a target to achieve a 16 per cent share of RES in final consumption in 2020. The national instruments that regulate and support the promotion of renewable energy in Bulgaria are the Renewable Energy Act and the National Renewable Energy Action Plan. In its progress report on the promotion and use of energy from RES in accordance with the above-mentioned EU directive, Bulgaria reported that it attained its target in 2012. Nevertheless, the Party continues to promote the use of RES by implementing the measure to increase the share of heating and cooling from RES, which aims to replace conventional fuels used in district heating with RES and grow thermal generation from 2 per cent in 2014 to 10 per cent in 2020. The mitigation impact of this measure in 2020 is estimated to be 61 kt CO_2 eq.

36. **Residential and commercial sectors.** The measure that has the most significant mitigation impact in the residential and commercial sectors is the implementation of the programme for accelerated gasification in Bulgaria. This measure, which is also part of the Energy Strategy of Bulgaria, aims to give 30 per cent of households access to the gas distribution network. Replacing the electricity used in these sectors with natural gas could save 100–1,800 kWh/year/household. The estimated emission reduction from this measure in 2020 is 370 kt CO_2 eq. Another key measure is the renovation of communal, public and state buildings with a total area of over 250 m^2 at the rate required under the EU energy efficiency directive , which stipulates annual renovation of 3 per cent of the total floor area of heated and/or cooled central government buildings to meet the minimum energy performance standard set out in the same directive. The estimated mitigation impact of the measure is 25 kt CO_2 eq in 2020. Replacing obsolete and inefficient equipment for energy production with new equipment, linked to the requirements under EU directive 2009/125/EC, which establishes a framework for setting the eco-design requirements for energy-related products, is expected to reduce emissions by 9 kt CO_2 eq in 2020.

37. The planned measure reported by Bulgaria in itsBR4 on the development and staged implementation of its national programme 1,000 Sunny Roofs aims to improve energy efficiency in buildings by commissioning combined systems of solar thermal collectors and heat pumps in 1,000 multi-family buildings. Although the programme is not included in any national strategic documents, it is still relevant for the promotion of the use of RES, in line with Bulgaria's national RES policy. The estimated mitigation impact of this measure is 17 kt CO_2 eq per year.

38. **Transport sector.** Transport sector emissions have increased by 46.9 per cent since 1990 and accounted for 9.5 per cent of total emissions in 2018. In addition to implementing EU-wide measures such as the EU regulation on emission performance standards for new passenger cars (regulation 443/2009/EC) and the EU fuel quality directive (directive 2009/30/EC), which requires fuel suppliers to reduce the GHG intensity of energy supplied for road transport, Bulgaria has put in place a range of national mitigation actions targeting the transport sector, spanning cross-cutting and sector-specific measures. The measure to introduce intelligent transport systems along national and urban road networks incorporates a wide range of technical solutions designed to improve mobility and increase road traffic safety, including the integrated management of public transport charges, traffic forecasts and improved traffic management, traveller information and toll collection. The estimated GHG mitigation impact of this measure is 170 kt CO_2 eq in 2020.

39. Increasing the share of electric public transport, including railways, trolleybuses, trams and the metro, aims to achieve a modal shift to public transport or non-motorized transport through infrastructure improvements and by renovating vehicles. The estimated mitigation impact of this measure is 127 kt CO_2 eq in 2020. The measure to develop and promote cycling applies a project-oriented approach that includes the design and construction

of new cycling infrastructure, in addition to the development of systems for bicycles provided by municipalities. The estimated mitigation impact of this measure is 120 kt CO_2 eq in 2020.

40. Another relevant measure that promotes the use of RES in transport involves increasing the share of biofuels. This measure relates to Bulgaria's obligations under the EU directive on the promotion of the use of energy from renewable sources to increase the share of RES in final energy consumption in the transport sector to 10 per cent in 2020. At the national level, the staged introduction of certain levels of biodiesel and bioethanol content in fuels is regulated by the Energy from Renewable Sources Act. The estimated GHG emission reduction from this measure stands at 101 kt CO_2 eq in 2020. Other PaMs reported in the transport sector include rehabilitating and modernizing the existing road infrastructure to ensure that vehicles can travel at the optimum speed and in the optimum driving mode; reducing the share of trips by private motor vehicles; and developing and constructing intermodal terminals for combined transport. The overall estimated effect of these measures is 213 kt CO_2 eq in 2020.

41. **Industrial sector.** The measure related to audits on energy efficiency and on the implementation of prescribed measures requires industrial systems with an annual energy consumption of over 3,000 MWh to undergo an energy efficiency audit every three years. The estimated impact of the measure is 119 kt CO_2 eq in 2020. This measure is regulated by the Energy Efficiency Act, which holds the owners of audited industrial systems or installations that have undergone energy efficiency inspections responsible for energy efficiency management.

(c) Policies and measures in other sectors

42. **Industrial processes.** In its BR4, Bulgaria did not report any measures related to industrial processes. However, the Party provided information on the EU regulatory framework on F-gases, underpinned by the EU regulation on F-gases (regulation 517/2014/EU), which entered into force in 2015 and repealed the EU regulation on certain F-gases (regulation 842/2006/EC) and is included in the latest proposed amendment of Bulgaria's Clean Ambient Air Act. The EU regulation on F-gases has extended the provisions relating to the ban on the use of high-GWP refrigerants in service and maintenance; market bans on HFCs in certain products and equipment; the phase-down of HFCs; and a market quota system for pre-charged equipment.

43. **Agriculture.** Although agriculture accounts for 6.3 per cent of total emissions, emissions for this sector have decreased significantly (48.5 per cent) since 1990, primarily owing to the significant decrease in the livestock population since the Party's transition to a market economy and a number of mitigation actions put in place in line with the EU Common Agricultural Policy for 2014–2020. The most relevant mitigation actions include activities for improving the management of cropland, grassland and organic soil; for example, encouraging the use of suitable crop rotation and nitrogen-fixing crops and managing degraded agricultural land through biological reclamation, using herbaceous species that are typical to that region and adopting more effective soil treatment methods. The other implemented actions include improving manure management systems and introducing low-carbon practices for processing manure. Bulgaria also reported one adopted measure involving technical support for farmers on tilling soil or stubble and one planned measure that will provide financial support for improving rice production technologies and methods. All measures in the agriculture sector affect CH_4 emissions and their overall impact is estimated at 3.86 kt CO_2 eq in 2020.

44. **LULUCF.** Most of the mitigation actions for the LULUCF sector are focused on increasing forest area, given the major role of forests in offsetting emissions from other sectors. The actions include measures related to afforestation or reforestation (e.g. increasing the size of urban and suburban parks and green zones, and anti-erosion afforestation), forest management (e.g. restoration and maintenance of protective forest belts, increasing density in listed plantations) and restoration of degraded land (e.g. afforestation of non-wooded areas within forest areas, abandoned agricultural land, deforested areas and eroded land or land threatened by erosion outside of forest areas). According to the Bulgarian Forestry Act, the country's forestry planning is conducted at three levels: national (National Strategy for the Development of the Forestry Sector and the Strategic Plan for the Development of the

Forestry Sector), regional (regional plans for the development of wooded areas) and local (forestry plans and programmes at the local level). Bulgaria also reported one mitigation action on non-forest land that includes restoration and sustainable management of wetlands and protection and preservation of wetlands in forest areas. The overall estimated impact of the mitigation actions in this sector is 9.1 kt CO_2 eq.

45. **Waste management.** The waste sector accounted for 3.6 per cent of total emissions in 2018. Waste sector emissions have decreased by 53.9 per cent since 1990. Bulgaria has put in place measures at both the national and the regional level to complement and support EU regulations on waste, such as the EU landfill directive (directive 1999/31/EC). The Party currently levies a national landfill tax of EUR 11.25/t on all waste types and plans to increase this rate to EUR 48.57/t by 2020. The National Waste Management Plan (2014–2040) is aimed at resource-efficient and sustainable waste management and efficient use of waste as a resource in Bulgaria. In line with the National Waste Management Plan, municipal mayors also develop waste management programmes for their jurisdictions. The mitigation measures for the waste sector with the highest estimated mitigation impacts are the construction of installations for the mechanical and biological treatment of waste and the treatment and recovery of compost and biogas (estimated mitigation impact of 728 kt CO_2 eq in 2020) and implementing systems for the capture and burning of biogas at new and existing regional landfills (estimated mitigation impact of 634 kt CO_2 eq in 2020).

46. Other measures with significant mitigation impacts include introducing anaerobic stabilization of sludge in new urban wastewater treatment plants and in other plants undergoing reconstruction (in areas with more than 20,000 residents), with an estimated emission reduction of 128 kt CO_2 eq in 2020, and the use of biomass (from biodegradable waste) as fuel in the combustion units of industrial installations, with an estimated emission reduction of 554 kt CO_2 eq in 2020.

(d) Response measures

47. Bulgaria reported on its assessment of the economic and social consequences of its response measures. The Party reported that the majority of its national climate change legislation measures are related to the transposition of EU legislation. In its response measures, the Party prioritizes reducing or phasing out market imperfections (e.g. use of preferential feed-in tariffs in combined heat and power generation and State regulations on licensed activities in the power sector) and fiscal incentives (e.g. introduction of a number of stimulating measures for the subjects of taxation).

(e) Assessment of adherence to the reporting guidelines

48. The ERT assessed the information reported in the BR4 of Bulgaria and identified issues relating to completeness and thus adherence to the UNFCCC reporting guidelines on BRs. The findings are described in table 5.

Table 5
Findings on mitigation actions and their effects from the review of the fourth 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 3 Issue type: completeness Assessment: recommendation	In CTF table 3, the Party did not report information on the start year of implementation for the measure encouraging the use of suitable crop rotation, especially with atmospheric nitrogen-fixing crops. However, the start year for the measure was reported as 2013 in the summary table of PaMs in the textual part of the BR4. During the review Bulgaria explained that the start year for the above-mentioned mitigation action was not reported in CTF table 3 owing to a technical error that occurred during data entry in the BR CTF application. The ERT recommends that Bulgaria provide the required information (including the start year of implementation) for all the mitigation actions reported in CTF table 3, or explain why such information was not provided.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
2	Reporting requirement specified in paragraph 7 Issue type: completeness Assessment: recommendation	The Party did not report 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 in its BR4. During the review, Bulgaria elaborated on the role and responsibilities of the interministerial working group but did not clearly indicate whether any changes were made to the domestic institutional arrangements. The revised BR4 submitted by the Party after the review week also did not indicate any changes in its domestic institutional arrangements for domestic compliance, monitoring, reporting, archiving of information and evaluation of the progress towards its economy-wide emission reduction target. The ERT reiterates the recommendation from the previous review report that Bulgaria include in its next BR 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 or provide accurate information if no such changes have occurred

Note: Item listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on BRs or to the CTF table number from the UNFCCC reporting guidelines on CTF tables. The reporting on the requirements not included in this table is considered to be complete, transparent and thus 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. Bulgaria reported that it does not intend to use units from market-based mechanisms under the Kyoto Protocol to meet its commitment under the ESD. It reported in CTF tables 4 and 4(b) that it did not use any units from market-based mechanisms in 2017 or 2018. Given that the contribution of LULUCF activities is not included in the joint EU target under the Convention, reporting of contributions of LULUCF activities is not applicable for Bulgaria. Table 6 illustrates Bulgaria's ESD emissions and the use of units from market-based mechanisms to achieve its ESD target.

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

Year	*ESD emissions (kt CO_2 eq)*	*AEA (kt CO_2 eq)*	*Use of units from market-based mechanisms (kt CO_2 eq)*[a]	*Annual AEA surplus/deficit (kt CO_2 eq)*[b]	*Cumulative AEA surplus/deficit (kt CO_2 eq)*
2013	22 238.07	26 933.22	NA	4 695.15	4 695.15
2014	22 900.87	27 200.37	NA	4 299.50	8 994.65
2015	25 354.87	27 467.52	NA	2 112.65	11 107.30
2016	25 587.95	27 734.67	NA	2 146.72	13 254.02
2017	26 526.79	25 879.45	NA	–647.34	12 606.68

Sources: EU transaction log (AEAs), Bulgaria's BR4 and CTF table 4(b) and information provided by the Party during the review.

[a] The use of "NA" indicates that the Party stated in its BR that it does not intend to use market-based mechanisms to achieve its target.

[b] A positive number (surplus) indicates that ESD emissions were lower than the AEA, while a negative number (deficit) indicates that ESD emissions were greater than the AEA.

50. In assessing the progress towards achieving the 2020 joint EU target, the ERT noted that Bulgaria's emission reduction target for the ESD is 20 per cent above the base-year level (see para. 15 above). In 2017, Bulgaria's emissions covered by the ESD were 2.5 per cent

(647.34 kt CO_2 eq) above the AEA under the ESD. Bulgaria has a cumulative surplus of 12,606.68 kt CO_2 eq with respect to its AEAs between 2013 and 2017.

51. The ERT noted that Bulgaria is making progress towards its ESD target by implementing mitigation actions that are delivering significant emission reductions.

(b) Assessment of adherence to the reporting guidelines

52. The ERT assessed the information reported in the BR4 of Bulgaria and identified an issue relating to completeness and thus adherence to the UNFCCC reporting guidelines on BRs. The findings are described in table 7.

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

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation*
1	Reporting requirement specified in paragraph 10 Issue type: completeness Assessment: recommendation	The Party did not report information either in the textual part of the BR or in During the review Bulgaria explained that it does not intend to acknowledged that the notation keys are missing in CTF table 4(b). The ERT recommends that the Party report information on the use of units from market-based mechanisms under the Convention and from other market-based mechanisms in the BR and CTF table 4(b) or explain why no information was reported, for example, by using notation keys.

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

3. Projections overview, methodology and results

(a) Technical assessment of the reported information

53. Bulgaria reported updated projections for 2020 and 2030 relative to actual inventory data for 2019 under the WEM scenario. The WEM scenario reported by Bulgaria includes implemented and adopted PaMs until 2017.

54. In addition to the WEM scenario, Bulgaria reported the WAM scenario. According to the BR4, the WAM scenario includes PaMs adopted or planned after 2017. The ERT noted that Bulgaria did not provide a clear definition of the WEM and WAM scenarios, nor did it clearly explain which PaMs are included or their effect on projections. On the basis of the information reported, it is not possible to assess whether the scenarios were prepared according to the UNFCCC reporting guidelines on BRs.

55. 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 for CO_2, CH_4, N_2O, PFCs, HFCs and SF_6 (treating PFCs and HFCs collectively in each case) for 2020–2030. The projections are also provided in an aggregated format for each sector and for a Party total using GWP values from the AR4.

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

56. The methodology used for the preparation of the projections is identical to that used for the preparation of the emission projections for the NC7. Bulgaria did not provide information on the changes since the submission of its NC7 in the assumptions, methodologies, models and approaches used in the projection scenarios. The Party uses a set of ad hoc national Excel-based models to estimate the projections. The models take into consideration both macroeconomic data and sectoral information, including forecasts of consumption and use. Bulgaria reported in CTF table 5 the key variables and assumptions used in the preparation of the projection scenarios.

57. To prepare its projections, Bulgaria relied on key underlying assumptions relating to GDP growth rate, population and energy prices (oil, gas and coal). These variables and assumptions, which were common to both the WEM and the WAM scenario, were reported in CTF table 5. The assumptions were updated on the basis of the most recent economic developments known at the time of the preparation of the projections. The ERT noted that the Party's annual GDP growth rate was assumed to be 4.3 per cent in 2020 and 2.8 per cent in 2030, despite projections for a rather significant annual decline in the population, which is assumed to shrink by 1.1 per cent in 2020 and by 3.7 per cent in 2030. In addition, the ERT noted that, compared with the 2017 level, prices of oil, coal and gas are assumed to increase by 22.3, 13.3 and 13.5 per cent, respectively, in 2020 and by 53.0, 63.1 and 33.6 per cent, respectively, in 2030.

58. Bulgaria provided information on sensitivity analysis in its BR4 submission. Sensitivity analyses were conducted for GDP growth rate considering three cases (reference GDP, reference with higher GDP and reference with lower GDP), which were based on different assumptions regarding the GDP growth rate. For the higher GDP growth rate, GHG emissions in the WEM scenario are projected to be higher than those for the reference GDP growth rate by 34.0 and 22.4 per cent in 2020 and 2030, respectively. For the lower GDP growth rate, GHG emissions in the WEM scenario are projected to be 33.0 and 62.4 per cent lower than those for the reference GDP growth rate in 2020 and 2030, respectively. The ERT noted that the sensitivity analysis presented implies that the GDP has a significant influence on the GHG emissions.

(c) Results of projections

59. The projected emission levels under different scenarios and information on the quantified economy-wide emission reduction target are presented in table 8 and figure 1.

Table 8
Summary of greenhouse gas emission projections for Bulgaria

	Total GHG emissions		*Emissions under the ESD*	
	GHG emissions (kt CO_2 eq per year)	*Change in relation to 1990 level (%)*	*ESD emissions (kt CO_2 eq per year)*[b]	*Comparison to 2020 AEA (%)*
2020 AEA under the ESD[a]	NA	NA	26 543.23	100.0
Inventory data 1990	101 849.10	–	NA	NA
Inventory data 2017	61 367.16	–39.7	25 870.00	–2.5
WEM projections for 2020	59 925.85	–41.2	24 850.00	–6.4
WAM projections for 2020	58 075.18	–43.0	24 850.00	–6.4
WEM projections for 2030	52 760.66	–48.2	25 943.00	–2.3
WAM projections for 2030	49 718.66	–51.2	25 943.00	–2.3

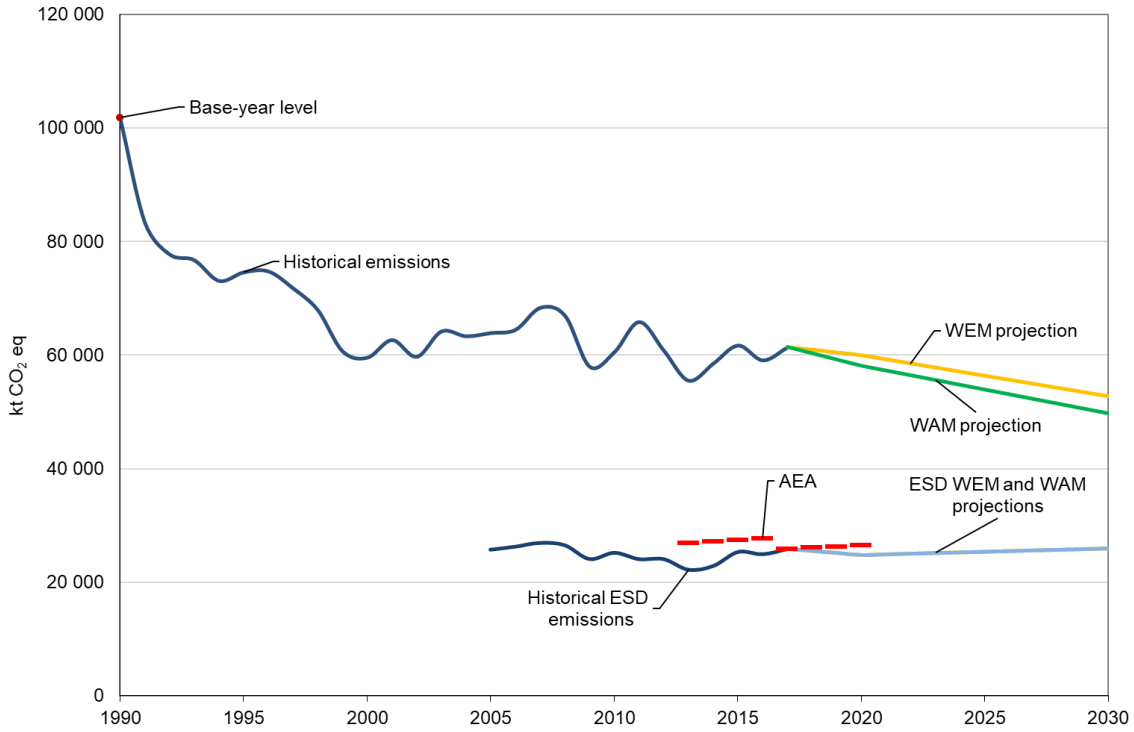
Sources: Bulgaria's BR4 and CTF table 6 and ESD emissions and projections data provided by Bulgaria during the review.

Note: The projections are for GHG emissions excluding LULUCF and excluding indirect CO_2.

[a] The quantified economy-wide emission reduction target under the Convention is a joint target of the EU and its member States. The target is to reduce emissions by 20 per cent compared with the base-year (1990) level by 2020. Bulgaria's target under the ESD is 20 per cent above the 2005 level by 2020.

[b] The ERT notes that, according to the information provided by the Party during the review, the ESD emissions used for projections were preliminary estimates, which were later modified on the basis of the ESD review by the European Commission's technical expert team. Therefore, the values included in table 8 are not identical to those reported in table 6 of this report.

Figure 1
Greenhouse gas emission projections reported by Bulgaria



Sources: EU transaction log (AEAs), Bulgaria's BR4 and CTF tables 1 and 6 and ESD emissions and projections data provided by Bulgaria during the review.

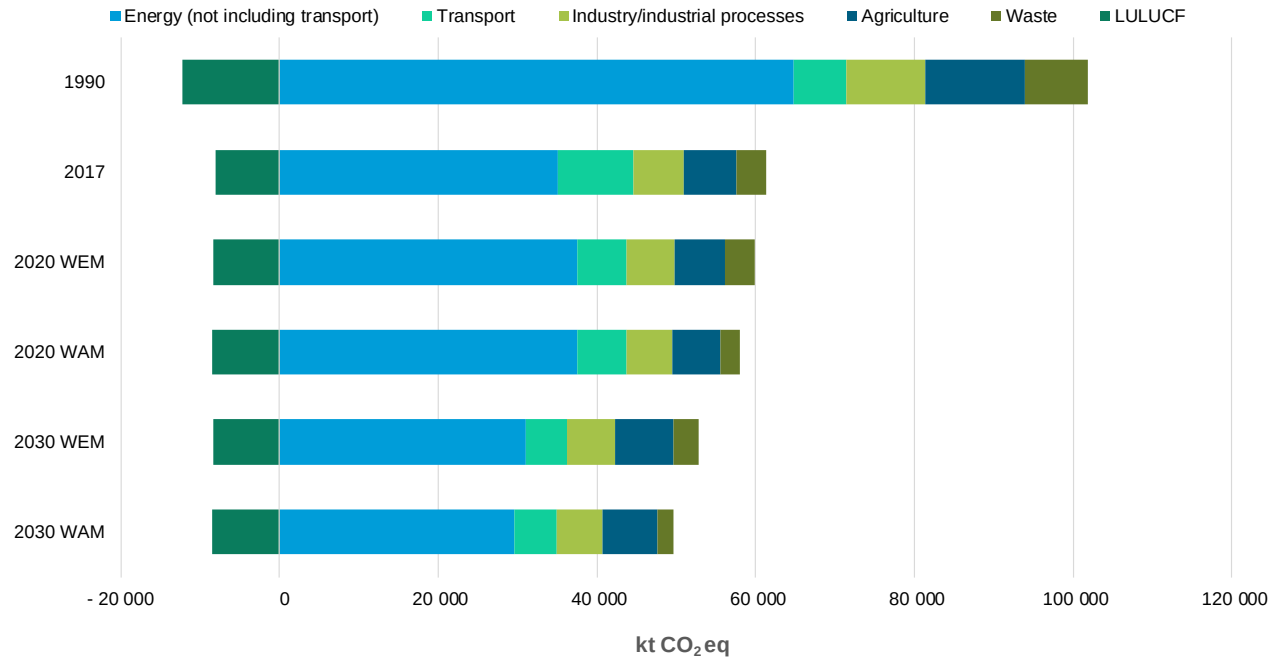
60. Bulgaria's total GHG emissions excluding LULUCF in 2020 and 2030 are projected under the WEM scenario to decrease by 41.2 and 48.2 per cent, respectively, below the 1990 level. Under the WAM scenario, emissions in 2020 and 2030 are projected to be lower than those in 1990 by 43.0 and 51.2 per cent, respectively.

61. Bulgaria's target under the ESD is to limit its ESD emission growth to 20 per cent above the 2005 level by 2020 (see para. 15 above). Bulgaria's AEAs, which correspond to its national emission target for ESD sectors, change from 26,933.22 kt CO_2 eq in 2013 to 26,543.23 kt CO_2 eq for 2020. The projected level of emissions under the WEM and WAM scenarios is 6.4 per cent below the AEAs for 2020. The ERT noted that the Party's projected cumulative surplus of AEAs is 16,002.57 kt CO_2 eq for 2020, which suggests that Bulgaria expects to meet its target under both the WEM and the WAM scenario.

62. Bulgaria presented the WEM and WAM scenarios by sector for 2020 and 2030, as summarized in figure 2 and table 9.

63. According to the projections reported for 2020 under the WEM scenario, the most significant emission reductions were expected to occur in the energy sector not including transport, the agriculture sector, the waste sector and the industrial processes sector, amounting to projected reductions of 42.1 per cent, 49.0 per cent, 52.2 per cent and 39.7 per cent between 1990 and 2020, respectively. The ERT noted that removals from the LULUCF sector were projected to decrease by 31.3 per cent in that period. The ERT also noted that most of the reductions mainly occurred before 2000 owing to significant emission reductions in the energy and agriculture sectors (45.6 and 58.2 per cent, respectively). Subsequently, total emissions remained relatively stable in the remaining years of the historical period (see figure 1) and were dominated by the energy sector (excluding transport). The emission reductions that occurred before 2000 were due to the shrinking of the majority of Bulgaria's economic sectors, as reflected by the reduced levels of energy consumption, with the exception of the transport sector.

Figure 2
Greenhouse gas emission projections for Bulgaria presented by sector



Source: Bulgaria's BR4 CTF table 6.

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

	GHG emissions and removals (kt CO_2 eq)					*Change (%)*			
		2020		*2030*		*1990–2020*		*1990–2030*	
Sector	*1990*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*
Energy (not including transport)	64 758.50	37 504.06	37 522.06	31 013.54	29 638.02	–42.1	–42.1	–52.1	–54.2
Transport	6 604.44	6 213.18	6 213.19	5 281.40	5 299.29	–5.9	–5.9	–20.0	–19.8
Industry/ industrial processes	10 047.56	6 056.15	5 840.32	6 028.84	5 813.00	–39.7	–41.9	–40.0	–42.1
Agriculture	12 461.57	6 354.90	6 037.16	7 317.32	6 951.46	–49.0	–51.6	–41.3	–44.2
LULUCF	–12 217.06	–8 390.52	–8 490.52	–8 291.47	–8 442.55	–31.3	–30.5	–32.1	–30.9
Waste	7 977.03	3 815.70	2 462.46	3 119.53	2 016.91	–52.2	–69.1	–60.9	–74.7
Other	–	–	–	–	–	–	–	–	–
Total GHG emissions excluding LULUCF	**101 849.10**	**59 925.85**	**58 075.18**	**52 760.66**	**49 718.66**	**–41.2**	**–43.0**	**–48.2**	**–51.2**

Source: Bulgaria's BR4 CTF table 6.

64. The pattern of projected emissions reported for 2030 under the same scenario remains the same. Emissions from the transport and waste sectors are projected to significantly decrease between 2017 and 2020 (by 34.3 and 34.9 per cent, respectively), with a significantly smaller decrease for 2020–2030 (14.7 and 18.1 per cent, respectively). Under the WEM scenario, energy sector emissions are projected to increase by 6.7 per cent between 2017 and 2020 and decrease by 21.0 per cent between 2020 and 2030. Emissions from the agriculture sector follow the opposite pattern, with a decrease of 8.0 per cent in 2017–2020, followed by an increase of 15.1 per cent in 2020–2030.

65. If additional measures are considered (i.e. under the WAM scenario), the patterns of emission reductions by 2020 presented by sector remain the same, albeit with slightly larger drops in total emissions, with the waste sector accounting for the most significant additional emission reduction (1,353.24 kt CO_2 eq). Similarly, the pattern of projected emissions reported for 2030 under the WAM scenario remains the same with more significant reductions, with the energy and waste sectors accounting for the most significant additional emission reductions (1,375.52 and 1,102.62 kt CO_2 eq, respectively).

66. Bulgaria presented the WEM and WAM scenarios 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 (%)*			
		2020		*2030*		*1990–2020*		*1990–2030*	
Sector	*1990*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*	*WEM*	*WAM*
CO_2[a]	76 541.76	46 284.01	46 302.10	39 238.41	38 057.21	–39.5	–39.5	–48.7	–50.3
CH_4	16 148.99	7 407.42	5 895.27	6 868.83	5 394.65	–54.1	–63.5	–57.5	–66.6
N_2O	9 154.66	4 852.30	4 711.55	5 645.46	5 474.71	–47.0	–48.5	–38.3	–40.2
HFCs	–	1 364.59	1 148.73	990.43	774.56	–	–	–	–
PFCs	–	0.02	0.02	0.02	0.02	–	–	–	–
SF_6	3.69	17.51	17.51	17.51	17.51	374.5	374.5	374.5	374.5
NF_3	–	–	–	–	–	–	–	–	–
Total GHG emissions without LULUCF	**101 849.10**	**59 925.85**	**58 075.18**	**52 760.66**	**49 718.66**	**–41.2**	**–43.0**	**–48.2**	**–51.2**

Source: Bulgaria's BR4 CTF table 6.
[a] Bulgaria did not include indirect CO_2 emissions in its projections.

67. For 2020, the most significant reductions are projected for CO_2, CH_4 and N_2O emissions: 39.5, 54.1 and 47.0 per cent between 1990 and 2020, respectively.

68. For 2030, the most significant reductions are again projected for CO_2, CH_4 and N_2O emissions: 48.7, 57.5 and 38.3 per cent between 1990 and 2030, respectively. In 2020–2030, unlike other GHGs that show a downward trend, N_2O emissions are projected to increase, mainly owing to a rise in emissions from the agriculture sector, which is the main contributor of N_2O emissions.

69. If additional measures are considered (i.e. under the WAM scenario), the patterns of emission reductions by 2020 presented by gas remain the same, with a relatively large difference in CH_4 emission reductions between the WEM and WAM scenarios (54.1 and 63.5 per cent, respectively) compared with the other gases owing to additional reductions in the waste sector, which accounts for a large share of CH_4 emissions. The patterns of projected emissions by gas reported for 2030 under the WAM scenario also remain the same.

(d) Assessment of adherence to the reporting guidelines

70. The ERT assessed the information reported in the BR4 of Bulgaria and identified issues relating to completeness and transparency and thus 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 fourth 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	The Party did not transparently explain in the BR4 which implemented and adopted PaMs were considered under the WEM and WAM scenarios. In addition, Bulgaria did not transparently explain whether the existing PaMs

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
	Issue type: transparency Assessment: recommendation	under the WEM scenario were to be extended or enhanced and included under a WAM scenario. The BR4 did not contain transparent information on the PaMs considered under each scenario and their mitigation impacts included under the projected scenarios (section 5.1, p.69). Moreover, the mitigation impacts provided in the summary of the PaMs (pp.53–67) do not facilitate an understanding of which PaMs are included in the WEM and WAM scenarios. For example, the projections for the WEM scenario differ from those for the WAM scenario even for the sectors with no additional planned PaMs indicated under the WAM scenario in the BR4, such as the waste sector (section 4.2, p. 53). Therefore, it is not possible to identify which PaMs are included under each scenario. During the review, the Party explained that existing measures included in the Third NAPCC for 2013–2020 were extended up to 2030, taking into account the potential impact of the Bulgarian Government's existing strategic documents for the post-2021 period, such as the Transport Strategy of Bulgaria until 2030, the National Air Pollution Control Programme 2020–2030 and the National Forest Biomass Energy Action Plan 2018–2027. The ERT recommends that Bulgaria transparently explain in its next BR which implemented and adopted PaMs were considered under the WEM scenario and which planned PaMs were considered under the WAM scenario by including a complete list of the PaMs and considering their potential mitigation impacts under each scenario.
2	Reporting requirement specified in paragraph 43 Issue type: completeness Assessment: encouragement	Bulgaria did not report information in the BR4 to facilitate a basic understanding of the models and/or approaches used to project GHG emissions and removals and to estimate the total effects of PaMs on emissions and removals. During the review, Bulgaria explained that it uses an ad hoc Excel-based model based on the EU guidelines for GHG projections, together with emission factors from its GHG inventory. However, the Party did not provide further information to transparently describe the model, as requested by the UNFCCC reporting guidelines on NCs. The ERT reiterates the encouragement from the previous review report for Bulgaria to report in its next BR information on the model or approach used for projections, by providing information on the gases and/or sectors for which the model or approach was used; the type of model or approach used and its characteristics; the original purpose for which the model or approach was designed and any further modifications, if applicable; the strengths and weaknesses of the model or approach; and how the model or approach used accounts for any overlaps or synergies between different PaMs.
3	Reporting requirement specified in paragraph 45 Issue type: transparency Assessment: encouragement	Bulgaria only reported a brief description of the main differences between the assumptions and methods used to estimate projections for the BR4 and those used for previous BRs. The BR4 (p. 92) mentions the update of the projected energy balance until 2030, revised projection models and implementation of quality assurance/quality control activities but does not clearly explain the specific differences in the assumptions and methods used. During the review, Bulgaria explained that while the method and emission factors used for projections in the BR4 are the same as those used for the previous BRs, the main difference between the BR3 and the BR4 stems from the use of the updated national projected energy balance until 2030 and the projected activity data, which used new assumptions and variables. However, the Party did not explain the specific differences in the assumptions and variables used in detail. The ERT reiterates the encouragement from the previous review report for Bulgaria to describe in detail how the methods and assumptions used for its BR are different from those used for previous BRs.
4	Reporting requirement specified in paragraph 46	Bulgaria included in the revised version of its BR4 a sensitivity analysis for the projections. However, the ERT noted that the Party did not provide qualitative details regarding the sensitivity of the projections to underlying assumptions.

No.	*Reporting requirement, issue type and assessment*	*Description of the finding with recommendation or encouragement*
	Issue type: transparency Assessment: encouragement	The ERT noted that the Party did not provide transparent information on the different scenarios considered in the sensitivity analysis. For example, the Party did not specify the GDP growth rates assumed for the three cases considered for the sensitivity analysis. The ERT recommends that Bulgaria include a detailed and transparent qualitative discussion in its next BR on the sensitivity of the projections to underlying assumptions. The ERT notes that the Party could include transparent and detailed information on the scenarios considered for the sensitivity analysis.
5	Reporting requirement specified in paragraph 48 Issue type: completeness Assessment: encouragement	The Party did not report relevant information on factors and activities for each sector in a tabular format to facilitate an understanding of the emission trends in 1990–2020. During the review, Bulgaria provided a table explaining the trends in GHG emissions, but did not provide the information on factors and activities in a tabular format. The ERT reiterates the encouragement from the previous review report for Bulgaria to present information on factors and activities for each sector to explain emission trends in a tabular format.

Notes: (1) The reporting on the requirements not included in this table is considered to be complete, transparent and thus adhering to the UNFCCC reporting guidelines on NCs and on BRs. (2) Paragraph number listed under reporting requirement refers to the relevant paragraph of the UNFCCC reporting guidelines on NCs, as per paragraph 11 of the UNFCCC reporting guidelines on BRs.

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

71. Bulgaria is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3–5, of the Convention. However, Bulgaria provided information in its BR4 on its provision of support to developing country Parties.

72. The ERT noted that the information reported in the BR4 was the same as that in the BR3 and does not include the information for 2017–2018.

III. Conclusions and recommendations

73. The ERT conducted a technical review of the information reported in the BR4 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 the progress of Bulgaria towards achieving its target.

74. 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 40.2 per cent below its 1990 level, in 2018. The changes in total emissions were driven mainly by factors such as the Party's transition from a centrally planned economy to a market-based economy, which led to a decrease in power production from thermal power stations, structural changes in industry and a decline in cattle and sheep populations and in the use of fertilizers in agriculture.

75. 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 GWP values from the AR4. Emissions and removals from the LULUCF sector are not included.

76. Under the ESD, Bulgaria has a target of limiting its emission growth to 20 per cent above the 2005 level by 2020. The 2013–2020 progression in Bulgaria's AEAs (its national emission target under the ESD) is 26,933.22–26,543.23 kt CO_2 eq.

77. Bulgaria reported on the EU's joint 2030 targets under the ETS and effort-sharing regulation. Under its nationally determined contribution, the EU has pledged to reduce emissions by at least 40 per cent by 2030 compared with the 1990 level. Under this target, emissions from EU ETS sectors need to be reduced by 43 per cent by 2030 compared with the 2005 level, while emissions from ESD sectors need to be reduced by 30 per cent by 2030 compared with the 2005 level. This target under the ESD has been translated into individual binding targets for EU member States. According to the effort-sharing regulation, the national target of Bulgaria is to ensure that emissions from sectors covered by the effort-sharing regulation remain at the 2005 level by 2030.

78. In 2017, Bulgaria's ESD emissions were 2.5 per cent (647.34 kt CO_2 eq) above the AEA under the ESD. Bulgaria does not intend to use units from market-based mechanisms. For 2013–2017, without the use of market-based mechanisms, Bulgaria has a cumulative surplus of 12,606.68 kt CO_2 eq with respect to its AEAs. The ERT noted that Bulgaria is making progress towards its ESD target.

79. The GHG emission projections provided by Bulgaria in its BR4 correspond to the WEM and WAM scenarios. Under these scenarios, emissions are projected to be 41.2 and 43.0 per cent below the 1990 level by 2020, respectively. According to the projections under the WEM scenario, ESD emissions are estimated to reach 24,850.00 kt CO_2 eq by 2020. Under the WAM scenario, Bulgaria's emissions from the ESD sectors in 2020 are projected to be 24,850.00 kt CO_2 eq. The projected level of emissions under the WEM and WAM scenarios is 6.4 per cent below the AEAs for 2020. The ERT noted that the Party's projected cumulative surplus of AEAs in 2020 is 16,002.57 kt CO_2 eq, which suggests that Bulgaria expects to meet its target under both the WEM and the WAM scenario.

80. Bulgaria's main policy framework relating to energy and climate change is the Third NAPCC for 2013–2020, which provides actions for GHG emission reduction across all sectors. The mitigation actions are compliant with the overarching EU 2020 climate and energy package, including the revised EU ETS and the ESD. Key legislation supporting Bulgaria's climate change goals includes the Renewable Energy Act, the Energy Efficiency Act and the Climate Change Mitigation Act. The mitigation actions with the most significant mitigation impact are those in the energy sector (e.g. fuel substitution (from coal to natural gas) and improving production efficiency in existing coal-fired power plants) and in the waste sector (e.g. construction of installations for mechanical and biological treatment of waste and for treatment and recovery of compost and biogas, along with the capture and burning of biogas in all new and existing regional landfills).

81. Bulgaria is not an Annex II Party and is therefore not obliged to adopt measures and fulfil obligations defined in Article 4, paragraphs 3–5, of the Convention. However, Bulgaria provided information on its provision of support to developing country Parties. The ERT noted that the information reported in the BR4 was the same as that in the BR3 and does not include information for 2017–2018.

82. 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 the required information for all the mitigation actions reported in CTF table 3 (e.g. start year of implementation), or explaining why relevant information was not provided (see issue 1 in table 5);

(ii) Providing summary information on changes in its domestic institutional arrangements since its last NC or BR, 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, or providing accurate information if no such changes have occurred (see issue 2 in table 5);

(iii) Reporting information on the use of units from market-based mechanisms under the Convention and from other market-based mechanisms in BR and CTF table 4(b) in relation to tracking progress towards its target, or explaining why no such information was reported, for example, by using notation keys (see issue 1 in table 7);

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

(i) Explaining the use of notation keys in relation to the quantified economy-wide emission reduction target in CTF table 2(e)I, for example, through a footnote to the table (see issue 1 in table 3);

(ii) Explaining which implemented and adopted PaMs were considered under the WEM scenario and which planned PaMs were considered under the WAM scenario by including a complete list of the PaMs, with their potential mitigation impacts considered under each scenario (see issue 1 in table 11).

Annex

Documents and information used during the review

A. Reference documents

2019 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-2019.

2020 GHG inventory submission of Bulgaria. Available at https://unfccc.int/ghg-inventories-annex-i-parties/2020.

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/biennial-report-submissions/third-biennial-reports-annex-i.

BR4 of Bulgaria. Available at https://unfccc.int/BRs.

BR4 of the EU. Available at https://unfccc.int/BRs.

BR4 CTF tables of Bulgaria. Available at https://unfccc.int/BRs.

"Common tabular format for 'UNFCCC biennial reporting guidelines for developed country Parties'". Annex to decision 19/CP.18. Available at https://unfccc.int/resource/docs/2012/cop18/eng/08a03.pdf.

"Compilation of economy-wide emission reduction targets to be implemented by Parties included in Annex I to the Convention". FCCC/SBSTA/2014/INF.6. Available at http://unfccc.int/resource/docs/2014/sbsta/eng/inf06.pdf.

European Green Deal. Available at https://ec.europa.eu/info/files/communication-european-green-deal_en.

"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 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.

National Energy and Climate Plan of Bulgaria. Available at https://ec.europa.eu/energy/topics/energy-strategy/national-energy-climate-plans_en.

Report on the technical review of the third biennial report of Bulgaria. FCCC/TRR.3/BGR. Available at https://unfccc.int/review-reports-BR3_and_NC7.

"UNFCCC biennial reporting guidelines for developed country Parties". 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 Detelina Petrova (Ministry of Environment and Water), including additional material. The following documents[1] were provided by Bulgaria:

Ministry of Environment and Water, Republic of Bulgaria. 2017. *First Official Report on the Implementation of the Third National Action Plan on Climate Change 2013-2020*. Available at https://www.moew.government.bg/en/national-action-plans-on-climate-change-and-reports/.

2018. Climate Change Mitigation Act (CCMA). S.G. 15/2018 pp.1–39. Available at https://www.moew.government.bg/static/media/ups/articles/attachments/Climate_Change_Mitigation_Actb79ac7271ff39de8cf1d9459a418e3f0.pdf.

[1] Reproduced as received from the Party.